

Remember that the pesticide label is the legal document on pesticide use. Read the label and follow all instructions closely. The use of a pesticide in a manner not consistent with the label can lead to the injury of crops, humans, animals and the environment. The use of a pesticide inconsistent with the label directions can also lead to civil or criminal fines and/or condemnation of the crop. Pesticides are good management tools for the control of pests on crops, but only when they are used in a safe, effective and prudent manner according to the label.

**These recommendations are not intended to replace the specific product labels.  
Always read and follow label instructions carefully.**

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# Insect, Disease and Nematode Control for Commercial Vegetables

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This MSU Extension bulletin was prepared to help commercial vegetable producers make informed decisions on pest management.

## How to Use This Bulletin

Recommendations are organized into sections by crop. Within a crop, specific pests are listed along with their control recommendations. Frequent users may want to insert tabs for easy location of each crop section.

This publication focuses on chemical tactics and should be used in conjunction with an overall sound program of integrated pest management. Chemical recommendations are included for insect, disease and nematode control, as well as handling pesticides safely to prevent human and environmental harm. The management suggestions in this bulletin are designed to help protect the grower's crop from the pre-plant stage to market and, in certain cases, through storage.

The suggestions include the basic information necessary for the chemical components of pest control. The majority of the suggested materials have been tested at Michigan State University to determine the most effective materials, rates of application, timing of applications, method of application and site of application on the plant or in the soil. When this information is coupled with week-to-week information on pest populations, as disseminated in Crop Advisory Teams (CAT) Alerts, the minimum number of chemicals and treatments need be applied to attain the desired level of control.

It is extremely important that growers monitor (scout) each individual field for potential pest problems. Pest populations (insects, nematodes, and diseases) vary not only from year to year, but also from field to field and even within a given field. Pest populations vary in first appearance, number of individuals and severity of damage. These observations are the prime responsibility of the grower.

Growers should make them known to county and university Extension personnel. Through this type of two-way communication, Michigan agriculture will remain in the forefront in quality and quantity.

A grower's choice of a particular pesticide should be based on pests present, beneficial insects present (including honeybees and predators and parasites of pests), available materials, days to harvest, environmental and personal safety and cost.

Materials and rates of application listed on pages 22-123 are based on the latest information available at the time this publication went to press. Materials marked with an asterisk (\*) are particularly recommended for problem infestations.

Recommendations are changed as products are removed from the market, new products are introduced, new uses are found for old products, or new restrictions are placed on their use.

Your county MSU Extension agent is informed of the changes as they occur through Crop Advisory Team (CAT) Alerts or the MSU Extension computer network. Recommendations may be updated in the on-line version of this bulletin (see Useful Websites). Check with your Extension agent for updates that have occurred since the publication of this bulletin. **Always read and follow the directions and limitations on the pesticide label.**

The information given here is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by MSU Extension is implied.

Some of the more hazardous pesticides are on the Restricted Use Pesticide (RUP) list. You will need to be certified by the Michigan Department of Agriculture in order to buy and use these RUP's. Your county Extension agent has a current listing of the RUP's and will advise you on the procedures for certification.

## Safety Tips and Special Warnings

Your county agricultural agent can supply information on the dangers of environmental and personal safety with insecticides, fungicides and nematicides. You can get help for insecticide, fungicide and nematicide poison cases by telephoning the nearest Poison Control Center (see back cover). A list of insecticides and nematicides and their relative toxicities (LD50) is given on the following pages. The potential to leach into the groundwater or runoff into surface waters is given for both insecticides and fungicides.

**Phosphate Insecticides.** The phosphate group includes Imidan, Guthion and other similar materials. Many of these are extremely dangerous to users at the time of application. Read the label on the container for instructions for safe use. If any insecticide cannot be used according to those directions, do not use it at all.

**Note to Aerial Applicators.** Pilots and loading crews should know the dangers of applying methyl parathion and other hazardous insecticides. Take special care to avoid skin, respiratory and oral absorption.

- Always read the label before buying or using pesticides. Use pesticides only for the purpose(s) listed and in the manner directed.
- Pesticides that require special protective clothing or equipment should be used only by trained, experienced applicators.

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\* The authors are Extension specialists in Entomology, Plant Pathology, and Nematology; Lynnae is in the Pesticide Education Program.

- Do not apply more than the specified amount of pesticides; overdoses can harm you, the consumers and the environment.
- Keep pesticides away from food and dishes.
- Keep children and pets away from pesticides and sprayed areas.
- Do not smoke or eat while applying pesticides.
- Avoid inhaling pesticides.
- Never spray on a windy day.
- When mixing pesticides, use care to avoid splashing.
- Avoid breaking or spilling pesticide containers.
- Avoid contact with skin and clothing.
- If you spill a pesticide on your skin, wash with detergent and water. If spilled on clothing, change clothing immediately.
- Store pesticides in their original containers with proper labels in a locked storage area. Never transfer a pesticide to a container that would attract children, such as a soft drink bottle.
- Dispose of empty containers safely. Triple rinse (or equivalent) containers and offer for recycling or dispose of in a licensed sanitary landfill. Refer to your dealer for directions for disposal of specific containers.
- Wash with soap and water after using pesticides and launder clothes separately before wearing again.
- Getting any pesticide into the eyes or mouth can be especially serious. Read and understand first aid instructions listed on the label **BEFORE** you use the pesticide. Follow instructions explicitly. Flush eyes or mouth with water as soon as possible after exposure. Do not induce vomiting unless it is specified on the label. See a doctor immediately if there is any chance of poisoning. Take the pesticide container or label with you so that the doctor can read the "Instructions to the Physician" that are included on the label. Many labels carry the telephone number of a 24-hour emergency service offered by the pesticide company. Call this number for authoritative advice on diagnosis and treatment. Your physician can use this service if needed. The physician can also receive advice, when needed, by calling the nearest Poison Treatment Center listed on the back cover.

### **Pesticide Emergency Preparedness**

At the time that the pesticide is purchased, ask the chemical dealer for a complete specimen label and Material Safety Data Sheet (MSDS are required for farms with employees) of the product you bought. This label and labeling information packet is an exact duplicate of the label information that is affixed to and/or must accompany the pesticide container. Use the specimen label material as a reference during any pesticide emergency. Bring the label along with any person who has become poisoned and needs medical attention.

Closely follow all the warning statements outlined in the Precautionary Statements section of the pesticide label. Be certain that you use all protective clothing and equipment as specified by the label. Make certain all persons involved in the operation of the farm know and can carry out the information in the Statement of Practical Treatment. (See also the section on SARA Title III.)

You can develop an emergency farm plan that will prepare you and your employees for pesticide and other farm emergencies, by completing the form in Extension Bulletin E-2575.

### **Pesticide Registration**

Recommendations in this bulletin are based on field trials conducted in Michigan and other North Central Region states over a period of several years. All pesticides must be currently registered with the U.S. Environmental Protection Agency (E.P.A.) and the Michigan Department of Agriculture before they can be used legally in Michigan.

The pesticide label is a legal document on pesticide use. Read the label carefully and follow all instructions closely. Use of any pesticide in a manner not consistent with the label can lead to civil or criminal punishment and/or condemnation of the illegally sprayed crop. Do not mix and apply together any pesticides and fertilizers if it is forbidden on either product label.

### **Pesticide Tolerances (Residues) on Vegetable Crops**

Tolerances are established by the E.P.A. for every pesticide registered in the United States. These tolerances are the maximum allowable residues in parts per million (ppm) of a pesticide that may be on or in a specified crop at the time of harvest. If residues of a pesticide on a crop exceed the tolerance established for that pesticide, that crop may be seized and destroyed.

To keep below the tolerance levels established for a pesticide, apply only the formulated amount of pesticide per acre as instructed by the product label. Do not exceed this restriction. Also, to meet the label-required pre-harvest interval, discontinue the use of pesticides the number of days before harvest that the label specifies. Always remember the following restrictions on the use of all pesticides: 1) The legal amount of active material per acre that can be applied during a given growing season; and 2) The number of days before harvest that chemical application on a crop must be discontinued.

### **Use of Pesticides for Pests Not on Label**

The law regulating pesticides in the United States is the Federal Insecticide, Fungicide and Rodenticide Act, or FIFRA. FIFRA is administered by the Environmental Protection Agency (EPA) and in Michigan by the Michigan Department of Agriculture (MDA). FIFRA governs the registration, distribution, sale and use of all pesticides. Within FIFRA there exists a provision that allows the use of a pesticide for a pest not noted on the label as long as the application is made to a crop specified on the label. This provision is referred to as 2(ee). All rates and restrictions, including preharvest intervals, for the labeled crop must be followed. Please note, however, that the manufacturer will not assume responsibility for product performance so 2(ee) applications are made at the grower's risk. For more information about 2(ee) applications, contact your local MSU Extension or Michigan Department of Agriculture office.

### **Record Keeping**

The 1990 Farm Bill requires that all applicators who apply restricted use pesticides (RUP) keep records and maintain them for two years. Records to be kept include:

- brand name or product name and the EPA registration number,
- total amount of the product used,
- size of the area treated,

- crop, commodity, stored product or site to which the pesticide was applied,
- location of the application,
- month, day and year of the application,
- name and certification number of the applicator or applicator's supervisor.

Any record form is acceptable as long as the required data is included. Penalties are up to \$500 for the first violation and up to \$1,000 for subsequent violations. Provisions for protecting the identity of the individual producers are included in the law. Commercial applicators must furnish a copy of the required records to the customer of the RUP application.

### **Agricultural Chemical Use Precautions**

The use of any pesticide, especially a restricted-use-pesticide (RUP), entails a significant amount of responsibility and liability on the part of the grower. Therefore, handle all pesticides with extreme caution and respect for the following reasons:

- to protect yourself and others.
- to protect your crop and soil from chemical damage.
- to protect the environment from chemical damage.

These points cannot be emphasized enough. Pesticide accidents occur most often during mixing and tank filling operations. Although accidental ingestion of chemicals is considered to be the greatest health hazard, there is also great danger of poisoning when pesticides contact skin or eyes or when dust or vapors are inhaled. To prevent such accidents, wear protective clothing at all times when handling and applying pesticides and cleaning spray equipment. Such mandatory garments include chemical resistant gloves and boots, splash-guard goggles and a respirator manufactured specifically for the type of chemical compound that is being used. Care for these items as you would your farm implements. They may save your life in case of an accident. Always heed all the precautionary statements on the product label and cover-up to protect yourself. (See MSU Extension Bulletins E-1546, Take Cover! Protect Yourself from Exposure, E-2215, Using Pesticides Safely: A Guide for the Applicator; NC-204, Protective Clothing for Handling Pesticides, and AM-106, EPA Chemical Resistance Category Chart, for more information.)

Protecting yourself during any application of an agricultural chemical is required. Give the same consideration to any field worker(s) you may employ. Farm workers assisting in the application of any pesticide should also wear protective clothing, as specified by the product label.

Protect your crops and land by applying any pesticide at the label directed rate and under favorable environmental conditions. To do otherwise may be a violation of the label and could cause damage to the crop and carry over in the soil. Excessive pesticide residues in the soil may also leach into surface and groundwater. Overdosing will also increase residues on the crop and the number of days before the crop can be harvested legally. To avoid any pesticide damage and/or illegal residues on crops and in the soil, follow the recommended rates of application and use properly calibrated implements.

Pesticide drift from aerial and ground application is a serious problem. Drift can be a particular problem if houses, schools or urban areas are nearby. Drift can also contaminate sensitive crops and the environment (crop land and surface water). Avoid pesticide drift from all pesticides. Because few chemicals are allowed

on forage for all types of livestock, exercise extreme caution when using any pesticides to avoid contaminating hay, pasture and stover. Where problems with pesticide drift exist, use the least hazardous materials with additives labeled to reduce spray drift. These additives add elasticity to spray suspensions to reduce the shearing effect (break up of spray stream) caused by spray dispensing equipment and air movement.

### **SARA Title III Emergency Planning and Community Right to Know Act**

The Emergency Planning and Community Right to Know Law, under SARA Title III, requires farmers to notify their State Emergency Response Commission (SERC), Local Emergency Planning Committee (LEPC), and local fire department that they store extremely hazardous materials, along with the name and telephone number of the facility representative. Check with your state Department of Natural Resources or MSU Extension to receive a list of EPA established "Extremely Hazardous Substances" and their threshold planning quantities.

The LEPC and fire chief may request maps of your storage facility and detailed lists of materials you store.

This law also requires that, in the event of a spill, the SERC, LEPC and National Response Commission be notified. The reportable quantities for spills is much less than for storage and can be obtained from the above sources. See Extension Bulletin E-2575 for more details on SARA Title III and a list of commonly used extremely hazardous substances.

### **Worker Protection Standard**

New federal rules for farm worker protection, issued during 1992, require farmers to provide additional training and notification to farm workers to prevent accidental or occupational exposure to pesticides. Farmers should contact Extension agents to learn the details of this standard and availability of training materials for education of workers and handlers.

Read and follow the label instructions on Restricted Entry Intervals (REI) for every pesticide used. Some pesticide labels require both oral warning and posted signs to notify workers of pesticide applications. If the label doesn't require both forms of notification, notify workers either orally or by posting warning signs at entrances to treated areas. (Greenhouses must post warning signs for every application.) When using posted signs, post 24 hours or less before the pesticide application and remove signs within three days after the end of the restricted entry interval. Keep workers out during the entire time the signs are posted (except for early-entry workers wearing the proper personal protective equipment).

### **Michigan Groundwater Stewardship Program (MGSP)**

The Michigan Groundwater Stewardship Program is a cooperative effort between the Michigan Department of Agriculture (MDA), Michigan State University Extension, Conservation Districts, and the USDA Natural Resources Conservation Service. The program is funded through fees assessed on sales of pesticides and nitrogen fertilizers. MGSP-sponsored education, technical assistance and cost share help individuals reduce the risk of groundwater contamination associated with pesticide and nitrogen fertilizer use.

Producers who complete the environmental risk assessments for their farmstead and cropping systems (Farm\*A\*Syst and

Crop\*A\*Syst) will be able to determine what structural, management and record-keeping changes (if any) will be needed for their farming systems to be in conformance with Michigan Right to Farm guidelines and state and federal environmental laws.

Once a producer develops and implements a plan to address the risks indicated by the environmental assessments, he or she can contact the MDA to request farming system verification under the Michigan Agriculture Environmental Assurance Program (MAEAP). MAEAP-verified farms are eligible for various incentives.

### Protect Nontarget Organisms

Bees and other pollinating insects are essential for successful production of tree fruits, small fruits, most seed crops and certain vegetables. Many insecticides are highly toxic to pollinating honeybees and wild bees. Be aware of how bee poisonings can occur from applying pesticides and how to prevent them. Take the following precautions to reduce the chance of bee poisoning:

- Do not apply pesticides that are toxic to bees if the site contains a crop or weeds which are in bloom. This applies not only to the fruit bloom but also to dandelions and clovers that may be reached by the spray. Mow cover crops and weeds to remove the blooms prior to spraying.
- Select pesticides that are least harmful to bees and select the safest formulation. Dusts are more hazardous to bees than sprays. Wettable powders and microencapsulated products are more hazardous than emulsifiable concentrates or water soluble formulations because particulate pesticide material may be carried back to the hive. Granular insecticide formulations are generally the least hazardous to bees.
- Reduce drift during application. Use drift control materials whenever possible.
- Time pesticide applications carefully. Evening applications are less hazardous than early morning; both are safer than midday applications.
- Do not let puddles of spray accumulate on the ground where bees might drink it. Supplying fresh water near bee's hives can reduce this hazard.
- Do not treat near hives. Bees may need to be moved or covered before using insecticides near colonies.

The best way to avoid injury of beneficial insects and microorganisms is to minimize pesticide usage. Use selective pesticides when ever possible and apply only when necessary as part of a total pest management program.

Pesticides can be harmful to all kinds of vertebrates such as fish and wildlife. Most recognizable are the direct effects from acute poisoning. Fish kills can result from water polluted by a pesticide (usually insecticides). Pesticides can enter water via drift, surface runoff, soil erosion, and leaching.

Bird kills from pesticides can occur when birds ingest the toxicant in granules, baits, or treated seed; are exposed directly to the spray; consume a treated crop; drink and use contaminated water; or feed on pesticide-contaminated prey.

### Endangered Species Act

To minimize the adverse impact of pesticides on endangered species, the EPA has initiated The Endangered Species Act.

Every implicated pesticide will have an endangered species warning statement regarding use of the product within the geographic area where endangered species restrictions apply. Users must obtain a county-specific endangered species bulletin from the local Extension office, which will identify the specific area where use restrictions apply. Application of listed pesticides in the identified geographic areas in that county will be restricted or prohibited.

### Right to Farm

Farmers in Michigan are protected from nuisance lawsuits under the Right to Farm Act if they follow acceptable management practices. The Generally Accepted Agricultural and Management Practices for pesticide utilization and pest control, nutrient utilization, and manure management have been completed and are revised annually. Contact your Extension agent or regional office of the Michigan Department of Agriculture to obtain copies.

### Pesticide Name

The insecticide trade name (first letter capitalized; Lorsban, for example) is used when an insecticide is sold under only one well known brand name. The accepted common name of an insecticide is used when it is sold under several brand names, with some trade names are shown on the following line(s). The fungicide and nematicide trade names are listed underneath the chemical formulation name.

### Pesticide Formulations

Fungicides, insecticides and nematicides can be purchased in a variety of formulations. Not only is it important that a grower purchase the correct pesticide for the intended pest control (i.e., pesticide product labeled for both the crop and the pest), but also that the grower chooses the formulation best suited for the particular job. Such a decision should be based on the pesticide product's effectiveness, cost, practicality and relative safety to the applicator, the crop and the environment. The following are some additional considerations worth remembering when choosing a specific formulation:

- Some formulations require constant spray tank agitation; others do not.
- Dusts and granules do not require water for application, but accurate calibration of equipment and uniform distribution are often difficult to achieve and maintain.
- The potential hazard to the applicator and the potential of drift and environmental contamination vary substantially among formulations.
- Dry formulations are generally less affected by subfreezing temperatures during storage than liquid formulations.
- Some crops may be treated with any formulation of a particular pesticide; others require using a specific formulation.
- The price per pound of active ingredient varies for different formulations.

Also remember that for two products with the same active ingredient but different formulation, the application rate to be used on a specific site and pest may be different. **Always read and follow the label instructions carefully.**

## Restrictions

The pre-harvest interval, the minimum number of days required between last application and harvest or other use of the crop, is listed. Special limits on the use of the pesticide are also given when they apply. Follow these restrictions exactly to avoid possible deleterious residues on the crop at harvest. Pesticides that are relatively safe around honeybees are also noted when pertinent.

## Compatibility

When two or more chemicals are mixed together in a spray tank, they may or may not mix well, or the mixture may cause injury to germinating seeds or plants. This relationship is called compatibility. The lack of compatibility could affect the application and effectiveness of the chemical spray.

It is usually not advisable to mix different formulations such as wettable powders and emulsifiable concentrates together in a spray tank. This is especially important if other materials, such as foliar nutrients, are included in the spray and applied in low gallonage per acre. Always be sure to read and follow the directions and limitations on the pesticide label before mixing.

## Pesticide Additives

During the development of a pesticide, chemical companies attempt to formulate the active ingredient to optimize performance, mixing and handling under diverse conditions. Every commercially available pesticide formulation contains its own particular set of additives to accomplish this action. However, sometimes additional additives are required for specific applications or when compatibility or mixing problems occur. The pesticide label will describe the need and use of these additives. Avoid indiscriminate use of additives because they may not improve pesticide performance and may actually reduce pest control or cause crop injury.

The following are some definitions of pesticide spray additives. For more information on types of spray additives and when to use them with herbicides, see MSU Extension Bulletin E-1858, *Using Spray Additives with Herbicides*.

- Adjuvant—any substance that enhances pesticide effectiveness, an added ingredient.
- Surfactant—a surface active material that can facilitate emulsifying, dispersing, spreading, wetting, sticking or other surface-modifying characteristics of a pesticide solution.
- Emulsifier — an agent that promotes the dispersion of one liquid in another.
- Wetting Agent Spreader— an ingredient that reduces water surface tension causing better contact between the spray solution and treated surfaces.
- Soap—sodium or potassium salts of fatty acids. These additives can form insoluble materials in hard water. Detergents are synthetic materials used for cleaning.
- Sticker—a deposit builder that increases pesticide adhesion to plant surfaces.
- Defoaming Agent—reduces or eliminates foaming in the spray tank.
- Drift Control Agent—an agent that prevents the formation of very fine spray droplets that are especially subject to drift; improves coverage.

- Compatibility Agent or Co-solvent — an inert ingredient that may aid in the dispersion of otherwise incompatible mixtures.

Pesticides are applied in a number of ways, so adding and using an additive is up to the applicator. Sometimes, additives are only required for pest control treatments made during adverse climatic conditions. In other cases, the nature of the pesticide may require adding an additive to the spray mixture rather than the formulation. The pesticide label always gives directions for the use of additives, if they are required.

## Soil Type Considerations

Soil texture (sand, silt, clay) and organic matter content influence the effectiveness of soil-applied pesticides. In general, lower rates of pesticides are required on sandy (coarse-textured) soils than on clays or soils with high organic matter content (fine-textured) to obtain the same level of control. Pesticide rate recommendations in this bulletin are given for medium-textured soils with greater than 3 per cent organic matter content, unless otherwise noted. Clay and organic matter absorb pesticides, making them less available to kill soil-borne pests. Soils with high clay and organic matter content require greater pesticide rates for adequate pest control. Sandy soils with low organic matter content require careful pesticide rate selection to avoid crop injury.

Poor application of soil insecticides, such as plowing or drilling the insecticides deeper than about 4 inches, or using sidedressings when broadcast treatments are best, reduces the value of pesticide treatments. Do not expect the impossible in your efforts to control soil-borne pests. As with foliar sprays, materials need to be carefully applied to achieve maximum effectiveness.

## Pesticides and the Environment

Many people obtain their drinking water from wells. Well water is groundwater. Groundwater is stored in water-bearing geological formations called aquifers. It moves through aquifers and is obtained at springs, streams, or wells.

The upper level of the saturated zone in the soil is called the water table. The water table depth fluctuates, depending on the amount of water removed from the ground and the amount of water added by recharge.

Both surface water and groundwater are subject to contamination by point and non point source pollution. Point source contamination refers to movement of a pesticide into water from a specific site. Nonpoint source contamination generally results from land runoff, precipitation, acid rain, or percolation rather than from discharge at a single location.

Several factors influence the fate of pesticides in groundwater.

**Adsorption** is the binding of chemicals to soil particles. The amount and persistence of pesticide adsorption varies with pesticide properties, soil moisture, soil pH, and soil texture. Soils high in organic matter or clay are the most adsorptive; coarse, sandy soils are much less adsorptive.

A soil-adsorbed pesticide is less likely to volatilize, leach or be degraded by microorganisms. It is also less available for absorption by plants. Therefore, pesticides used on highly adsorptive soils may require higher rates or more frequent applications to compensate for soil adsorption.

**Volatilization** occurs when a solid or liquid turns into a gas. A pesticide in a gaseous state can be carried away from the treated

area by air currents. This is called vapor drift. Unlike the drift of sprays and dusts that can sometimes be seen during application, vapor drift is invisible.

Avoid applying volatile pesticides when conditions favor volatilization, such as temperature inversions. Pesticide labels usually mention the potential for volatility of pesticides. Volatilization can sometimes be reduced through the use of low volatile formulations or soil incorporation of the pesticide.

**Photodegradation** is the breakdown of pesticides by the sunlight. Pesticides applied to foliage or the soil surface may be broken down by exposure to light. Soil incorporation can reduce pesticide exposure to sunlight.

**Microbial degradation** occurs when microorganisms such as fungi and bacteria use a pesticide as a food source. It can be rapid and thorough under favorable soil conditions, including warm temperatures, favorable pH levels, adequate soil moisture, oxygen and fertility. The amount of adsorption also influences microbial degradation. Adsorbed pesticides are more slowly degraded because they are less available to some microorganisms.

**Chemical degradation** is the breakdown of a pesticide by soil processes not involving a living organism. Adsorption of the pesticides, soil pH, soil temperature and moisture influence the rate of degradation. Some pesticides are more rapidly degraded on low pH soils.

**Absorption** is the process by which plants and microorganisms take up chemicals. It is another process that can transfer pesticides in the environment. Once absorbed, most pesticides are degraded within plants. Residues may persist inside the plant or be released back into the environment as the plant decays.

**Runoff** moves pesticides in surface water, either mixed in the water or bound to soil particles. The amount of pesticide runoff depends on the grade or slope of the field, the type of soil, the amount of rainfall, (especially close to the time of application), and properties of the pesticide. For example, a pesticide applied to a saturated clay soil is highly susceptible to runoff. Established vegetation or plant residues reduce runoff.

Pesticide runoff is greatest when heavy rainfall occurs shortly after application. No-tillage, minimum-tillage, and soil incorporation reduce runoff. Surface grading, drainage ditches and dikes, and the use of border vegetation can help reduce pesticide movement into surface water.

**Leaching** is the movement of pesticides through the soil into groundwater. Several factors influence leaching including water solubility of the pesticide, soil structure and texture, and persistence of pesticide adsorption to soil particles. If a pesticide is strongly adsorbed to soil particles, it is less likely to leach, regardless of its solubility, unless the soil particles themselves move with the water flow.

### Keeping Pesticides Out of Groundwater and Surface Water

It is very difficult to purify or clean contaminated groundwater or surface water. Management practices can be implemented to effectively reduce pesticide runoff and leaching and protect groundwater and surface water.

Use integrated crop management programs —Minimize pesticide use by combining chemical control with other pest management practices such as tillage, cultivation, crop rotation, and pest scouting.

- Reduce compaction—Surface water runoff increases when soils are compacted.
- Rotate crops —Crop rotations may provide more surface crop residue and may reduce the application of the same pesticides to a field.
- Use conservation tillage practices —Include no-till, minimum till, cover crops, grass waterways and buffer strips.
- Consider the geology of your area—When planning pesticide applications, be aware of the water table depth and the permeability of the geological layers between the surface soil and groundwater.
- Select pesticides carefully—Choose pesticides with the least potential for leaching into groundwater or for runoff into surface water.
- Transport pesticides safely—Have pesticides delivered directly to your pesticide storage facility to avoid liability and potential accidents and spills in transit whenever possible. DOT shipping rules must be followed for transporting large quantities of pesticides, including proper placarding of the vehicle, liability insurance, special handling requirements, etc.
- Follow label directions—The label carries crucial information about the proper rate, timing, and placement of the pesticide.
- Calibrate accurately—Equipment should be calibrated carefully and often.
- Measure accurately—Concentrates need to be carefully measured before they are placed into the spray tank. Do not “add a little extra” to ensure the pesticide will do a better job.
- Avoid back-siphoning —The end of the fill hose should remain above the water level in the spray tank at all times to prevent back-siphoning of chemicals into the water supply. Use an anti-backflow device when siphoning water directly from a well, pond, or stream. These practices also reduce the likelihood of the hose becoming contaminated with pesticides.
- Consider weather and irrigation—If you suspect heavy or sustained rain, delay applying pesticides. Control the quantity of irrigation to minimize the potential for pesticide leaching and runoff.
- Avoid spray drift and volatilization—Do not spray when the wind is greater than 10 miles per hour and/or weather conditions (e.g. inversions) are conducive to pesticide drift from the target area. Make every effort to **AVOID PESTICIDE DRIFT!**
- Clean up spills—Avoid spills. When they do occur, contain and clean them up quickly with an absorbent material like cat litter. Chemicals spilled near wells and sinkholes can move directly and rapidly into groundwater. Chemicals spilled near ditches, streams or lakes can move rapidly into surface water.
- Change the location of mixing areas —Mix and load pesticides on an impervious pad, if possible. If mixing is done in the field, change the location of the mixing area regularly. Do not mix pesticides adjacent to the water source, and do

not let the water run inadvertently on the soil near the mixing area. This will increase pesticide leaching and/or runoff.

- Dispose of wastes and containers properly—All pesticide wastes must be disposed of in accordance with local, state, and federal laws. Pesticide containers are considered hazardous waste until they are cleaned or disposed of properly. When possible, reduce the number of pesticide containers by using bulk or returnable containers.

All pesticide containers can be rendered non-hazardous waste by triple rinsing (or equivalent). The rinsate should be added to the spray tank. After triple rinsing, perforate both ends so the container cannot be reused.

All metal and plastic triple-rinsed containers should be recycled, if possible. If this option is not available, dispose of them in a state licensed sanitary landfill. Dispose of all paper containers in a sanitary landfill or a municipal waste incinerator. Do not bury or burn any pesticide containers. Do not reuse any empty pesticide containers for any purpose.

Store pesticides away from water sources —Pesticide storage facilities should be situated away from wells, cisterns, springs, and other water sources. Pesticides must be stored in a facility that will protect them from temperature extremes, high humidity, and direct sunlight. The storage facility should be heated, dry and well ventilated. It should be designed for easy containment and cleanup of pesticide spills and made of materials that will not absorb any pesticide material that leaks out of a container. Store only pesticides in such a facility and always store them in their original containers.

Do not store any protective clothing or equipment in the pesticide storage facility. Store pesticides separately from insecticides and fungicides to avoid contamination of one material by another and accidental misuse.

Keep the facility locked at all times when not in use to prevent animals, children, and irresponsible adults from entering and becoming poisoned. Post the facility as a Pesticide Storage Facility to warn others that the area is off limits. Maintain an accurate inventory of the pesticides stored in the facility at all times in case of emergency.

Always read and follow the Storage and Disposal section of pesticide labels for specific storage and handling instructions.

For additional information on pesticide storage, refer to Midwest Plan Service Bulletin 37, Designing Facilities for Pesticide and Fertilizer Containment, available from Agricultural and Biosystems Engineering Dept., 122 Davidson Hall, Iowa State University, Ames, IA 50011; and MSU Bulletin E-2335 On-Farm Agrichemical Storage and Handling. Your state's water resources currently provide a vast supply of clean water for agriculture, homes, and industry. They can ensure high water quality for future needs only if they are protected now. Be sure to understand how your activities, including pesticide usage, can affect them.

### Handling and Mixing Pesticides

Always wear protective clothing and equipment when handling, mixing, and applying pesticides and during the cleanup of application equipment. Protective clothing should include full coverage clothing, chemical resistant gloves and boots, eye protection, hard hat, and a MSHA/NIOSH approved respirator with a chemical absorbent material as specified on the pesticide label.

Mix pesticides downwind and below eye level. Avoid excessive splashing and sloshing. If pesticides are spilled on you, wash them off immediately with lots of water and change clothing. Re-sue spraying only after cleaning up any spills. Try to use closed handling/mixing systems when appropriate.

Mix only what is required for the area to be sprayed according to label directions. Avoid mixing excessive amounts. To do otherwise will create a hazardous waste which is difficult and expensive to dispose of. Keep unauthorized persons out of the area in which you handle pesticides.

### Application Equipment

Efficient use of application machinery is very important to any pesticide application program. In many cases, improper use of machinery will result in poor pest control. With such occurrences, the grower may blame the efficacy of the pesticide for the failure of the control program when poor coverage is at fault.

Proper equipment and its maintenance are very important for any pesticide control program. Spray equipment should have the following features:

- The equipment should be made of non-corrodible materials.
- A tank with sufficient capacity so that the number of mixing and filling operations are minimized.
- A pump with a capacity of at least 5 gal/minute and pressure up to 100 psi.
- An agitation system from the pressure control to the bottom of the tank.
- A plumbing system with 50-mesh screens in the intake line and at each nozzle.
- A pressure gauge that accurately measures pressures up to 100 psi.
- A spray boom that can be adjusted for distance above application site and nozzle placement along the structure.
- Nozzles of the proper size, arrangement, airstream placement and dispersal pattern.

Pest control on vegetable crops has been applied successfully with standard low-pressure sprayers, air-blast sprayers, aircraft, irrigation systems and soil application equipment. Use the proper implements for the crop and soil situation. In the case of insect and disease control, the location of the pests on the plants determines how the machinery should be adjusted and used. For example, if the pests are on the underside of the leaves, adjust the implement so that the chemical is applied on those areas. A general rule to follow with application implements is that the best control results when the chemical treatments are aimed directly at the pests.

### Cleaning and Care of Pesticide Application Equipment

It is important to clean pesticide application equipment, especially if it is used for more than one crop and for applying insecticides, fungicides and herbicides. The need for extensive cleaning can be minimized if one sprayer is only used to apply herbicides and another is used for insecticide and fungicide applications.

When cleaning a sprayer that is used for applying only one type of pesticide, a thorough water rinse is necessary. Rinse the entire sprayer, inside and out, including the boom, hoses and nozzles. Partially fill the spray tank with water and keep the pump run-

ning so that the rinse water circulates throughout the entire system. Spray the water rinsate out through the nozzles, making sure to properly collect the rinsate. To save money and protect the environment, rinse the equipment in the field using a water-filled nurse tank and apply the collected water rinsate to the crop.

To clean application equipment used to apply a variety of pesticides, thoroughly wash the entire spray system with one of the following cleaning agents in 100 gal of water:

- 1 gal household ammonia. Allow to stand in the spray tank and system overnight. **OR**
- 5 lb of sal soda. **OR**
- 8 lb trisodium phosphate.

Run the pump so that the cleaning solution circulates throughout the entire system. Leave the cleaning solution in the spray system for at least 2 hours, and do not apply it to any crop or crop land. Discard the cleaning solution in an appropriate pesticide rinsate degradation pit. Rinse the entire system with water at least three times after all the cleaning solution has drained from the sprayer. Do not leave pesticide solutions or cleaning solutions in the tank overnight unless otherwise instructed.

Corrosion and mechanical damage to pumps, tanks, nozzles, etc., may result from leaving water in the spray system over the winter. To prepare the spray equipment for storage, disconnect all hoses and allow all water to drain out. Coat all bare metal parts with oil or a rust inhibitor.

Disassemble metal nozzles and store them in oil. Prepare the spray pump for storage based on the manufacturer's recommendations.

### Notes on Nematode Management

Nematodes are microscopic worms that live in the soil and roots of plants. A few species feed on foliage or modified tissue, like onion bulbs. Nematode-infected vegetables do not grow well, yields are low and quality is often poor. Some nematodes cause root swellings called knots or galls (root-knot nematode), while others cause necrosis (root-lesion nematode, onion bloat nematode), and still others cause root stunting (stubby-root nematode). All of these nematodes can cause reduced yields or quality of various vegetable crops.

Plant parasitic nematodes can be present in most soil types, but usually cause the greatest damage in sandy soils. Some species, however, cause serious problems in muck soils. Nematode damage is frequently blamed on other causes, such as nutrient deficiencies or disease-causing organisms, like fungi and bacteria. Nematodes can also reduce plant resistance to certain fungi and bacteria.

Most soil-borne nematodes are beneficial and help control insects, decompose organic matter and regulate soil nutrition. While plant-parasitic nematodes cannot be eliminated completely from a field, control measures such as crop rotation, fallowing and applying chemical nematicides help prevent nematode damage in vegetable production.

1. Rotate vegetable crops so that plants injured by nematodes are not grown on the same soil more often than once every 3 years. For example, Irish potatoes, tomatoes, peppers, carrots, celery and other crops are injured by root-knot nematodes. Grasses are non-hosts for the northern root-knot nematode therefore no development and reproduction occur on these plants. Other vegetables are less susceptible than the ones mentioned

above but they are still hosts to this species of root-knot nematode.

2. In some cases, fallowing can be used to reduce nematode populations. Fallowed ground must be worked several times to keep it dry and free of weeds. Disturbance of the soil can provide good control of dagger and needle nematodes.

3. Growing monocots will reduce population densities of the northern root-knot nematode but not lesion nematodes. Pearl millet is a poor host for lesion nematodes.

4. Whenever necessary, use an appropriate nematicide. Specific nematicide recommendations for each crop are presented in this bulletin. Information about how to submit soil and root samples for nematode analysis is given in MSU Extension Bulletin E-2199, Detecting and Avoiding Nematode Problems. Use root and soil samples to identify nematode problem sites.

Use chemical nematicides only when nematode population densities exceed specific nematode-crop action thresholds. The rate of nematicide selected for use should be based, in part, on the nematode type and population density present in a specific production site. The procedure for nematode analysis is presented in Appendix C.

### For More Information

For more information on the use of pesticides, see the MSU Extension bulletins available through your local MSU Extension office or the MSU Extension Bookstore at [www.shop.msu.edu](http://www.shop.msu.edu). A complete listing of available publications is available on the Bookstore website at [www.shop.msu.edu](http://www.shop.msu.edu) (click on MSU Extension Bookstore at the top of the page). To contact the Bookstore by phone, dial (517) 432-1859 or (800) 709-9195 toll free, or email [shopmsu@msu.edu](mailto:shopmsu@msu.edu).

### Useful Web Sites

Order E0312 online  
<http://shop.msu.edu>

Michigan State University IPM Program:  
<http://www.ipm.msu.edu>

Michigan State University Vegetable News and Resources  
<http://www.msue.msu.edu/topic/info/vegetables>

Michigan Department of Agriculture and Rural Development  
<http://www.michigan.gov/mdard>

Insecticide Registration, Product labels and MSDS Sheets:  
<http://www.cdms.net>

## LIST OF INSECTICIDES AND NEMATOCIDES USED ON COMMERCIAL VEGETABLES

Trade Name	Common Name	EPA Reg No	Registrant	REI <sup>1</sup>	Class <sup>2</sup>	LD50s <sup>3</sup>		L/R <sup>4</sup>
						Oral	Dermal	
Acephate 90 WDG	acephate	34704-1051	Loveland Products	24 hrs	1B	1030	>10000	3/3
Acephate 90 WSP	acephate	34704-862	Loveland Products	24 hrs	1B	1030	>10000	3/3
Acephate 97	acephate	70506-8-55467	Tenkoz	24 hrs	1B	688-1127	>2000	3/3
Acephate 97 UP	acephate	70506-8	United Phosphorus	24 hrs	1B	688-1127	>2000	3/3
Actara	thiamethoxam	100-938	Syngenta	12 hrs	4A	>5000	>2000	1/2
Admire Pro	imidacloprid	264-827	Bayer Cropscience	12 hrs	4A	609	>2000	1/2
Agree WG	Bt aizawai	70051-47	Certis USA	4 hrs	11A	>5050	>2020	3/1
*Agri-Mek 0.15 EC	abamectin	100-898	Syngenta	12 hrs	6	300	>1800	3/2
*Agri-Mek SC	abamectin	100-1351	Syngenta	12 hrs	6	310	>2000	3/2
*Ambush 25W	permethrin	5481-502	Ambac	12 hrs	3A	>2000	>2000	3/2
*Asana XL	esfenvalerate	352-515	DuPont	12 hrs	3	458	>2000	3/2
Assail 30 SG	acetamiprid	8033-36-70506	United Phosphorus	12 hrs	4A	805-886	>2000	2/3
Assail 70WP	acetamiprid	8033-23-70506	United Phosphorus	12 hrs	4A	1064	>2000	2/3
*Athena	bifenthrin + abamectin	279-3356	FMC	12 hrs	3A, 6	774	>5000	3/2
Avaunt	indoxacarb	352-597	DuPont	12 hrs	22	687-1867	>5000	3/1
*Avicta Duo	abamectin + thiamethoxam	100-1321	Syngenta	NA	6, 4A	126	>5000	1/2
*Aztec 2.1G	cyfluthrin + phostebupirim	5481-9030	Ambac	48 hrs	3A, 1B	132-190	>2000	2/1
*Baythroid XL	beta-cyfluthrin	264-840	Bayer Cropscience	12 hrs	3	647-695	>2000	3/2
Belay	clothianidin	59639-150	Valent	12 hrs	4A	3044	>5000	1/2
Belay 50 WDG	clothianidin	59639-152	Valent	12 hrs	4A	3044	>5000	1/2
Beleaf 50 SG	flonicamid	71512-10-279	FMC	12 hrs	9C	>2000	>2000	3/3
Belt SC	flubendiamide	264-1025	Bayer Cropscience	12 hrs	28	>2000	>4000	3/1
*Bifenture 10 DF	bifenthrin	70506-227	United Phosphorus	12 hrs	3	550	>2000	3/2
*Bifenture EC	bifenthrin	70506-57	United Phosphorus	12 hrs	3A	262	>2000	3/2
Biohit HP WP	Bt kurstaki	73049-54	Valent	4 hrs	11A	>5000	>2500	3/1
Blackhawk	spinosad	62719-523	Dow Agroscience	4 hrs	5	>5000	>5000	3/3
*Bolton	chlorpyrifos + gamma-cyhalothrin	67760-112	Chemnova	24 hrs	1B, 3A	300-800	>2000	-/-
Bracket 97	acephate	70506-8-1381	Winfield Solutions	24 hrs	1	688-1127	>2000	3/3
Bracket 97 Soluble	acephate	5481-8978-1381	Winfield Solutions	24 hrs	1	688-1127	>2000	3/3
*Brigade 2EC	bifenthrin	279-3313	FMC	12 hrs	3A	262	>2000	3/2
*Brigade WSB	bifenthrin	279-3108	FMC	12 hrs	3A	335	>2000	3/2
*Brigadier	bifenthrin + imidacloprid	279-3332	FMC	12 hrs	3, 4A	175	>5000	1/2
*Capture 1.15 G	bifenthrin	279-3244	FMC	12 hrs	3A	7431	>5000	3/2
*Capture LFR	bifenthrin	279-3302	FMC	12 hrs	3A	175	>5000	3/2
Carbaryl 4L	carbaryl	34704-447	Loveland Products	12 hrs-21 days	1A	699	>4000	3/3
Carbaryl 4L	carbaryl	19713-49	Drexel	12hrs-21 days	1A	590	>2000	3/3
Chlorpyrifos 15G	chlorpyrifos	19713-505	Drexel	1-3 days	1B	223	>5000	3/2
*Chlorpyrifos 4E AG	chlorpyrifos	19713-520	Drexel	1-3 days	1B	223	>5000	3/2
Closer SC	sulfoxaflor	62719-623	Dow Agroscience	12 hrs	4C	>5000	>5000	3/3
*Cobalt	chlorpyrifos + gamma-cyhalothrin	62719-575	Dow Agroscience	24 hrs	1B, 3A	320	>5000	-/-
Confirm 2F	tebufenozide	8033-111-10163	Gowan	4 hrs	18	>5000	>5000	1/2
Coragen	chlorantraniliprole	352-729	DuPont	4 hrs	28	>5000	>5000	3/1
*Counter 15G Smartbox	terbufos	5481-545	Ambac	48 hrs	1B	10	96	3/3
*Counter 20-G	terbufos	5481-562	Ambac	48 hrs	1B	3.58	32-71	3/3
Cruiser 5 FS	thiamethoxam	100-941	Syngenta	12 hrs	4A	>5000	>5050	1/2

## LIST OF INSECTICIDES AND NEMATICIDES USED ON COMMERCIAL VEGETABLES

Trade Name	Common Name	EPA Reg No	Registrant	REI <sup>1</sup>	Class <sup>2</sup>	LD50s <sup>3</sup>		L/R <sup>4</sup>
						Oral	Dermal	
Cruiser Maxx Potato	thiamethoxam + fludioxonil	100-1248	Syngenta	12 hrs	4A, 12	3129	>5050	1/1
*Cypermethrin	cypermethrin	70506-20-55467	Tenkox	12 hrs	3A	355	>2000	3/1
*Danitol 2.4 EC	fenpropathrin	59639-35	Valent	24 hrs	3	66	>2000	3/2
*Diazinon 50 WP	diazinon	66222-10	Makhteshim-Agan	2-4 days	1B	1960	>2020	3/1
*Diazinon AG 500	diazinon	5905-248	Helena	2-4 days	1B	2040	>2020	3/1
*Diazinon AG600	diazinon	66222-103-34704	Loveland Products	2-4 days	1B	1600	>2020	3/1
*Dibrom 8 EC	naled	5481-479	Ambac	SL	1B	235	>5050	3/3
*Dimethoate 4E	dimethoate	66330-223	Arysta	48 hrs	1B	450	>2000	2/3
Dimethoate 4 EC	dimethoate	34704-207-67760	Cheminova	48 hrs	1B	450	>2000	2/3
Dimethoate 4EC	dimethoate	19713-231	Drexel	48 hrs	1B	60	1000	2/3
Dimethoate 400	dimethoate	34704-207	Loveland Products	48 hrs	1B	425	2020	2/3
Dipel DF	Bt Kurstaki	73049-39	Valent	4 hrs	11A	>5050	>2020	3/1
Dipel ES	Bt Kurstaki	73049-17	Valent	4 hrs	11A	>5050	>5050	3/1
*Discipline 2 EC	bifenthrin	5481-517	Ambac	12 hrs	3A	262	>2000	3/2
Durivo	thiamethoxam + chlorantraniliprole	100-1318	Syngenta	12 hrs	4A, 28	>5000	>5000	1/1
*Empower 2	bifenthrin + Indole-3-butyric acid	5905-548	Helena	1-18 days	3A, -	7431	>5000	2/2
*Endigo ZC	thiamethoxam+ Lambda-cyhalothrin	100-1276	Syngenta	24 hrs	3A, 4A	310	>2000	1/2
*Endosulfan 3 EC	endosulfan	19713-399	Drexel	4-17 days	2A	45	256	3/1
Entrust	spinosad	62719-282	Dow Agroscience	4 hrs	5	>5000	>5000	3/3
Entrust SC	spinosad	62719-621	Dow Agroscience	4 hrs	5	>5000	>5000	3/3
Exirel	cyantraniliprole	352-859	DuPont	12 hrs	28	>5000	>5000	-/-
*Fanfare 2 EC	bifenthrin	66222-99	Makhteshim-Agan	12 hrs	3A	150	>2000	3/2
*Force 3G	tefluthrin	100-1075	Syngenta	0 hrs	3	969	>2000	3/2
*Force CS	tefluthrin	100-1253	Syngenta	12 hrs	3	174	2000-5000	3/2
Fulfill	pymetrozine	100-912	Syngenta	12 hrs	9B	>5000	>2000	2/1
*Gladiator	zeta-cypermethrin + avermectin	279-3441	FMC	12 hrs	3, 6	550	>5000	-/-
*Govern	chlorpyrifos	62719-220-55467	Tenkox	1-3 days	1B	300	>1000	3/2
*Hatchet	chlorpyrifos	62719-220	Dow Agroscience	1-3 days	1B	300	>1000	3/2
*Hero	bifenthrin + zeta-cypermethrin	279-3315	FMC	12 hrs	3A, 3A	550	>5000	3/2
*Hero EW	bifenthrin + zeta-cypermethrin	279-3329	FMC	12 hrs	3A, 3A	175	>5000	3/2
*Holster	cypermethrin	34704-875	Loveland	12 hrs	3A	137	>2000	3/1
Imidan 70 WP	phosmet	10163-169	Gowan	4-5 days	1B	258-275	>2000	3/3
Intrepid 2 F	methoxyfenozide	62719-442	Dow Agroscience	4 hrs	18	>5000	>2000	1/2
Javelin WG	Bt kurstaki	70051-66	Certis	4 hrs	11A	>5000	-	3/1
Kryocide	cryolite	70506-172	United Phosphorus	12 hrs	UN	>5000	>2100	3/1
*Lambda-Cy	lambda-cyhalothrin	70506-121	United Phosphorus	24 hrs	3	81	>2000	3/2
*Lannate LV	methomyl	352-384	DuPont	48 hrs	1A	23	>2000	1/3
*Lannate SP	methomyl	352-342	DuPont	48 hrs	1A	23	>2000	1/3
*Larvin 3.2 EC	thiodicarb	264-379	Bayer Cropscience	48 hrs	1A	386	>2000	3/3
*Leverage 360	beta-cyfluthrin + imidacloprid	264-1104	Bayer Cropscience	12 hrs	3A, 4A	>1044	>2000	1/2
Lorsban 15 G	chlorpyrifos	62719-34	Dow Agroscience	1-3 days	1B	1288-2250	>5000	3/2
*Lorsban 4 E	chlorpyrifos	62719-220	Dow Agroscience	1-3 days	1B	300	>1000	3/2
*Lorsban 50W WSP	chlorpyrifos	62719-221	Dow Agroscience	NA	1B	382	>5000	3/2

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						Oral	Dermal	
Lorsban 75 WG	chlorpyrifos	62719-301	Dow Agroscience	1-3 days	1B	>500	>5000	3/2
*Lorsban Advanced	chlorpyrifos	62719-591	Dow Agroscience	1-3 days	1B	439	>5000	3/2
Malathion 5	malathion	9779-5	Winfield Solutions	12 hrs - 3 days	1B	5500	2000	3/3
Malathion 5 EC	malathion	19713-217	Drexel	12 hrs - 7 days	1B	5500	>2000	3/3
Malathion 57 EC	malathion	34704-108	Loveland	12-72 hrs	1B	550	>2000	3/3
Malathion 8	malathion	10163-21	Gowan	12-72 hrs	1B	5400- 5700	>2000	3/3
Malathion 8 Aquamul	malathion	34704-474	Loveland Products	12-72 hrs	1B	550	>2000	3/3
*Methyl 4 EC	parathion-methyl	67760-43	Cheminova	3-6 days	1B	13	662	3/2
*Mocap 15 G	ethoprop	264-457	Bayer Cropscience	48 hrs	1B	250	>2000	1/3
*Mocap EC	ethoprop	264-458	Bayer Cropscience	48 hrs	1B	16-47	166-369	1/3
Movento	spirotetramat	264-1050	Bayer Cropscience	24 hrs	23	>2000	>4000	3/3
*Mustang Max	Zeta-cypermethrin	279-3249	FMC	12 hrs	3A	157	>5000	3/2
Nimitz	fluensulfone	66222-243	Makhteshim-Agan	SL	-	>2000	>2000	-/-
*Nudrin LV	methomyl	83100-27-83979	Rotam North America	48 hrs	1A	55-174	>2000	1/3
*Nudrin SP	methomyl	83100-28-83979	Rotam North America	48 hrs	1A	7.14-14.2	>5050	1/3
*Nufos 4E	chlorpyrifos	67760-28	Cheminova	1-3 days	1B	205	>4000	3/2
Nuprid 1.6 F	imidacloprid	228-488	NuFarm	12 hrs	4A	>2000	>2000	1/2
Nuprid 2 F	imidacloprid	228-484	NuFarm	12 hrs	4A	>2000	>2000	1/2
Oberon 2 SC	spiromesifen	264-719	Bayer Cropscience	12 hrs	23	>2000	>4000	3/2
Orthene 97	acephate	5481-8978	Amvac	24 hrs	1B	688-1127	>2000	3/3
*Perm-Up 25DF	permethrin	70506-66	United Phosphorus	12 hrs	3A	-	-	3/2
*Perm-Up 3.2 EC	permethrin	70506-9	United Phosphorus	12 hrs	3A	1030	>2000	3/2
Platinum	thiamethoxam	100-939	Syngenta	12 hrs	4A	>5000	>2000	1/2
Platinum 75 SG	thiamethoxam	100-1291	Syngenta	12 hrs	4A	>5000	>2000	1/2
Poncho 600	clothianidin	264-789	Bayer Cropscience	NA	4A	2000	>4000	1/2
Portal	fenpyroximate	71711-19	Nichino America	12 hrs	21A	760	>2000	3/1
*Pounce 1.5 G	permethrin	279-3059	FMC	12 hrs	3A	>5000	>5000	3/2
*Pounce 25 WP	permethrin	279-3051	FMC	12 hrs	3A	1100	>2000	3/2
*Proaxis	gamma-cyhalothrin	74921-3	Pytech Chemicals	24 hrs	3A	>2500	>5000	3/1
*Proaxis	gamma-cyhalothrin	74291-3-5905	Helena	24 hrs	3A	>2500	>5000	3/1
*Proclaim	emamectin benzoate	100-904	Syngenta	12 hrs	6	1516	>2000	2/1
Pyrenone	piperonyl butoxide + pyrethrins	432-1033	Bayer Cropscience	12 hrs	3A	4500- 4900	>2000	3/2
Radiant SC	spinetoram	62719-545	Dow Agroscience	4 hrs	5	>5000	>5000	-/-
*Regent 4 SC	fipronil	7969-207	BASF	0 hrs	2B	300	273	2/2
Rimon 0.83EC	novaluron	66222-35-400	Chemtura	12 hrs	15	4723	2000- 8000	3/1
Saurus	chlorpyrifos	62719-34-5905	Helena	1-3 days	1B	1288- 2250	>5000	3/2
Scorpion 35 SL	dinotefuran	10163-317	Gowan	12 hrs	4A	>2000	>2000	1/2
*S-FenvaloStar	esfenvalerate	71532-21-73006	LG International	12 hrs	3A	458	>2000	3/2
Sivanto	flupyradifurone	264-1141	Bayer Cropscience	4 hrs	4D	>2000	>2000	
*Sniper	bifenthrin	34704-858	Loveland	12 hrs	3A	262	>2000	3/2
*Stallion	Zeta-cypermethrin + chlorpyrifos	279-9545	FMC	24 hrs	3A, 1B	55-175	>5000	-/-
*Steed	bifenthrin + zeta-cypermethrin	279-3380	FMC	12 hrs	3A, 3A	310	>5000	3/2

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						Oral	Dermal	
*Swagger	bifenthrin + imidacloprid	34704-1045	Loveland	12 hrs	3A, 4A	1098	>2000	1/2
*Telone C-17	1,3-dichloropropene + chloropicrin	62719-12	Dow Agroscience	SL	-	304-519	500	2/3
*Telone II	1,3-dichloropropene	62719-32	Dow Agroscience	SL	-	>110	>333	2/3
*Thimet 20 G	phorate	5481-530	Ambac	48 hrs	1B	5.1-13.5	67	3/1
Transform WG	sulfoxaflor	62719-625	Dow Agroscience	24 hrs	4C	>2000	>5000	-/-
Trigard 75 WP	cyromazine	100-654	Syngenta	12 hrs	17	4460	>2010	1/2
*Tundra EC	bifenthrin	1381-196	Winfield Solutions	12 hrs	3A	262	>2000	3/2
*Tundra Supreme	chlorpyrifos + bifenthrin	1381-243	Winfield Solutions	24 hrs	1B, 3A	98	5050	3/2
*Up-Cyde 2.5 EC	cypermethrin	70506-20	United Phosphorus	12 hrs	3A	355	>2000	3/1
*Vapam HL	metam-sodium	5481-468	Ambac	SL	-	812	>2020	2/3
Venom	dinotefuran	59639-135	Valent	12 hrs	4A	>5000	>5000	1/2
Verimark	cyantraniliprole	352-860	DuPont	4 hrs	28	>5000	>5000	-/-
Vetica	flubendiamide + buprofezin	71711-32	Nichino America	12 hrs	28, 16	>5000	>5000	3/1
Voliam Flexi	thiamethoxam + chlorantraniliprole	100-1319	Syngenta	12 hrs	4A, 28	>5000	>5000	1/1
*Vulcan	chlorpyrifos	66222-233	Makhteshim-Agan	1-3 days	1B	82	202	3/2
*Vydate L	oxamyl	352-372	DuPont	48 hrs	1A	9-10	>5000	3/3
*Warhawk	chlorpyrifos	34704-857	Loveland Products	1-3 days	1B	300	>1000	3/2
*Warrior II with Zeon Technology	lambda-cyhalothrin	100-1295	Syngenta	24 hrs	3	310	>2000	3/2
*Whirlwind	chlorpyrifos	62719-220-5905	Helena	1-3 days	1B	300	>1000	3/2
Xentari	Bt ABTS	73049-40	Valent	4 hrs	11A	>5000	>2000	3/1

1. Re-Entry Interval: SL=See Label. Read and follow the label directions. Post areas or give oral warnings that areas have been treated to warn workers not to enter until the REI has elapsed as required by the label.
2. Insecticide Resistance Action Committee Mode of Action Classification (<http://www.irac-online.org/documents/moa-classification/?ext=pdf>) or taken from the label
3. The LD50 is a standard toxicological term which indicates the number of milligrams (mg) of pesticide per kilogram (kg) of test animal body weight required to kill 50 percent of a test animal population. Values less than 10 indicate extremely high toxicity to mammals. The LD50 data have been obtained from Material Safety Data Sheets.
4. Leaching / Runoff Potential: 1=high, 2=intermediate, 3=low. These leaching/runoff potential ratings are from the NRCS WIN-PST Pesticide Properties Database at <http://go.usa.gov/Kok>

\* = Restricted Use Pesticide. All or certain formulations of these toxicants have been classified Restricted Use Pesticides.

## LIST OF FUNGICIDES USED ON COMMERCIAL VEGETABLES

Fungicide	Common Name	EPA Reg No	Registrant	REI <sup>1</sup>	LD50s <sup>2</sup>		L/R <sup>3</sup>	FRAC <sup>4</sup>
					Oral	Dermal		
42-S Thiram	thiram	264-929	Bayer Cropscience	24 hrs	3580	>4000	3/3	M3
Actigard	acibenzolar-S-methyl	100-922	Syngenta	12 hrs	>5000	>2000	2/3	21
Agri-mycin 17	Streptomycin sulfate	55146-96	NuFarm	12 hrs	>5000	>2000	1/3	25
*Agri Tin 80 WP	triphenyltin hydroxide	55146-72	NuFarm	48 hrs	160	500	3/1	-
Aliette WDG	fosetyl-aluminum	432-890	Bayer Environmental Science	12 hrs	2860	>2020	3/3	33
Aliette WDG	fosetyl-aluminum	264-516	Bayer CropScience	12 hrs	2860	>2020	3/3	33
Allegiance-FL	metalaxyl	264-935	Bayer CropScience	24 hrs	>2900	>2000	1/2	4
Apron Maxx RTA	fludioxonil/mefenoxam	100-946	Syngenta	48 hrs	>5050	>2020	3/1	12 & 4
Apron XL	mefenoxam	100-799	Syngenta	48 hrs	862	>2020	3/3	4
Badge SC	copper hydroxide / copper oxychloride	80289-3	Isagro	24-48 hrs	>2000	>2000	3/1	M1
Badge X2	copper hydroxide / copper oxychloride	80289-12	Isagro	24-48 hrs	>300	>2000	3/1	
Basic Copper 53	copper sulfate	45002-8	Albaugh	48 hrs	1502	>2000	3/1	M1
Blocker 4F	PCNB	5481-8992	Amvac	12 hrs	>5050	>2020	3/2	14
Bravo Ultrex	chlorothalonil	50534-201-100	Syngenta	12 hrs	>5000	>2000	3/2	M5
Bravo Weather Stik	chlorothalonil	50534-188-100	Syngenta	12 hrs	9000	>2000	3/2	M5
Cabrio EG	pyraclostrobin	7969-187	BASF	12 hrs	>2000	>2000	3/1	11
Cannonball	fludioxinil	100-969	Syngenta	12 hrs	>5050	>2020	3/1	12
Cannonball WG	fludioxinil	100-1454	Syngenta	12 hrs	>2000	>2000	3/1	12
Cannoball WP	fludioxinil	100-1360	Syngenta	12 hrs	>5050	>2020	3/1	12
Captan 4L ST	captan	42750-253	Albaugh	NA	>2000	>2000	3/3	M4
Catamaran	potassium phosphite / chlorothalonil	42519-31	Luxembourg-Pamol	12 hrs	>5000	>5000	1/2	-
Cercobin	thiophanate-methyl	8033-129-67760	Cheminova	1-3 days	816-2000	>2000	3/2	1
Champ 30 DP	copper hydroxide	55146-115	NuFarm	48 hrs	1346	>5000	3/1	M1
Champ DP	copper hydroxide	55146-57	NuFarm	48 hrs	1098	>5000	3/1	M1
Champ Formula 2F	copper hydroxide	55146-64	NuFarm	48 hrs	>2000	>5000	3/1	M1
Champion	copper hydroxide	55146-115	Nufarm	24-48 hrs	1098	>5000	3/1	M1
C-O-C-S WDG	copper oxychloride / copper sulfate	34704-326	Loveland	24-48 hrs	1131	>2000	3/1	M1
Copper Count N	copper ammonium carbonate	10465-3	Chemical Specialties	12-48 hrs	-	-	-/-	M1
Cuprofix Ultra Disperss	copper sulfate	70506-201	United Phosphorus	48 hrs	300-960	>2000	3/1	M1
Curzate 60 DF	cymoxanil	352-592	DuPont	12 hrs	433	>5000	3/3	27
Dithane DF Rainshield	mancozeb	62719-402	Dow AgroSciences	24 hrs	>5000	>5000	3/1	M3
Dithane F-45 Rainshield	mancozeb	62719-396	Dow AgroSciences	24 hrs	>5000	>5000	3/1	M3
Dithane M-45	mancozeb	62719-387	Dow AgroSciences	24 hrs	>5000	>5000	3/1	M3
Double Nickel 55 WDG	Bacillus amyloliquefaciens	70051-108	Certis	4 hrs	>5000	>5050	-/-	44
Echo 720	chlorothalonil	60063-7	Sipcam	12 hrs	3260	>2020	3/2	M5
Echo 90 DF	chlorothalonil	60063-10	Sipcam	12 hrs	3260	>2020	3/2	M5
Echo ZN	chlorothalonil	60063-4	Sipcam	12 hrs	>3500	>2000	3/2	M5
Endura	boscalid	7969-197	BASF	12 hrs	>2000	>2000	2/1	7
Equus 720 SST	chlorothalonil	66222-154	Makhteshim-Agan	12 hrs	>5000	>5000	3/2	M5

## LIST OF FUNGICIDES USED ON COMMERCIAL VEGETABLES

Fungicide	Common Name	EPA Reg No	Registrant	REI <sup>1</sup>	LD50s <sup>2</sup>		L/R <sup>3</sup>	FRAC <sup>4</sup>
					Oral	Dermal		
Equus DF	chlorothalonil	66222-149	Makhteshim-Agan	12 hrs	>5000	>2000	3/2	M5
Evito 480 SC	fluoxastrobin	66330-64	Arysta	12 hrs	>5000	>5000	3/1	11
Flint 50WG	trifloxystrobin	264-777	Bayer CropScience	12 hrs	>5050	>2000	3/2	11
Fontelis	penthiopyrad	352-834	DuPont	12 hrs	>5000	>5000	2/2	7
Forum	dimethomorph	241-427	BASF	12 hrs	500-2000	>4000	2/2	40
Fosphite	mono- and dipotassium salts of phosphorous acid	68573-2	JH Biotech	4 hrs	-	-	1/3	-
Gavel 75 DF	zoxamide + mancozeb	10163-6414	Gowan	48 hrs	>5000	>5000	3/1	M & 22
Gem 25 WDG	trifloxystrobin	264-781	Bayer CropScience	12 hrs	>5050	>2000	3/2	11
Gem 500	trifloxystrobin	264-826	Bayer CropScience	12 hrs	>3000	>4000	3/2	11
Initiate 720	chlorothalonil	34704-881	Loveland	12 hrs	9000	>2020	3/2	M5
Inspire Super	difenoconazole	100-1262	Syngenta	12 hrs	3129	>2000	3/1	3
Iprodione 4L AG	iprodione	66330-297	Arysta	24 hrs	>2000	>1000	3/3	2
Kentan DF	copper based compounds	80289-2	Isagro	48 hrs	945	>2000	3/1	M1
Kocide 2000	copper hydroxide	352-656	DuPont	24-48 hrs	1346	>5000	3/1	M1
Kocide 3000	copper hydroxide	352-662	DuPont	24-48 hrs	1847	>2000	3/1	M1
Koverall 75 WP	mancozeb	67760-110	Cheminova	24 hrs	>5000	>5000	3/1	M3
Kumulus DF	sulfur	51036-352-66330	Arysta	24 hrs	>2200	>2000	1/1	M2
Luna Sensation	fluopyram / trifloxystrobin	264-1090	Bayer CropScience	12 hrs	2000	>2000	1/2	7 & 11
Luna Tranquility	fluopyram / pyrimthanil	264-1085	Bayer CropScience	12 hrs	>2000	>2000	1/2	7 & 9
ManKocide	copper hydroxide / mancozeb	352-690	DuPont	48 hrs	2535	>5000	3/1	M1 & M3
Manzate Max	mancozeb	70506-194	United Phosphorus	24 hrs	>5000	>5000	3/1	M3
Maxim Potato Seed Protectant	fludioxonil	100-821	Syngenta	12 hrs	>5050	>2020	3/1	12
Maxim 4 FS	fludioxonil	100-758	Syngenta	12 hrs	>5050	>2020	3/1	12
Maxim MZ 0.5 D	mancozeb / fludioxonil	100-1158	Syngenta	24 hrs	>5000	>5000	3/1	M3 & 12
Maxim XL	fludioxonil / mefenoxam	100-916	Syngenta	48 hrs	2830	>2020	3/1	12 & 4
Merivon	fluxapyroxad + pyraclostrobin	7969-310	BASF	12 hrs	50-300	>5000	1/1	7 & 11
Mertect 340-F	thiabendazole	100-889	Syngenta	12 hrs	>5000	>5050	3/1	1
Meteor	iprodione	70506-243	United Phosphorus	24 hrs	2958	>2000	3/3	2
Micro Sulf	sulfur	55146-75	NuFarm	24 hrs	>5000	>2000	1/1	M2
Microthiol Disperss	sulfur	70506-187	United Phosphorus	24 hrs	>2000	>2000	1/1	M2
Moncoat MZ	mancozeb / flutolanil	10163-320	Gowan	24 hrs	>5000	>2000	2/1	M3 & 7
Moncoat MZ	mancozeb / flutolanil	71711-8	Nichino	24 hrs	>5000	>2000	2/1	M3 & 7
Moncut	flutolanil	10163-301	Gowan	12 hrs	>5000	>5000	2/2	7
Nevado 4F	iprodione	66222-144	Makhteshim-Agan	24 hrs	>1170	>2000	3/3	2
Nu-Cop 3L	copper hydroxide	42750-75	Albaugh	48 hrs	1440	>2020	3/1	M3
Nu-Cop 50 DF	copper hydroxide	45002-4	Albaugh	48 hrs	1300	>2000	3/1	M3
Omega 500 F	fluazinam	71512-1-100	Syngenta	12 hrs - 2 days	>5000	>2000	3/2	29
Orius 3.6F	tebuconazole	66222-117	Makhteshim-Agan	12 hrs	>2000	>2000	1/2	3
Penncozeb 75 DF	mancozeb	70506-185	United Phosphorus	24 hrs	>5000	>2000	3/1	M3

## LIST OF FUNGICIDES USED ON COMMERCIAL VEGETABLES

Fungicide	Common Name	EPA Reg No	Registrant	REI <sup>1</sup>	LD50s <sup>2</sup>		L/R <sup>3</sup>	FRAC <sup>4</sup>
					Oral	Dermal		
Pencozeb 80WP	mancozeb	70506-183	United Phosphorus	24 hrs	>5000	>2000	3/1	M3
Phostrol	phosphorous acid	55146-83	NuFarm	4 hrs	>5000	>5000	1/3	33
Polyram 80 DF	metiram	7969-105-34704	Loveland	24 hrs	>5000	>2000	3/2	M3
Presidio	fluopicolide	59639-140	Valent	12 hrs	>2000	>4000	1/2	43
Previcur Flex	propamocarb	264-678	Bayer CropScience	12 hrs	2000-2900	>3000	3/2	28
Pristine	boscalid / pyraclostrobin	7969-199	BASF	12 hrs	1490	>2000	2/1	7 & 11
Priaxor	fluxapyroxad / pyraclostrobin	7969-311	BASF	12 hrs	500-2000	>5000	1/1	7 & 11
Procure 480 SC	triflumizole	400-518	Chemtura	12 hrs	1420	>5000	2/3	3
Prophyt	potassium phosphite	42519-22	Luxembourg-Pamol	4 hrs	>5000	>4000	1/3	-
Prophyt	potassium phosphite	42519-22-5905	Helena	4 hrs	>5000	>4000	1/3	-
Propimax EC	propiconazole	62719-346	Dow AgroSciences	12 hrs	3000	>3500	2/1	3
Quadris	azoxystrobin	100-1098	Syngenta	4 hrs	>5000	>4000	3/1	11
Quadris Opti	azoxystrobin / chlorothalonil	100-1171	Syngenta	12 hrs	1750	>5000	3/1	11 & M
Quadris Ridomil Gold SL	metalaxyl / azoxystrobin	100-1311	Syngenta	0 hrs	>5000	>4000	1/1	4 & 11
Quadris Top	azoxystrobin / difenoconazole	100-1313	Syngenta	12 hrs	>2000	>2000	3/1	11 & 3
Quilt	azoxystrobin / propiconazole	100-1178	Syngenta	12 hrs	1750	>5000	2/1	3 & 11
Quilt Xcel	azoxystrobin / propiconazole	100-1324	Syngenta	12 hrs	1030	>5000	2/1	3 & 11
Quintec	quinoxifen	62719-375	Dow AgroSciences	12 hrs	>2000	>2000	3/1	13
Rally 40WSP	myclobutanil	62719-410	Dow AgroSciences	24 hrs	>2500	>5000	2/2	3
Ranman	cyazofamid	71512-3-279	FMC	12 hrs	>5000	>2000	3/2	21
Reason 500 SC	fenamidone	264-695	Bayer CropScience	12 hrs	>5000	>5000	3/3	11
Revus	mandipropamid	100-1254	Syngenta	4 hrs	>5000	>5000	3/1	40
Revus Top	mandipropamid / difenoconazole	100-1278	Syngenta	12 hrs	2958	>5000	3/1	3 & 40
Ridomil Gold/Bravo	mefenoxam / chlorothalonil	100-1221	Syngenta	48 hrs	5000	>5050	3/2	4 & M5
Ridomil Gold MZ	mefenoxam / mancozeb	100-1269	Syngenta	48 hrs	>2000	>2000	3/1	4 & M
Ridomil Gold/Copper	mefenoxam/copper hydroxide	100-804	Syngenta	48 hrs	550	>2020	3/1	4 & M1
Ridomil Gold PC	mefenoxam/PCNB	100-823	Syngenta	48 hrs	>5050	>2020	3/2	4 & 14
Ridomil Gold GR	mefenoxam	100-798	Syngenta	48 hrs	>5000	>2000	3/3	4
Ridomil Gold SL	mefenoxam	100-1202	Syngenta	48 hrs	550	>2000	3/3	4
Rovral 4F	iprodione	264-482	Bayer CropScience	24 hrs	1170	>2000	3/3	2
Rovral 4F	iprodione	279-9564	FMC	24 hrs	>2000	>2000	3/3	2
Scala SC	pyrimethanil	264-788	Bayer CropScience	12 hrs	4505-5000	>5000	2/3	9
*Sectagon 42	metam sodium	61842-6	Tessenderlo Kerley	SL	790-970	1050	2/3	-
*Sectagon K-54	metam potassium	61842-7	Tessenderlo Kerley	SL	500	>2000	-/-	-
Serenade	Bacillus subtilis	69592-12	Agraquest	4 hrs	>5000	>5000	3/2	44
Serenade ASO	Bacillus subtilis	264-1152	Bayer CropScience	4 hrs	>5000	>2000	3/2	44
Serenade Max	Bacillus subtilis	69592-11	Agraquest	4 hrs	>2000	>2000	3/2	44

## LIST OF FUNGICIDES USED ON COMMERCIAL VEGETABLES

Fungicide	Common Name	EPA Reg No	Registrant	REI <sup>1</sup>	LD50s <sup>2</sup>		L/R <sup>3</sup>	FRAC <sup>4</sup>
					Oral	Dermal		
Serifel	Bacillus amyloliquefaciens	71840-18	BASF	4 hrs	>5000	>5000	-/-	44
SoilGard 12G	Gliocladium virens	70051-3	Certis	NA	-	-	3/2	-
Sonata	Bacillus pumilis	264-1153	Bayer CropScience	4 hrs	>5000	>5050	3/2	-
Sovran	kresoxim-methyl	7969-154	BASF	12 hrs	>5000	>2000	3/3	11
Stadium	azoxystrobin / difenoconazole / fludioxinil	100-1453	Syngenta	NA	550	>5000	3/1	11, 12 & 3
Sulfur DF	sulfur	51036-352-2935	Wilbur-Ellis	24 hrs	>2200	>2000	1/1	M2
*Super Tin 80 WP	fentin hydroxide	352-689	DuPont	48 hrs	160	500	3/1	30
*Super Tin 80WP	fentin hydroxide	70506-214	United Phosphorus	48 hrs	160	500	3/1	30
Switch 62.5 WG	cypodiniol + fludioxonil	100-953	Syngenta	12 hrs	>5000	>2000	3/1	9 & 12
Tanos	famoxadone + cymoxanil	352-604	DuPont	12 hrs	>5000	>2000	3/2	11 & 27
Tebuzol 3.6F	tebuconazole	70506-114	United Phosphorus	12 hrs - 19 days	1700	>5000	1/2	3
*Telone C35	1,3-dichloropropene + chloropicrin	62719-302	Dow AgroSciences	SL	100-200	907-1000	2/3	UN
Thiolux	sulfur	34704-1079	Loveland	24 hrs	>5000	>2000	1/1	M2
Thiram 480DP	thiram	400-434	Chemtura	24 hrs	2950-4430	>4000	3/3	M3
Thiram 50 WP Dyed	thiram	264-942	Bayer CropScience	24 hrs	>2000	>2000	3/3	M3
Tilt	propiconazole	100-617	Syngenta	12 hrs	1310	>5000	2/1	3
Topsin 4.5 FL	thiophanate-methyl	73545-13-70506	United Phosphorus	1 - 3 days	>5000	>2000	3/2	1
Topsin M WSB	thiophanate-methyl	73545-16-70506	United Phosphorus	1 - 3 days	>5000	>2000	3/2	1
Torino	cyflufenamid	8033-103-10163	Gowan	4 hrs	>2000	>2000	3/1	U6
Trilogy	neem oil	70051-2	Certis	4 hrs	>5000	>2000	-/-	-
Ultra Flourish	mefenoxam	55146-73	NuFarm	48 hrs	>1172	>2020	3/3	4
Vivando	metrafenone	7969-284	BASF	12 hrs	>5000	>5000	-/-	U8
Zampro	ametoctradin / dimethomorph	7969-302	BASF	12 hrs	500-2000	>5000	2/2	45 & 40
Zing!	chlorothalonil / zoxamide	10163-331	Gowan	12 hrs	1750-5000	>5000	3/2	22 & M5
Ziram 76DF	ziram	70506-173	United Phosphorus	48 hrs	1889	>5000	2/3	M3

1. Re-Entry Interval: SL=See Label. Read and follow the label directions. Post areas or give oral warnings that areas have been treated to warn workers not to enter until the REI has elapsed as required by the label.
2. The LD<sub>50</sub> is a standard toxicological term which indicates the number of milligrams (mg) of pesticide per kilogram (kg) of test animal body weight required to kill 50 percent of a test animal population. Values less than 10 indicate extremely high toxicity to mammals. The LD<sub>50</sub> data have been obtained from Material Safety Data Sheets.
3. Leaching / Runoff Potential: 1=high, 2=intermediate, 3=low. These leaching/runoff potential ratings are from the NRCS WIN-PST Pesticide Properties Database at <http://www.nrcs.usda.gov/Kok>
4. FRAC codes are from the following website: [www.frac.info](http://www.frac.info), or taken from the label.

\* = Restricted Use Pesticide. All or certain formulations of these toxicants have been classified as Restricted Use Pesticides.

NA = Not Applicable

## Conversion Equivalents and Abbreviations

### Measurements

1 fluid ounce (fl oz)=2 tablespoons (Tbsp) =  
6 teaspoons

1 cup (c)=8 fluid ounces (fl oz)

1 pint (pt)= 16 fluid ounces (fl oz) =  
32 tablespoons (Tbsp)

1 quart (qt)=2 pints (pts) = 32 fluid  
ounces (fl oz)

1 gallon (gal)=4 quarts (qt) = 128 fluid  
ounces (fl oz)

1 pound (lb)=16 ounces (oz)

1 Acre (A)=43,560 square feet (sq ft)  
=17,424 row feet (ft) for 30 in. rows

ppm=parts per million

### Label Key

B	means Bait
D	means Dust
DF	means Dry Flowable
DG	means Dispersable Granule
EC	means Emulsifiable Concentrate, or Emulsion
F	means Flowable
G	means Granule
L or LC	means Liquid Concentrate
LS	means Liquid Solution
S	means Sprayable
SC	means Suspension Concentrate
SP	means Soluble Powder
μ	means micro
μm	means micrometer
W or WP	means Wettable Powder
RUP	means Restricted Use Pesticide

### Calculation of Banded Rates

To calculate a banded rate from a given broadcast rate, use the following formula:

$$\text{Rate/A needed for banded application} = \frac{\text{Band width in inches} \times \text{Broadcast Rate/A}}{\text{Row spacing in inches}}$$

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# Asparagus

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

## INSECTS

### FOLIAR TREATMENT:

CUTWORM: Apply if >5% of crowns are infested.

#### Carbaryl

- *Carbaryl* 4L, 1 qt. (spears); 2 qt. (fern). (1 day)
- *Sevin* 4 F (1 qt. (spears); 2 qt. (fern)) or *Sevin* 80 S (1.25 to 2.5 lb. (spears); 2.5 to 5 lb. (fern)) or *Sevin* XLR Plus (1 qt. (spears); 2 qt. (fern)) (1 day)

#### Chlorpyrifos

- *Chlorpyrifos* 4E AG, 2 pt. (1 day) (RUP)
- *Govern*, 2 pt. (1 day) (RUP)
- *Hatchet*, 2 pt. (1 day) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced (2 pt.) or *Lorsban* 75 WG (1.33 lb.) (1 day) (RUP)
- *Nufos* 4E, 2 pt. (1 day) (RUP)
- *Vulcan*, 2 pt. (1 day) (RUP)
- *Warhawk*, 2 pt. (1 day) (RUP)
- *Whirlwind*, 2 pt. (1 day) (RUP)

*Javelin* WG, 0.12 to 1.5 lb. (0 days)

#### Methomyl

- *Lannate* LV (1.5 to 3 pt.) or *Lannate* SP (0.5 to 1 lb.) (1 day) (RUP)
- *Nudrin* LV (1.5 to 3 pt.) or *Nudrin* SP (0.5 to 1 lb.) (1 day) (RUP)

#### Permethrin

- *Ambush* 25 W, 3.2 to 6.4 oz. (1 day) (RUP)
- *Perm-UP* 25DF (3.2 to 6.4 oz.) or *Perm-UP* 3.2 EC (2 to 4 oz.) (1 day) (RUP)
- *Pounce* 25 WP, 3.2 to 6.4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 1 qt. (spears); 2 qt. (fern). (1 day)

*Sevin* 4 F (1 qt. (spears); 2 qt. (fern)) or *Sevin* 80 S (1.25 to 2.5 lb. (spears); 2.5 to 5 lb. (fern)) or *Sevin* XLR Plus (1 qt. (spears); 2 qt. (fern)) (1 day)

ASPARGUS BEETLE: Apply during harvest season if >2% of spears have eggs or >5% of plants are infested with common asparagus beetle. Treat after harvest if defoliation exceeds 10%.

#### Carbaryl

- *Carbaryl* 4L, 1 qt. (spears); 2 qt. (fern). (1 day)
- *Sevin* 4 F (1 qt. (spears); 2 qt. (fern)) or *Sevin* 80 S (1.25 to 2.5 lb. (spears); 2.5 to 5 lb. (fern)) or *Sevin* XLR Plus (1 qt. (spears); 2 qt. (fern)) (1 day)

#### Chlorpyrifos

- *Chlorpyrifos* 4E AG, 2 pt. (1 day) (RUP)
- *Govern*, 2 pt. (1 day) (RUP)
- *Hatchet*, 2 pt. (1 day) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced (2 pt.) or *Lorsban* 75 WG (1.33 lb.) (1 day) (RUP)
- *Nufos* 4E, 2 pt. (1 day) (RUP)
- *Vulcan*, 2 pt. (1 day) (RUP)
- *Warhawk*, 2 pt. (1 day) (RUP)
- *Whirlwind*, 2 pt. (1 day) (RUP)

#### Dimethoate

- *Dimethoate* 4 EC, *Dimethoate* 400, *Dimethoate* 4E, 1 pt.. (180)

#### Malathion

- *Malathion* 57 EC (1.5 to 2 pt.) or *Malathion* 8 Aquamul (1.25 pt.) (1 day)

#### Methomyl

- *Lannate* LV (1.5 to 3 pt.) or *Lannate* SP (0.5 to 1 lb.) (1 day) (RUP)
- *Nudrin* LV (1.5 to 3 pt.) or *Nudrin* SP (0.5 to 1 lb.) (1 day) (RUP)

#### Permethrin

- *Ambush* 25 W, 3.2 to 6.4 oz. (1 day) (RUP)
- *Perm-UP* 25DF (3.2 to 6.4 oz.) or *Perm-UP* 3.2 EC (2 to 4 oz.) (1 day) (RUP)
- *Pounce* 25 WP, 3.2 to 6.4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 4 to 8 fl oz. (60 days) Fern Treatment Only.

*Carbaryl* 4L, 1 qt. (spears); 2 qt. (fern). (1 day)

*Sevin* 4 F (1 qt. (spears); 2 qt. (fern)) or *Sevin* 80 S (1.25 to 2.5 lb. (spears); 2.5 to 5 lb. (fern)) or *Sevin* XLR Plus (1 qt. (spears); 2 qt. (fern)) (1 day)

#### Spinosad

- *Entrust* (1.25 to 2 oz.) or *Entrust* SC (4 to 6 fl oz.) (60 days) Fern treatment only.

ASPARGUS APHIDS: Apply if >5% of ferns show injury.

*Assail* 70WP, 2.3 oz/A. (1) Do not make more than 2 applications per growing season

*Assail* 70WP, 1.1 to 2.3 oz/A. (1)

#### Chlorpyrifos

- *Chlorpyrifos* 4E AG, 2 pt. (1 day) (RUP)
- *Govern*, 2 pt. (1 day) (RUP)
- *Hatchet*, 2 pt. (1 day) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced (2 pt.) or *Lorsban* 75 WG (1.33 lb.) (1 day) (RUP)
- *Nufos* 4E, 2 pt. (1 day) (RUP)
- *Vulcan*, 2 pt. (1 day) (RUP)
- *Warhawk*, 2 pt. (1 day) (RUP)
- *Whirlwind*, 2 pt. (1 day) (RUP)

#### Dimethoate

- *Dimethoate* 4 EC, *Dimethoate* 400, *Dimethoate* 4E, 1 pt.. (180) Post harvest only.

*Fulfill*, 2.75 oz. (170 days) Fern application only. May require 5 to 7 days for aphid mortality.

*Malathion* 57 EC, 1.5 to 2 pt. (1 day)

*Pyrenone*, 1 to 12 fl oz. (0 days)

PLANT BUGS: Apply if >5% of new growth shows tip die-back injury.

Permethrin. Fern treatment only.

- *Perm-UP* 25DF (6.4 oz.) or *Perm-UP* 3.2 EC (4 oz.) (1 day) (RUP)
- *Pounce* 25 WP, 6.4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

#### THRIPS:

*Assail* 70WP, 2.3 oz/A. (1) Do not make more than 2 applications per growing season

#### Malathion

- *Malathion* 57 EC (1.5 to 2 pt.) or *Malathion* 8 Aquamul (1.25 pt.) (1 day)

*Pyrenone*, 1 to 12 fl oz. (0 days)

#### ARMYWORM:

#### Bacillus thuringiensis

- *Biobit* HP, 0.5 to 2 lb. (0 days)
- *DiPel* DF, 0.5 to 2 lb. (0 days)
- *Javelin* WG, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

## Beans, Snap

### Chlorpyrifos

- *Chlorpyrifos* 4E AG, 2 pt. (1 day) (RUP)
- *Govern*, 2 pt. (1 day) (RUP)
- *Hatchet*, 2 pt. (1 day) (RUP)
- *Lorsban* 4 E / *Lorsban Advanced* (2 pt.) or *Lorsban 75 WG* (1.33 lb.) (1 day) (RUP)
- *Nufos* 4E, 2 pt. (1 day) (RUP)
- *Vulcan*, 2 pt. (1 day) (RUP)
- *Warhawk*, 2 pt. (1 day) (RUP)
- *Whirlwind*, 2 pt. (1 day) (RUP)

*Coragen*, 3.5 to 5 fl oz. (1 day)

### Methomyl

- *Lannate* LV (1.5 to 3 pt.) or *Lannate* SP (0.5 to 1 lb.) (1 day) (RUP)
- *Nudrin* LV (1.5 to 3 pt.) or *Nudrin* SP (0.5 to 1 lb.) (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

**BROWN STINK BUG:**

**JAPANESE BEETLE, TARNISHED PLANT BUG:**

*Assail* 70WP, 2.3 oz/A. (1) Do not make more than 2 applications per growing season

**ASPARAGUS MINER: suppression**

*Assail* 70WP, 2.3 oz/A. (1) Do not make more than 2 applications per growing season

**LEAFHOPPERS:**

*Assail* 70WP, 1.1 to 1.7 oz.. (1) Do not make more than 2 applications per growing season

**ASPARAGUS BEETLE, SPOTTED ASPARAGUS BEETLE:**

*Assail* 70WP, 1.1 to 2.3 oz/A. (1) Do not make more than 2 applications per growing season

**WHITEFLIES:**

*Movento*, 4 to 5 fl oz. (1 day)

## DISEASES

**PRE-PLANT FUMIGATION:** Soil sterilization by fumigation is best achieved by proper application of material. Correct soil moisture, temperature, and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or immediate tarping.

**CROWN NURSERY:**

**FUSARIUM CROWN ROT, ROOT ROT:**

1,3 Dichloropropene/chloropicrin

- *Telone* C35, 13-35 gal. (RUP)

Metam Potassium

- *Sectagon-K54*, 30-60 gal. (RUP)

Metam Sodium

- *Sectagon* 42, 37.5-75 gal. (RUP)

**CROWN SOAK:**

**FUSARIUM CROWN ROT:**

Fludioxinil

- *Cannonball*, 0.5 oz/100 gal. (180 days)

Mancozeb

- *Dithane* M-45, 1.0 lb/100 gal. (180 days)
- *Koverall*, 1 lb/100 gal.
- *Manzate* Max, 0.8 qt/100 gal. (180 days)
- *Penncozeb* 75 DF, 1.0 lb/100 gal. (180 days)
- *Penncozeb* 80WP, 1.0 lb/100 gal. (180 days)

**FOLIAR TREATMENT:**

**RUST (*Puccinia asparagi*):** Apply after harvest (fern growth only).

\* Tebuconazole

- *Orius* 3.6F, *Tebuzol* 3.6, 4-6 fl oz. (180 days) Maximum 3 applications per season. Maximum 18 fl oz/acre/season. 12 hr REI.

### Chlorothalonil

- *Bravo* Ultrex, *Equus* DF, 1.8 to 3.6 lb. (0 days) Every 14 to 28 days.
- *Bravo* Weather Stik, *Echo* 720, *Equus* 720 SST, 2 to 4 pt. (190 days)
- *Echo* Zn, 3.0 to 5.75 pts. (190)

### Mancozeb

- *Dithane* DF Rainshield, *Dithane* M-45, 2 lb. (180 days)
- *Dithane* F-45 Rainshield, 1.6 qt. (180 days)
- *Koverall*, 2 lb. (180 days)
- *Manzate* Max, 1.6 qt. (180 days)
- *Manzate* Pro-Stick, 2 lb. (180 days) Maximum 8 lb/season.
- *Penncozeb* 75 DF, 2 lb. (180 days) Maximum 8 lb/season.
- *Penncozeb* 80WP, 2.0 lb. (180 days)

### Myclobutanil

- *Rally* 40 WSP, 5 oz. (180 days) At least every 14 days, 6 applications maximum.

### Sulfur

- *Kumulus* DF, *Thiolux*, 10 to 30 lb. (0 days)
- *Microthiol* Disperss, 10 to 30 lb. (0 days)
- *Sulfur* DF, 10 to 30 lb. (0 days)

**Note:** Control will be limited under heavy disease pressure. PHYTOPHTHORA SPEAR ROT, CROWN ROT: Apply 30 to 60 days before first cutting, and another application just before harvest in a minimum of 10 gal of water.

### Mefenoxam

- *Ridomil* Gold SL, 1 pt. (1 day)
- *Ultra* Flourish, 2 pt. (1 day)

### Mono-, dibasic sodium salts of phosphorous acid

- *Fosphite*, 1 to 3 qt per 20 gal (ground) or 10 gal (aerial) of water. (0 days)

### Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 2.5 to 5 pt. (0 days) Apply to full fern.
- *Prophyt*, 2 to 4 pt. (0 days)

**PURPLE SPOT (*Stemphylium vesicarium*):**

### \* Chlorothalonil

- *Bravo* Ultrex, *Equus* DF, 1.8 to 3.6 lb. (190 days) Every 14 to 28 days.
- *Bravo* Weather Stik, *Echo* 720, *Equus* 720 SST, 2 to 4 pt. (190 days)

### \* Trifloxystrobin

- *Flint*, 3 to 4 oz. (180 days) No more than 12 oz year, rotate with other non-strobilurin products.

### Azoxystrobin

- *Quadris*, 6.0-15.0 fl oz every 7-14 days. (100 days)

Do not apply more than one foliar application *Quadris* or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

**Note:** Products labeled for rust control may be helpful for purple spot control

## Beans, Snap

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

**NEMATODES****SOIL TREATMENT:**Ethoprop

- *Mocap* 15 G, 40 to 54 lb/A. Broadcast from 3 days prior to planting to at-planting time and incorporate to a depth of 4 inches. (RUP)

**PLANTING TREATMENT:**Ethoprop

- *Mocap* 15 G, 13 to 20 lb. (36 inch row spacing) In a 12- to 15-inch band over the row. Do not allow spray or granules to contact the seed. (RUP)

**INSECTS**

**SEED TREATMENT:** Treatments are applied to seed prior to planting. Insecticide and fungicide treatments can be combined according to directions. Handle seed carefully to prevent cracking.

MEXICAN BEAN BEETLE, APHIDS, SEED CORN MAGGOT, BEAN LEAF BEETLE, LEAFHOPPERS: Early season control.

*Cruiser* 5 FS, 1.28 fl oz/100 lb seed.

SEED CORN MAGGOT:

*Lorsban* 50 W, 2 oz/100 lb seed. (RUP)

**PLANTING TREATMENT:**

LEAFHOPPERS, APHIDS:

Imidacloprid

- *Admire* Pro, 7 to 10.5 fl oz. (21 days) See label for application method.
- *Nuprid* 2 F, 16 to 24 fl oz. (21 days) Apply preplant, in furrow, or as a post-planting drench.

*Sivanto*, 7 - 10.5 fl oz/A.

CUTWORM:

*Capture* LFR, 3.4 to 6.8 fl oz. (RUP)

*Diazinon* 50 W, 4 to 8 lb. (RUP)

APHIDS, LEAFHOPPERS, PLANT BUGS, SEEDCORN MAGGOT:

*Thimet* 20 G, 4.5 to 7.0 oz/1000 row ft. (RUP)

MEXICAN BEAN BEETLE:

*Thimet* 20 G, 4.9 to 9.4 oz/1000 row ft. (RUP)

SEEDCORN MAGGOT:

Bifenthrin

- *Brigade* WSB, 8 to 16 oz. (RUP)
- *Capture* LFR, 3.4 to 6.8 fl oz. (RUP)

Chlorpyrifos

- *Chlorpyrifos* 4E AG, . (RUP)
- *Govern*, . (RUP)
- *Hatchet*, . (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced, *Lorsban* 75 WG, . (RUP)
- *Nufos* 4E, . (RUP)
- *Vulcan*, . (RUP)
- *Whirlwind*, . (RUP)

See labels for rates.

WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

**FOLIAR TREATMENT:**

LEAFHOPPERS: Apply when 5 or more are seen per ft of row (2/ft for seedlings).

\* Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)

Acephate

- *Acephate* 90 WDG (0.55 to 1.11 lb.) or *Acephate* 90 WSP (0.5 to 1.1 lb.) or *Acephate* 97 (0.5 to 1 lb.) or *Acephate* 97 UP (0.5 to 1 lb.) (14 days)
- *Bracket* 97, 8 to 16 oz. (14 days)
- *Orthene* 97, 8 to 16 oz. (14 days)

Acetamiprid

- *Assail* 30 SG (2.5 to 5.3 oz.) or *Assail* 70WP (1 to 2.3 oz.) (7 days)

Bifenthrin

- *Bifenture* 10 DF, 4 to 16 oz/A. (3 days)
- *Bifenture* EC, 1.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (1.6 to 6.4 fl oz.) or *Brigade* WSB (4 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 1.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 1.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 1.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 1.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 1.6 to 6.4 fl oz. (3 days) (RUP)

Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 5.5 fl oz. (7 days) (RUP)
- *Swagger*, 7.6 to 11 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

Carbaryl

- *Carbaryl* 4L, 1 qt. (3 days)
- *Sevin* 4 F, *Sevin* XLR Plus, 1 qt. (3 days)

*Dibrom* 8 Emulsive, 1 pt. (1 day) (RUP)

Dimethoate

- *Dimethoate* 4 EC, *Dimethoate* 400, *Dimethoate* 4E, 0.5 to 1 pt. (0 days)

Esfenvalerate

- *Adjourn*, 2.9 to 5.8 fl oz. (3 days) (RUP)
- *Asana* XL, 2.9 to 5.8 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 2.9 to 5.8 fl oz. (3 days) (RUP)

**Note:** Do not allow livestock to graze treated fields. Do not harvest treated bean vines for livestock forage, fodder or hay.

Imidacloprid

- *Admire* Pro, 1.2 fl oz. (7 days)
- *Nuprid* 1.6 F, 3.5 fl oz. (7 days) Do not exceed 10.5 oz/Acre per season.

*Leverage* 360, 2.4 to 2.8 fl oz. (7 days) (RUP)

Malathion

- *Malathion* 5 (15.6 fl oz - aerial application only) or *Malathion* 5 EC (2 pt.) or *Malathion* 8 (1.5 pt.) (7 days for *Malathion* 5, 1 day for others)

Methomyl

- *Lannate* LV (0.75 to 3 pt. (1.5 pt. or less, 1 day; over 1.5 pt., 3 days)) or *Lannate* SP (0.25 to 1 lb. (0.5 lb. or less, 1 day; over 0.5 lb., 3 days)) (RUP)
- *Nudrin* LV (0.75 to 3 pt (1.5 pt or less, 1 day; over 1.5 pt, 3 days)) or *Nudrin* SP (0.25 to 1 lb. (0.5 lb. or less, 1 day; over 0.5 lb., 3 days)) (RUP)

*Mustang* Max, 2.72 to 4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 1 qt. (3 days)

*Sevin* 4 F, *Sevin* XLR Plus, 1 qt. (3 days)

*Sivanto*, 7 - 10.5 fl oz/A.

*Vetiva*, 13.6 to 17 fl oz. (14 days)

## Beans, Snap

EUROPEAN CORN BORER: Treat at bud-bloom stage. Use higher rates and/or more frequent application during periods of high adult activity and egg laying.

### \* Acephate

- *Acephate* 90 WDG (0.83 to 1.11 lb.) or *Acephate* 90 WSP (0.8 to 1.1 lb.) or *Acephate* 97 (0.75 to 1 lb.) or *Acephate* 97 UP (0.75 to 1 lb.) (14 days)
- *Bracket* 97, 12 to 16 oz. (14 days)
- *Orthene* 97, 12 to 16 oz. (14 days)

### \* Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (3 days)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (3 days) (RUP)

*Belt* SC, 2 to 3 fl oz. (1 day)

### Bifenthrin + Imidacloprid

- *Brigadier*, 5.5 fl oz. (7 days) (RUP)
- *Swagger*, 10.2 to 11 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

### Carbaryl

- *Carbaryl* 4L, 1 to 1.5 qt. (3 days)
- *Sevin* 4 F, *Sevin* XLR Plus, 1 to 1.5 qt. (3 days)

*Coragen*, 3.5 to 5 fl oz. (1 day)

### Esfenvalerate

- *Adjour*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

**Note:** Do not allow livestock to graze treated fields. Do not harvest treated bean vines for livestock forage, fodder, or hay.

*Intrepid* 2F, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (7 days)

*Javelin* WG, 0.12 to 1.5 lb. (0 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)

*Leverage* 360, 2.4 to 2.8 fl oz. (7 days) (RUP)

### Methomyl

- *Lannate* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) **Note:** Do not graze or feed treated bean vines to livestock within 3 days nor bean hay within 7 days of last application. (RUP)
- *Nudrin* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

*Mustang* Max, 2.72 to 4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 3 to 8 fl oz. (3 days)

*Carbaryl* 4L, 1 to 1.5 qt. (3 days)

*Sevin* 4 F, *Sevin* XLR Plus, 1 to 1.5 qt. (3 days)

### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (3 days)
- Vetiva*, 12 to 17 fl oz. (14 days)

BEAN LEAF BEETLE: Feeding on seedlings can cause severe defoliation. Treat if numbers exceed 1 per plant or defoliation exceeds 50%. A preharvest application may also be necessary to prevent pod damage.

### Acephate

- *Acephate* 90 WDG (0.55 to 1.11 lb.) or *Acephate* 90 WSP (0.5 to 1.1 lb.) or *Acephate* 97 (0.5 to 1 lb.) or *Acephate* 97 UP (0.5 to 1 lb.) (14 days)
- *Bracket* 97, 8 to 16 oz. (14 days)
- *Orthene* 97, 8 to 16 oz. (14 days)

### Acetamiprid

- *Assail* 30 SG (2.5 to 5.3 oz.) or *Assail* 70WP (1 to 2.3 oz.) (7 days)

### Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (3 days)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (3 days) (RUP)

### Bifenthrin + Imidacloprid

- *Brigadier*, 5.5 fl oz. (7 days) (RUP)
- *Swagger*, 10.2 to 11 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

### Carbaryl

- *Carbaryl* 4L, 0.5 to 1 qt. (3 days)
- *Sevin* 4 F, *Sevin* XLR Plus, 0.5 to 1 qt. (3 days)

### Dimethoate

- *Dimethoate* 4 EC, *Dimethoate* 400, *Dimethoate* 4E, 0.5 to 1 pt. (0 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)

*Leverage* 360, 2.4 to 2.8 fl oz. (7 days) (RUP)

### Malathion

- *Malathion* 5 (15.6 fl oz - aerial application only) or *Malathion* 5 EC (2 pt.) or *Malathion* 8 (1.5 pt.) (7 days for *Malathion* 5, 1 day for others)

*Mustang* Max, 2.72 to 4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Rimon* 0.83EC, 9 to 12 fl oz. (1 day)

*Carbaryl* 4L, 0.5 to 1 qt. (3 days)

*Sevin* 4 F, *Sevin* XLR Plus, 0.5 to 1 qt. (3 days)

CORN EARWORM: Treat from bud stage to 7 days before harvest if significant numbers of adults are being trapped in pheromone traps.

### Acephate

- *Acephate* 90 WDG (0.83 to 1.11 lb.) or *Acephate* 90 WSP (0.8 to 1.1 lb.) or *Acephate* 97 (0.75 to 1 lb.) or *Acephate* 97 UP (0.75 to 1 lb.) (14 days)
- *Bracket* 97, 12 to 16 oz. (14 days)
- *Orthene* 97, 12 to 16 oz. (14 days)

*Belt* SC, 2 to 3 fl oz. (1 day)

### Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (3 days)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (3 days) (RUP)

- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade WSB* (5.3 to 16 oz.) (3 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)

Bifenthrin + Imidacloprid

- *Brigadier*, 5.5 fl oz. (7 days) (RUP)
- *Swagger*, 10.2 to 11 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

Carbaryl

- *Carbaryl 4L*, 0.5 to 1.5 qt. (3 days)
- *Sevin 4 F*, *Sevin XLR Plus*, 0.5 to 1.5 qt. (3 days)

*Coragen*, 3.5 to 5 fl oz. (1 day)

Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

**Note:** Do not allow livestock to graze treated fields. Do not harvest treated bean vines for livestock forage, fodder, or hay.

*Javelin WG*, 0.12 to 1.5 lb. (0 days)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior II with Zeon Technology* (1.28 to 1.92 fl oz.) or *Warrior with Zeon Technology* (2.56 to 3.84 fl oz.) (7 days) (RUP)

*Leverage 360*, 2.4 to 2.8 fl oz. (7 days) (RUP)

Methomyl

- *Lannate LV* (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate SP* (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)
- *Nudrin LV* (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin SP* (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

*Mustang Max*, 2.72 to 4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant SC*, 4 to 8 fl oz. (3 days) Minimum of 4 days between applications; do not apply more than 28 fl oz. per season.

*Carbaryl 4L*, 0.5 to 1.5 qt. (3 days)

*Sevin 4 F*, *Sevin XLR Plus*, 0.5 to 1.5 qt. (3 days)

Spinosad

- *Entrust* (1.25 to 2 oz.) or *Entrust SC* (4 to 6 fl oz.) (3 days)

*Vetica*, 12 to 17 fl oz. (14 days)

**CUTWORM:** Cutworm feed on plants close to soil surface. Control may be applied when the crop first comes up and as needed.

\* Bifenthrin

- *Bifenture 10 DF*, 5.3 to 16 oz/A. (3 days)
- *Bifenture EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade WSB* (5.3 to 16 oz.) (3 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Empower*, 3.5 to 8.7 lb. (3 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)

Acephate

- *Acephate 90 WDG* (0.83 to 1.11 lb.) or *Acephate 90 WSP* (0.5 to 1.1 lb.) or *Acephate 97* (0.5 to 1 lb.) or *Acephate 97 UP* (0.5 to 1 lb.) (14 days)

- *Bracket 97*, 8 to 16 oz. (14 days)

- *Orthene 97*, 8 to 16 oz. (14 days)

*Belt SC*, 2 to 3 fl oz. (1 day)

Bifenthrin + Imidacloprid

- *Brigadier*, 5.5 fl oz. (7 days) (RUP)
- *Swagger*, 10.2 to 11 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

Carbaryl

- *Carbaryl 4L*, 1 to 1.5 qt. (3 days)
- *Sevin 4 F*, *Sevin XLR Plus*, 1 to 1.5 qt. (3 days)

Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

Do not allow livestock to graze treated fields. Do not harvest treated bean vines for livestock forage, fodder, or hay.

*Javelin WG*, 0.12 to 1.5 lb. (0 days)

Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (7 days) (RUP)
- *Warrior II with Zeon Technology* (0.96 to 1.6 fl oz.) or *Warrior with Zeon Technology* (1.92 to 3.2 fl oz.) (7 days) (RUP)

*Leverage 360*, 2.4 to 2.8 fl oz. (7 days) (RUP)

Methomyl

- *Lannate LV* (1.5 pt.) or *Lannate SP* (0.5 lb.) (1 day) **Note:** Do not graze or feed treated bean vines to livestock within 3 days nor bean hay within 7 days of last application. (RUP)
- *Nudrin LV* (1.5 pt.) or *Nudrin SP* (0.5 lb.) (1 day) (RUP)

*Mustang Max*, 1.28 to 4 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl 4L*, 1 to 1.5 qt. (3 days)

*Sevin 4 F*, *Sevin XLR Plus*, 1 to 1.5 qt. (3 days)

*Vetica*, 12 to 17 fl oz. (14 days)

**MEXICAN BEAN BEETLE:** Apply if there is more than 1 adult/2 plants or 1 egg mass/ft. of row.

Acephate. Also registered for bean leaf beetle.

- *Acephate 90 WDG* (0.55 to 1.11 lb.) or *Acephate 90 WSP* (0.5 to 1.1 lb.) or *Acephate 97* (0.5 to 1 lb.) or *Acephate 97 UP* (0.5 to 1 lb.) (14 days)

- *Bracket 97*, 8 to 16 oz. (14 days)

- *Orthene 97*, 8 to 16 oz. (14 days)

Acetamiprid

- *Assail 30 SG* (2.5 to 5.3 oz.) or *Assail 70WP* (1 to 2.3 oz.) (7 days)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

*Brigadier*, 5.5 fl oz. (7 days) (RUP)

Carbaryl. Also registered for bean leaf beetle.

- *Carbaryl 4L*, 0.5 to 1 qt. (3 days)

- *Sevin 4 F*, *Sevin XLR Plus*, 0.5 to 1 qt. (3 days)

Dimethoate

- *Dimethoate 4 EC*, *Dimethoate 400*, *Dimethoate 4E*, 0.5 to 1 pt. (0 days)

Esfenvalerate

- *Adjourn*, 2.9 to 5.8 fl oz. (3 days) (RUP)

## Beans, Snap

- *Asana* XL, 2.9 to 5.8 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 2.9 to 5.8 fl oz. (3 days) (RUP)

**Note:** Do not allow livestock to graze treated fields. Do not harvest treated bean vines for livestock forage, fodder or hay.

### Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (7 days) (RUP)
- *Warrior* II with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (7 days) (RUP)

*Leverage* 360, 2.4 to 2.8 fl oz. (7 days) (RUP)

### Malathion

- *Malathion* 5 (15.6 fl oz - aerial application only) or *Malathion* 5 EC (1.5 to 2 pt.) or *Malathion* 8 (1.5 pt.) (7 days for *Malathion* 5, 1 day for others)

### Methomyl

- *Lannate* LV (0.75 to 3 pt. (1.5 pt. or less, 1 day; over 1.5 pt., 3 days)) or *Lannate* SP (0.25 to 1 lb. (0.5 lb. or less, 1 day; over 0.5 lb., 3 days)) **Note:** Do not graze or feed treated bean vines to livestock within 3 days, nor bean hay within 7 days of last application. (RUP)
- *Nudrin* LV (0.75 to 3 pt. (1.5 pt. or less, 1 day; over 1.5 pt., 3 days)) or *Nudrin* SP (0.25 to 1 lb. (0.5 lb. or less, 1 day; over 0.5 lb., 3 days)) (RUP)

*Mustang* Max, 2.72 to 4 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Rimon* 0.83EC, 9 to 12 fl oz. (1 day)

*Carbaryl* 4L, 0.5 to 1 qt. (3 days)

*Sevin* 4 F, *Sevin* XLR Plus, 0.5 to 1 qt.. (3 days)

TARNISHED PLANT BUG: Treat if numbers exceed 1 per 5ft of row.

### Acephate

- *Acephate* 90 WDG (0.55 to 1.11 lb.) or *Acephate* 90 WSP (0.5 to 1.1 lb.) or *Acephate* 97 (0.5 to 1 lb.) or *Acephate* 97 UP (0.5 to 1 lb.) (14 days)
- *Bracket* 97, 8 to 16 oz. (14 days)
- *Orthene* 97, 8 to 16 oz. (14 days)

### Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (3 days)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @* 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (3 days) (RUP)

### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 5.5 fl oz. (7 days) (RUP)
- *Swagger*, 7.6 to 11 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero* EW (11.2 oz.) (3 days) (RUP)

### Carbaryl

- *Carbaryl* 4L, 1 to 1.5 qt. (3 days)
- *Sevin* 4 F, *Sevin* XLR Plus, 1 to 1.5 qt.. (3 days)

*Dibrom* 8 Emulsive, 1 pt. (1 day) (RUP)

### Dimethoate

- *Dimethoate* 4 EC, *Dimethoate* 400, *Dimethoate* 4E, 0.5 to 1 pt. (0 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)

*Leverage* 360, 2.4 to 2.8 fl oz. (7 days) (RUP)

### Malathion

- *Malathion* 5 (15.6 fl oz - aerial application only) or *Malathion* 5 EC (2 pt.) (7 days for *Malathion* 5, 1 day for 5 EC)

### Methomyl

- *Lannate* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (1 day) **Note:** Do not graze or feed treated bean vines to livestock within 3 days, nor bean hay within 7 days of last application. (RUP)
- *Nudrin* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Rimon* 0.83EC, 12 fl oz. (1 day)

*Carbaryl* 4L, 1 to 1.5 qt. (3 days)

*Sevin* 4 F, *Sevin* XLR Plus, 1 to 1.5 qt.. (3 days)

GREEN CLOVERWORM: Apply when damage to leaves is seen.

### Acephate

- *Acephate* 90 WDG (0.55 to 1.11 lb.) or *Acephate* 90 WSP (0.5 to 1.1 lb.) or *Acephate* 97 (0.5 to 1 lb.) or *Acephate* 97 UP (0.5 to 1 lb.) (14 days)
- *Bracket* 97, 8 to 16 oz. (14 days)
- *Orthene* 97, 8 to 16 oz. (14 days)

### Bacillus thuringiensis

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *Biobit* HP, 0.5 to 1 lb. (0 days)
- *DiPel* DF (0.25 to 1 lb.) or *DiPel* ES (1 to 2 pt.) (0 days)
- *Javelin* WG, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Belt* SC, 2 to 3 fl oz. (1 day)

### Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (1 day)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @* 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (3 days) (RUP)

### Bifenthrin + Imidacloprid

- *Brigadier*, 5.5 fl oz. (7 days) (RUP)
- *Swagger*, 10.2 to 11 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

### Carbaryl

- *Carbaryl* 4L, 0.5 to 1 qt. (3 days)
- *Sevin* 4 F, *Sevin* XLR Plus, 0.5 to 1 qt.. (3 days)

### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

**Note:** Do not allow livestock to graze treated fields. Do not allow harvest treated bean vines for livestock forage, fodder, or hay.

### Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (7 days) (RUP)
- *Warrior* II with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (7 days) (RUP)

*Leverage* 360, 2.4 to 2.8 fl oz. (7 days) (RUP)

*Mustang* Max, 2.72 to 4 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (7 days) (RUP)  
*Pyrenone*, 1 to 12 fl oz. (0 days)  
*Carbaryl* 4L, 0.5 to 1 qt. (3 days)  
*Sevin* 4 F, *Sevin* XLR Plus, 0.5 to 1 qt.. (3 days)  
*Vetica*, 12 to 17 fl oz. (14 days)

APHIDS: Apply if numbers exceed 1 per leaf.

\* Acephate

- *Acephate* 90 WDG (0.55 to 1.11 lb.) or *Acephate* 90 WSP (0.5 to 1.1 lb.) or *Acephate* 97 (0.5 to 1 lb.) or *Acephate* 97 UP (0.5 to 1 lb.) (14 days)
- *Bracket* 97, 8 to 16 oz. (14 days)
- *Orthene* 97, 8 to 16 oz. (14 days)

\* Dimethoate

- *Dimethoate* 4 EC, *Dimethoate* 400, *Dimethoate* 4E, 0.5 to 1 pt. (0 days)

\* Imidacloprid

- *Admire* Pro, 1.2 fl oz. (7 days)
- *Nuprid* 1.6 F, 3.5 fl oz. (7 days) Do not exceed 10.5 oz/Acre per season.

Acetamiprid

- *Assail* 30 SG (2.5 to 5.3 oz.) or *Assail* 70WP (1 to 2.3 oz.) (7 days)

Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (3 days)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @* 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (3 days) (RUP)

Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 5.5 fl oz. (7 days) (RUP)
- *Swagger*, 7.6 to 11 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

*Dibrom* 8 Emulsive, 1 pt. (1 day) (RUP)

Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

**Note:** Do not allow livestock to graze treated fields. Do not allow harvest treated bean vines for livestock forage, fodder, or hay.

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)

*Leverage* 360, 2.4 to 2.8 fl oz. (7 days) (RUP)

Malathion

- *Malathion* 5 (15.6 fl oz - aerial application only) or *Malathion* 5 EC (2 pt.) or *Malathion* 8 (1.5 pt.) (7 days for *Malathion* 5, 1 day for others)

Methomyl

- *Lannate* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

*Movento*, 4 to 5 fl oz. (1 day)

*Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 7 - 10.5 fl oz/A.

WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

## MITES

Apply to underside of leaves as needed. Most serious in dry years.

Bifenazate

- *Acramite* 4SC (16 to 24 fl oz.) or *Acramite* 50WS (1 to 1.5 lbs.) (3 days)

Bifenthrin

- *Bifenture* EC, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Bifenture* 10 DF, 12.8 to 16 oz/A. (3 days)
- *Brigade @* 2EC (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (3 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero* EW (11.2 oz.) (21 days) (RUP)

Dimethoate

- *Dimethoate* 4 EC, 1 pt. (7 days) **Note:** Do not feed treated forage to livestock.

Malathion

- *Malathion* 5 (15.6 fl oz - aerial application only) or *Malathion* 8 (1.5 pt.) (7 days for *Malathion* 5, 1 day for *Malathion* 8)

Naled

- *Dibrom* 8 Emulsive, 1 pt. (1 day) (RUP)

Phorate

- *Thimet* 20 G, 4.5 to 7.0 oz/1000 row ft. (60 days) Planting treatment. (RUP)

## DISEASES

### SEED TREATMENT:

DAMPING OFF (*Pythium* spp., *Rhizoctonia solani*, early season *Phytophthora*, *Fusarium* spp.):

Captan

- *Captan* 4 Flowable, 2.6 fl oz/100 lb seed.

Fludioxinil

- *Maxim* 4 FS, 0.08 to 0.16 fl oz/100 lb seed. Commercial seed treatment plants only. (*Fusarium*, *Rhizoctonia*).

Fludioxinil + mephenoxam

- *Apron* Maxx RFC (1.5 fl oz/100 lb seed) or *Apron* Maxx RTA (5 fl oz/100 lb seed) or *Maxim* XL (0.167 to 0.334 fl oz/100 lb seed)

Mefenoxam

- *Apron* XL LS, 0.32 to 0.64 fl oz/100 lb seed. *Pythium* and *Phytophthora* only.

Metalaxyl

- *Allegiance-FL*, 0.75 to 1.5 oz/100 lb seed. *Pythium* and *Phytophthora*.
- *Apron* 50 W, 1/2 to 1 oz/100 lb seed. *Phytophthora*.

Thiram

- 42-S Thiram, *Thiram* 480DP, *Thiram* 50 WP Dyed, 2 oz/100 lb seed.

### PREPLANT INCORPORATED:

DAMPING OFF (*Pythium* and *Phytophthora* spp. and *Rhizoctonia solani*):

Mefenoxam + PCNB

- *Ridomil* Gold PC, 3/4 lb/1,000 linear feet of row. Apply at the time of planting (*Pythium* and *Rhizoctonia* only). **Note:** Do not feed treated vines to livestock.

## Beans, Snap

### FOLIAR TREATMENT:

ANTHRACNOSE (*Colletotrichum lindemuthianum*):

\* Fluxapyroxad + Pyraclostrobin

- *Priaxor* Xemium Brand Fungicide, 4 - 8 fl oz. (7 days)

\* Thiophanate-Methyl

- *Cercobin* 4.1F, 21.8 - 31.7 fl oz. (14 days)
- *Topsin* 4.5 FL, 20-40 fl oz. (14 days) Apply at 10 to 30% bloom, repeat once 4 to 7 days or at peak bloom.
- *Topsin* M 70 WSB, 1 to 1 1/2 lb. (14 days) Apply at 10 to 30% bloom, repeat once 4 to 7 days or at peak bloom.

Azoxystrobin

- *Quadris*, 6.2 - 15.4 fl oz. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 2 pt. (0 days)

Copper Oxychloride + Copper Sulfate

- C-O-C-S WDG, 1.0 to 1.5 lbs. (0 days)

Copper Sulfate

- *Basic* Copper 53 (1.5 lb) or *Basicop* (2 lb) (0 days) Apply at 7 to 10 day intervals when plants are 5 inches.

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Penthiopyrad

- *Fontelis*, 14 - 30 fl oz. (3 days)

BACTERIAL BLIGHT (*Pseudomonas phaseolicola*): Apply as a protective spray and continue at 7- to 14-day intervals through harvest. The treatment is particularly important during wet weather.

Copper Ammonium Carbonate

- *Copper* Count N, 1 to 3 qt. (0 days)

Copper Hydroxide

- *Champ* DP Dry Prill, 0.67 to 2 lb. (0 days)
- *Champ* Formula 2 F, 2/3 to 2 pt. (0 days)
- *Champ/ON* (0.5 to 1.25 lb) or *Champion* WP (1 to 3 lb) or *Nu-Cop* 50 DF (1 to 1.5 lb) or *Nu-Cop* HB (0.5 to 1.5 lb) (0 days)
- *Kocide* 2000, 3/4 to 2 1/4 lb. (0 days)
- *Kocide* 3000, 0.5-1.25 lb. (0 day)
- *Nu-Cop* 3 L, 2/3 to 2 pt. (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 2 pt. (0 days)

Copper Oxychloride + Copper Sulfate

- C-O-C-S WDG, 1.5 lb. (0 days)

Copper Sulfate

- *Basic* Copper 53 (1.5 lb) or *Basicop* (4 lb) (0 days)
- *Cuprofix* Ultra 40 Disperss, 3/4 to 2 lb. (0 days)

RUST (*Uromyces phaseoli typica*): Apply when there are fewer than 10 pustules per plant and repeat every 7 days.

\* Fluxapyroxad + Pyraclostrobin

- *Priaxor* Xemium Brand Fungicide, 4 - 8 fl oz. (7 days)

Chlorothalonil

- *Bravo* Ultrex, *Equus* DF, 1.25 to 2.7 lb. (7 days)
- *Bravo* Weather Stik, 1 3/8 to 3 pt. (7 days) **Note:** Do not feed treated tops to livestock.
- *Echo* 720, *Equus* 720 SST, 1.375 to 3 pt/A. (7 days)
- *Echo* 90 DF, 1.2 to 2.4 lb. (7 days)

Myclobutanil

- *Rally* 40 WSP, 4 to 5 oz. (0 days) **Note:** Do not apply more than 1.25 lb/acre/crop.

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Penthiopyrad

- *Fontelis*, 14 - 30 fl oz. (3 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 4 pt. (7 days)

Sulfur

- *Microthiol* Disperss, 3 to 10 lb. (0 days)
- *Thiolux*, 3 to 10 lb. (0 days)

Tebuconazole

- *Orius* 3.6F, *Tebuzol* 3.6, 4-6 fl oz. (7 days) Maximum 24 fl oz/acre/season. 12 hr REI.

GRAY MOLD (*Botrytis cinerea*):

\* Chlorothalonil. Begin applications during early bloom stage and repeat every 7 days. **Note:** Observe restrictions on feeding of forage.

- *Bravo* Ultrex, *Equus* DF, 2.7 lb.
- *Bravo* Weather Stik, 3 pt.
- *Echo* 720, *Equus* 720 SST, 3 pt. (7 days)
- *Echo* 90 DF, 2.4 lb. (7 days) Every 7-10 days.

\* Fluxapyroxad + Pyraclostrobin

- *Priaxor* Xemium Brand Fungicide, 4 - 8 fl oz. (7 days)

\* Iprodione. Apply at early bloom and again at peak bloom if conditions are favorable for disease development. **Note:** Observe restrictions on feeding of forage. See label for permissible crop rotations.

- *Iprodione* 4L AG, 1.5 to 2 pt.
- *Meteor*, 1.5 - 2.0 pt. (14 days)
- *Rovral*, 1 1/2 to 2 lb. (14 days)
- *Rovral* 4 Flowable, 1/2 to 2 pt. (14 days)

\* Thiophanate-Methyl

- *Cercobin* 4.1F, 21.8 - 31.7 fl oz. (14 days)
- *Topsin* 4.5 FL, 20-30 fl oz (2 applications), 30-40 fl oz (1 application). (14 days)
- *Topsin* M 70 WSB, 1 1/2 to 2 lb. (14 days) Apply once using the higher rate at 50-70% of full bloom or apply twice using the lower rate with first application at 10 to 30% of full bloom and a second application 4 to 7 days later or at peak bloom. **Note:** Observe restrictions on feeding of forage.

Boscalid

- *Endura*, 8 to 11 oz. (7 days)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Penthiopyrad

- *Fontelis*, 14 - 30 fl oz. (3 days)

WHITE MOLD (*Sclerotinia sclerotiorum*):

Boscalid

- *Endura*, 8 to 11 oz. (7 days)

Fluxapyroxad + Pyraclostrobin

- *Priaxor* Xemium Brand Fungicide, 6 - 8 fl oz. (7 days) Suppression only

Iprodione. See label for permissible crop rotations. **Note:** Observe restrictions on feeding of forage.

- *Iprodione* 4L AG, 1.5 to 2 pt. (0 days)
- *Meteor*, 1.5 - 2.0 pt. (14 days)
- *Rovral*, 1 1/2 to 2 lb. (14 days)
- *Rovral* 4 Flowable, 1 1/2 to 2 pt. (14 days) Apply at early bloom and again at peak bloom if conditions are favorable for disease development.

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Penthiopyrad

- *Fontelis*, 16 - 30 fl oz. (3 days)

Thiophanate-Methyl

- *Cercobin* 4.1F, 32.7 - 43.6. (14 days)

- *Topsin* 4.5 FL, 20-40 fl oz. (14 days) Apply at 10 to 30% bloom, repeat once 4 to 7 days or at peak bloom.
- *Topsin M* 70 WSB, 1 to 2 lb. (14 days) Apply once using the higher rate at 50 to 70% of full bloom or apply twice using the lower rate with first application at 10 to 30% of full bloom and a second application 4 to 7 days later or at peak bloom.

**Note:** Observe restrictions on feeding of forage.

DOWNY MILDEW (*Phytophthora nicotianae*):

Mandipropamid

- *Revus*, 8 fl oz. (1 day)

## Beets

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

Sugar beet cyst and northern root-knot nematodes can reduce red beet yields. Fields with soil or root problems of undetermined cause should be tested for nematodes (see Appendix C). If the plant-parasitic nematodes are present in population densities above the economic threshold for red beets, crop rotation or application of a nematicide is recommended. The following nematicides are suitable for control of sugar beet cyst and northern root-knot nematodes in red beet production.

#### FALL SOIL FUMIGATION (BROADCAST):

1,3-D

- *Telone II*, 25 gal/A (muck soil), 9-18 gal/A (mineral soil).

1,3-D and chloropicrin

- *Telone C-17*, 27-30 gal/A (muck soil), 10-21 gal/A (mineral soil). Fumigate in the fall when soil temperatures at a 6-inch depth are above 50F. Inject the fumigant to a soil depth of 8-inches and lightly seal the soil immediately after application. Use soil fumigants only as directed on the label. In some limited situations, soil fumigants can be applied in the spring in Michigan.

Correct soil moisture, temperature and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or by immediate tarping. (RUP)

### INSECTS

#### SOIL TREATMENT:

LEAFHOPPERS, APHIDS, FLEA BEETLE:

Imidacloprid

- *Admire Pro*, 4.4 to 10.5 fl oz. (21 days) See label for application method.
- *Nuprid* 2 F, 10 to 24 fl oz. (21 days) Apply preplant or in furrow.

Thiamethoxam

- *Platinum* (5 to 12 fl oz.) or *Platinum* 75 SG (1.7 to 4.01 oz.) See label for application methods.

CUTWORM:

Diazinon

- *Diazinon* 50 W (4 to 8 lb.) or *Diazinon* AG 500 (2 to 4 qt.) or *Diazinon* AG600 (51 to 102 fl oz.) (RUP)

APHIDS, LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

#### FOLIAR TREATMENT:

FLEA BEETLE: Apply if damage is noted on leaves.

*Actara*, 1.5 to 3 oz. (7 days)

*Baythroid XL*, 1.6 to 2.4 fl oz. (0 days) (RUP)

Bifenthrin

- *Bifenture* 10 DF, 12.8 to 16 oz/A. (1 day)
- *Bifenture* EC, 5.12 to 6.4 fl oz. (1 day) (RUP)
- *Brigade @* 2EC (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (1 day) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (1 day) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (1 day) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (1 day) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (2.6 to 6.1 oz.) or *Hero* EW (2.8 to 6.7 oz.) (21 days) (RUP)
- *Steed*, 2.5 to 3.5 fl oz. (21 days) (RUP)

Carbaryl

- *Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (7 days)

Imidacloprid

- *Admire Pro*, 1.2 fl oz. (7 days)
- *Nuprid* 1.6 F, 3.5 fl oz. (7 days) Do not exceed 10.5 oz/Acre per season.

*Malathion* 8, 2.5 pt. (7 days)

*Mustang Max*, 1.76 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (7 days)

APHIDS: Apply as soon as they appear.

*Actara*, 1.5 to 3 oz. (7 days)

Bifenthrin

- *Bifenture* 10 DF, 12.8 to 16 oz/A. (1 day)
- *Bifenture* EC, 5.12 to 6.4 fl oz. (1 day) (RUP)
- *Brigade @* 2EC (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (1 day) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (1 day) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (1 day) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (1 day) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

*Diazinon* AG 500, 1 pt. (14 days) (RUP)

Imidacloprid

- *Admire Pro*, 1.2 fl oz. (7 days)
- *Nuprid* 1.6 F, 3.5 fl oz. (7 days) Do not exceed 10.5 oz/Acre per season.

Malathion

- *Malathion* 5, *Malathion* 5 EC, or *Malathion* 57 EC (1.5 to 2 pt.) or *Malathion* 8 (2.5 pt.) or *Malathion* 8 Aquamul (1 to 1.25 pt.) (7 days)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 7 - 10.5 fl oz/A.

LEAFHOPPER:

*Actara*, 1.5 to 3 oz. (7 days)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

Carbaryl

- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (7 days)

Imidacloprid

- *Admire Pro*, 1.2 fl oz. (7 days)
  - *Nuprid* 1.6 F, 3.5 fl oz. (7 days)
- Mustang Max*, 1.76 to 4 oz. (1 day) (RUP)
- Pyrenone*, 1 to 12 fl oz. (0 days)

## Beets

Sevin 4 F (1 to 2 qt.) or Sevin 80 S (0.63 to 1.25 lb.) or Sevin XLR Plus (1 to 2 qt.) (7 days)  
Sivanto, 7 - 10.5 fl oz/A.

### ARMYWORM:

Avaunt, 3.5 to 6 oz. (7 days)

#### Bacillus thuringiensis

- *Biobit* HP, 0.5 to 2 lb. (0 days)
- *DiPel* DF, 1 to 2 lb. (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

Coragen, 3.5 to 5 fl oz. (1 day)

Intrepid 2F, 6 to 16 fl oz. (14 days) 4 to 10 fl oz with PHI of 1 day when harvesting leaves.

Malathion 8, 2.5 pt. (7 days)

#### Methomyl

- *Lannate* LV (1.5 to 3 pt.) or *Lannate* SP (0.5 to 1 lb.) (0 days, roots; 10 days, tops) (RUP)
- *Nudrin* LV (1.5 to 3 pt.) or *Nudrin* SP (0.5 to 1 lb.) (0 days, roots; 10 days, tops) (RUP)

Mustang Max, 3.2 to 4 oz. (1 day) (RUP)

Radiant SC, 6 to 8 fl oz. (7 days) See label for treating and harvesting of leaves.

#### Spinosad

- *Entrust* (1.5 to 3 oz.) or *Entrust* SC (4.5 to 10 fl oz.) (3 days)

### CUTWORM:

#### Bacillus thuringiensis

- *Biobit* HP, 0.5 to 1 lb. (0 days)
- *DiPel* DF, 0.5 to 1 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (2.6 to 6.1 oz.) or *Hero* EW (2.8 to 6.7 oz.) (21 days) (RUP)
- *Steed*, 2.5 to 3.5 fl oz. (21 days) (RUP)

#### Methomyl

- *Lannate* LV (1.5 pt.) or *Lannate* SP (0.5 lb.) (0 days, roots; 10 days, tops) (RUP)
- *Nudrin* LV (1.5 pt.) or *Nudrin* SP (0.5 lb.) (0 days, roots; 10 days, tops) (RUP)

Mustang Max, 1.28 to 4 oz. (1 day) (RUP)

### WHITEFLIES:

Bifenture 10 DF, 12.8 to 16 oz/A. (1 day)

Sivanto, 10.5 - 14 fl oz/A.

## MITES

#### Bifenthrin

- *Bifenture* EC, 5.12 to 6.4 fl oz. (1 day) (RUP)
- *Bifenture* 10 DF, 12.8 to 16 oz/A. (1 day)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (1 day) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (1 day) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (1 day) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero* EW (11.2 oz.) (21 days) (RUP)

## DISEASES

### SEED TREATMENT:

DAMPING OFF (*Pythium* spp., *Rhizoctonia solani*): Treatments are applied to seed prior to planting. Use Thiram and Captan as seed treatments only. Use only as directed; over-treatment may cause injury.

#### Fludioxonil

- *Maxim* 4 FS, 0.08 to 0.16 fl oz/100 lb seed (*Rhizoctonia*). Commercial seed treatment plants only.

#### Fludioxonil + mefenoxam

- *Maxim* XL, 0.167 to 0.334 fl oz/100 lb seed (*Pythium* + *Rhizoctonia*).

#### Mefenoxam

- *Apron* XL LS, 0.085 fl oz/100 lb seed (*Pythium*).

#### Metalaxyl

- *Allegiance-FL*, 0.75 fl oz/100 lb seed (*Pythium*).

#### Thiram

- 42-S Thiram, *Thiram* 480DP, *Thiram* 50 WP Dyed, 8 oz.

### PREPLANT INCORPORATED:

DAMPING OFF (*Pythium* and *Phytophthora* spp.):

Mefenoxam. Apply as a broadcast preplant incorporation or a surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone after planting with 1/2 to 2 in. of sprinkler irrigation.

- *Ridomil* Gold SL, 1-2 pt.
- *Ridomil* Gold WSP, 1 to 2 lb.

### FOLIAR TREATMENT:

CERCOSPORA LEAF SPOT (*Cercospora beticola*): Apply every 7 to 10 days.

#### \* Azoxystrobin

- *Quadris*, 9.2 to 15.4 fl oz. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

#### \* Trifloxystrobin

- *Flint*, 2 to 3 oz. (7 days) Do not apply more than three sequential foliar applications of strobilurin fungicides before alternating with a fungicide that has a different mode of action.

#### Copper Hydroxide

- *Champ* DP Dry Prill, 1 1/3 to 2 2/3 lb. (0 days)
- *Champ* Formula 2 Flowable, 1 1/3 to 2 2/3 pt. (0 days)
- *Champ* WG, 2.02 lb. (0 days)
- *Champ* WP, 2 to 5 lb. (0 days)
- *Kocide* 2000, 1 1/2 to 3 3/4 lb. (0 days)
- *Kocide* 3000, 1.5 to 3.74 lb. (0 day)
- *Nu-Cop* 3 L, 1 1/3 to 3 1/3 pt. (0 days)

#### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 2 pt. (0 days)

#### Copper Sulfate

- *Cuprofix* Ultra 40, 1.25 to 3 lb. (0 days)

#### Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 5.5 fl oz. (7 days)

#### Penthiopyrad

- *Fontelis*, 16 - 30 fl oz. (0 days)

#### Tebuconazole

- *Orius* 3.6F, *Tebuzol* 3.6, 3-7.2 fl oz. (7 days) Maximum 28.8 fl oz/acre/season. 12 hr REI.

### RUST:

#### Penthiopyrad

- *Fontelis*, 16 - 30 fl oz. (0 days)

### POWDERY MILDEW:

#### \* Penthiopyrad

- *Fontelis*, 16 - 30 fl oz. (0 days)

#### Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 4 - 5.5 fl oz. (7 days)

#### Sulfur

- *Microthiol* Disperss, 3 to 5 lb. (0 days) 24 hr REI.

## Broccoli

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

Sugar beet cyst, root-knot and lesion nematodes can reduce broccoli yields. Fields with soil or root problems of undetermined cause should be tested for nematodes (see Appendix C). If the plant-parasitic nematodes are present in population densities above the economic threshold for broccoli, crop rotation or application of a nematicide is recommended. The following nematicide is suitable for control of sugar beet cyst, root-knot and lesion nematodes in broccoli production.

#### FALL SOIL FUMIGATION (BROADCAST):

##### 1,3-D

- *Telone II*, 25 gal/A (muck soil), 9-18 gal/A (mineral soil).

Fumigate in the fall when soil temperatures at a 6-inch depth are above 50F. Inject the fumigant to a soil depth of 8 inches and lightly seal the soil immediately after application. Use soil fumigants only as directed on the label. In some limited situations soil fumigants can be applied in the spring in Michigan.

Correct soil moisture, temperature and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or by immediate tarping.

### INSECTS

**SEEDBED TREATMENT:** Apply treatments to soil according to directions to protect young seedlings in the seedbed before transplanting in field.

**CABBAGE MAGGOT:** Apply to seedbed surface and incorporate to 3 to 4 inches.

##### Diazinon

- *Diazinon* 50 W (4 to 6 lb.) or *Diazinon* AG 500 (2 to 3 qt.) or *Diazinon* AG600 (51 to 76.5 fl oz.) Apply only as directed. (RUP)

**CUTWORM:**

##### Diazinon

- *Diazinon* 50 W (4 to 8 lb.) or *Diazinon* AG 500 (2 to 4 qt.) or *Diazinon* AG600 (51 to 102 fl oz.) Apply only as directed. (RUP)

#### SOIL TREATMENT:

**FLEA BEETLE, THRIPS:**

*Scorpion* 35SL, 9 to 10.5 fl oz. (21 days) See label for application method.

*Verimark*, 6.75-13.5 oz/A. (0 days)

**APHIDS and THRIPS:**

##### Imidacloprid

- *Admire Pro*, 4.4 to 10.5 fl oz. (21 days)
- *Nuprid 2 F*, 10 to 24 fl oz. (21 days)
- *Verimark*, 6.75-13.5 oz/A.

*Admire Pro*, 4.4 to 10.5 fl oz. (21 days)

*Nuprid 2 F*, 10 to 24 fl oz. (21 days)

*Verimark*, 6.75-13.5 oz/A.

**LEAFHOPPERS:**

*Sivanto*, 7 - 10.5 fl oz/A.

**WHITEFLIES:**

*Sivanto*, 10.5 - 14 fl oz/A.

**APHIDS:**

*Sivanto*, 7 - 12 fl oz/A.

#### TRANSPLANT WATER TREATMENT:

**CABBAGE MAGGOT:**

##### Diazinon

- *Diazinon* 50 W (1 to 2 lb/200 gal) or *Diazinon* AG 500 (4 to 8 oz/50 gal) or *Diazinon* AG600 (3.25 to 6.5 fl oz/50 gal) Use only as directed. (RUP)

*Verimark*, 10-13.5 oz/A. (0 days)

**ARMYWORM, DIAMONDBACK MOTH, CABBAGE LOOPERS,**

**IMPORTED CABBAGE WORM:**

*Coragen*, 3.5 to 5 fl oz. (3 days) See label for application methods.

*Verimark*, 5-10 oz/A. (0 days)

#### PLANTING TREATMENT: Treatments applied at seeding.

**CABBAGE MAGGOT:**

##### Bifenthrin

- *Bifenture* 10 DF, 8 to 16 oz/A.
- *Brigade* WSB, 8 to 16 oz. (RUP)

##### Chlorpyrifos

- *Chlorpyrifos* 15G (4.6 to 9.3 oz/1000 row ft.) or *Chlorpyrifos* 4E AG (1.6 to 2.75 fl oz/1000 row ft.) (30 days) (RUP)
- *Govern*, 1.6 to 2.75 fl oz/1000 row ft. (30 days) (RUP)
- *Hatchet*, 1.6 to 2.75 fl oz/1000 row ft. (30 days) (RUP)
- *Lorsban* 15 G (4.6 to 9.2 oz /1,000 row ft.) or *Lorsban* 4 E / *Lorsban* Advanced (1.6 to 2.75 fl oz / 1,000 row ft.) or *Lorsban* 75 WG (1.1 to 1.8 oz/1000 row ft.) (30 days) Apply in a 4-inch band over row at time of seeding. Use only as directed. (RUP)
- *Nufos* 4E, 1.6 to 2.75 fl oz/1,000 row ft. (30 days) (RUP)
- *Saurus*, 4.6 to 9.2 oz/1000 row ft. (30 days)
- *Vulcan*, 1.6 to 2.75 fl oz/1,000 row ft. (30 days) (RUP)
- *Warhawk*, 1.6 to 2.75 fl oz/1,000 row ft. (30 days) (RUP)
- *Whirlwind*, 1.6 to 2.75 fl oz/1,000 row ft. (30 days) (RUP)

*Verimark*, 10-13.5 oz/A. (0 days)

**ARMYWORM, IMPORTED CABBAGE WORM, DIAMONDBACK MOTH, CABBAGE LOOPERS:**

*Coragen*, 3.5 to 5 fl oz. (3 days) See label for application methods.

*Durivo*, 10 to 13 fl oz. (30 days)

*Verimark*, 5-10 oz/A. (0 days)

**APHIDS, FLEA BEETLE, THRIPS:**

*Belay* 50 WDG, 4.8 to 6.4 oz.

*Durivo*, 10 to 13 fl oz. (30 days)

##### Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum* 75 SG (1.66 to 3.67 oz.) (30 days)

*Verimark*, 6.75-13.5 oz/A. (0 days)

**ARMYWORM, CABBAGE MAGGOT, CUTWORM:**

*Capture* LFR, 3.4 to 6.8 fl oz. See label for application methods. (RUP)

**APHIDS: Root aphids.**

##### Chlorpyrifos

- *Chlorpyrifos* 4E AG, 1.2 fl oz/1000 row ft. (30 days) (RUP)
- *Govern*, 1.2 fl oz/1000 row ft. (30 days) (RUP)
- *Hatchet*, 1.2 fl oz/1000 row ft. (30 days) (RUP)
- *Nufos* 4E, 1.2 fl oz/1000 row ft. (30 days) (RUP)
- *Vulcan*, 1.2 fl oz/1000 row ft. (30 days) (RUP)
- *Whirlwind*, 1.2 fl oz/1000 row ft. (30 days) (RUP)

*Sivanto*, 7 - 12 fl oz/A.

**GRUBS, WIREWORMS:**

*Bifenture* 10 DF, 8 to 16 oz/A.

**LEAFHOPPERS:**

*Sivanto*, 7 - 10.5 fl oz/A.

**WHITEFLIES:**

*Sivanto*, 10.5 - 14 fl oz/A.

## Broccoli

**SOIL TREATMENT AFTER TRANSPLANTING:** Apply to the soil at the base of plants after transplanting. Adequate water is needed to wet the soil surface.

APHIDS: Apply as a post-seeding drench, transplant drench, or hill drench, or as a sidedress after plants are established.

Imidacloprid. Additional generic brands available.

- *Admire Pro*, 4.4 to 10.5 fl oz. (21 days)
- *Nuprid 2 F*, 10 to 24 oz. (21 days)

*Sivanto*, 7 - 12 fl oz/A.

*Verimark*, 6.75-13.5 oz/A. (0 days)

**CABBAGE MAGGOT:**

*Lorsban 4 E / Lorsban Advanced*, 1.6 to 2.75 fl oz / 1,000 row ft. (RUP)

*Verimark*, 10-13.5 oz/A. (0 days)

**ARMYWORM, CABBAGE LOOPERS, DIAMONDBACK MOTH,**

**IMPORTED CABBAGE WORM:**

*Coragen*, 3.5 to 5 fl oz. (3 days)

*Durivo*, 10 to 13 fl oz. (30 days)

*Verimark*, 5-10 oz/A. (0 days)

**APHIDS, FLEA BEETLE, THRIPS:**

*Durivo*, 10 to 13 fl oz. (30 days)

Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum 75 SG* (1.66 to 3.67 oz.) (30 days)

*Verimark*, 6.75-13.5 oz/A. (0 days)

**LEAFHOPPERS:**

*Sivanto*, 7 - 10.5 fl oz/A.

**WHITEFLIES:**

*Sivanto*, 10.5 - 14 fl oz/A.

**FOLIAR TREATMENT:**

**FLEA BEETLE:** Apply as needed soon after plants come up.

*Actara*, 1.5 to 3 oz. (0 days)

*Baythroid XL*, 2.4 to 3.2 fl oz. (0 days) (RUP)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

Bifenthrin

- *Bifenture 10 DF*, 5.3 to 16 oz/A. (7 days)
- *Bifenture EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade WSB* (5.3 to 16 oz.) (7 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

*Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)

Carbaryl

- *Carbaryl 4L*, 0.5 to 1 qt. (3 days)
- *Sevin 4 F* (0.5 to 1 qt.) or *Sevin 80 S* (0.63 to 1.25 lb.) or *Sevin 80 WSP* (0.67 to 1.25 lb.) or *Sevin XLR Plus* (0.5 to 1 qt.) (3 days)

Chlorpyrifos

- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban 4 E / Lorsban Advanced* (1 to 2 pt.) or *Lorsban 75 WG* (0.67 to 1.33 lb.) (21 days) (RUP)
- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

Cypermethrin

- *Ammo 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Holster*, 2.5 to 5 fl oz. (1 day) (RUP)

- *UP-Cyde 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)

Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

Imidacloprid. Additional generic brands available.

- *Admire Pro*, 1.3 fl oz. (7 days)

- *Nuprid 1.6 F*, 3.8 fl oz. (7 days) Do not exceed 19.2 oz/Acre per season.

*Kryocide*, 8 to 16 lb. (7 days)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Larvin 3.2*, 16 to 32 fl oz. (7 days) (RUP)

*Leverage 360*, 3 fl oz. (7 days) (RUP)

Malathion

- *Malathion 8* (1.5 to 2.5 pt.) or *Malathion 8 Aquamul* (1.25 pt.) (3 days)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Scorpion 35SL*, 2 to 7 fl oz. (1 day)

*Carbaryl 4L*, 0.5 to 1 qt. (3 days)

*Sevin 4 F* (0.5 to 1 qt.) or *Sevin 80 S* (0.63 to 1.25 lb.) or *Sevin 80 WSP* (0.67 to 1.25 lb.) or *Sevin XLR Plus* (0.5 to 1 qt.) (3 days)

*Voliam Flexi*, 4 to 7 oz. (3 days)

**IMPORTED CABBAGE WORM:** Apply if: 1) >10% of transplants are infested with any type of cabbage "worm" or 2) >50% of plants are infested before flowering, or 3) >10% of plants are infested at or after first flowering.

*Avaunt*, 2.5 to 3.5 oz. (3 days) Add a wetting agent to improve spray coverage.

Bacillus thuringiensis

- *Agree WG*, 0.5 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF* (0.25 to 1 lb.) or *DiPel ES* (1 to 2 pt.) (0 days)
- *Javelin WG*, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid XL*, 1.6 to 2.4 fl oz. (0 days) (RUP)

Bifenthrin

- *Bifenture 10 DF*, 5.3 to 16 oz/A. (7 days)
- *Bifenture EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade WSB* (5.3 to 16 oz.) (7 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)

Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

Carbaryl

- *Carbaryl 4L*, 1 to 2 qt. (3 days)
- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

Chlorpyrifos

- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban 4 E / Lorsban Advanced* (1 to 2 pt.) or *Lorsban 75 WG* (0.67 to 1.33 lb.) (21 days) (RUP)
- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

*Confirm 2F*, 6 to 8 fl oz. (7 days)

*Coragen*, 3.5 to 5 fl oz. (3 days)

Cypermethrin

- *Ammo 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Holster*, 2.5 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)

*Danitol 2.4 EC*, 10.66 to 16 fl oz. (7 days) (RUP)

*Diazinon AG 500*, 0.5 to 1 pt. (7 days) (RUP)

*Dibrom 8 Emulsive*, 1 pt. (1 day) (RUP)

*Endigo ZC*, 4 fl oz. (1 day) (RUP)

Esfenvalerate

- *Adjourn*, 2.9 to 5.8 fl oz. (3 days) (RUP)
- *Asana XL*, 2.9 to 5.8 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 2.9 to 5.8 fl oz. (3 days) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

*Intrepid 2F*, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

*Kryocide*, 8 to 16 lb. (7 days)

Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (1 day) (RUP)

*Larvin 3.2*, 16 to 32 fl oz. (7 days) (RUP)

*Leverage 360*, 3 fl oz. (7 days) (RUP)

Malathion

- *Malathion 5* (2 pt.) or *Malathion 5 EC* (1 to 2 pt.) or *Malathion 57 EC* (1 to 2 pt.) or *Malathion 8* (1.5 to 2.5 pt.) or *Malathion 8 Aquamul* (1.25 pt.) (3 days for Malathion 5 EC & 8; 2 days for all others)

Methomyl

- *Lannate LV* (0.75 to 3 pt.) or *Lannate SP* (0.25 to 1 lb.) (3 days) (RUP)
- *Nudrin LV* (0.75 to 3 pt.) or *Nudrin SP* (0.25 to 1 lb.) (3 days) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

Permethrin

- *Ambush 25 W*, 3.2 to 6.4 oz. (1 day) (RUP)
- *Perm-UP 25DF* (3.2 to 6.4 oz.) or *Perm-UP 3.2 EC* (2 to 4 oz.) (1 day) (RUP)
- *Pounce 25 WP*, 3.2 to 12.8 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (1 day) (RUP)

*Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant SC*, 5 to 10 fl oz. (1 day)

*Rimon 0.83EC*, 6 to 12 fl oz. (7 days)

*Carbaryl 4L*, 1 to 2 qt. (3 days)

*Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

*WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust SC* (3 to 6 fl oz.) (1 day)

*Vetica*, 10 to 20 fl oz. (1 day)

*VoliAm Flexi*, 4 to 7 oz. (3 days)

DIAMONDBACK MOTH: Apply treatments if: 1) >10% of transplants are infested with any type of cabbage "worm", 2) >50% of plants are infested before flowering, or 3) >10% of plants are infested at or after

1st flowering. Use *Bacillus thuringiensis* to avoid killing important natural enemies of diamondback moth.

\* Bacillus thuringiensis

- *Agree WG*, 0.5 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF* (0.25 to 1 lb.) or *DiPel ES* (1 to 2 pt.) (0 days)
- *Javelin WG*, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

\* Spinosad

- *Entrust* (0.5 to 1.25 oz.) or *Entrust SC* (1.5 to 4 fl oz.) (1 day)

Acetamiprid

- *Assail 30 SG*, 4 oz. (7 days) suppression only
  - *Assail 70WP*, 1.7 oz.. (3 days) Suppression only
- Avaunt*, 3.5 oz. (3 days) Add a wetting agent to improve spray coverage.

*Baythroid XL*, 2.4 to 3.2 fl oz. (0 days) (RUP)

Bifenthrin

- *Bifenture 10 DF*, 5.3 to 16 oz/A. (7 days)
- *Bifenture EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade WSB* (5.3 to 16 oz.) (7 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)

Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (7 days) (RUP)

Carbaryl

- *Carbaryl 4L*, 1 to 2 qt. (3 days)
- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

*Coragen*, 3.5 to 5 fl oz. (3 days)

*Diazinon AG 500*, 0.5 to 1 pt. (7 days) (RUP)

*Dibrom 8 Emulsive*, 1 pt. (1 day) (RUP)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

*Exirel*, 7-13.5 oz/A. (1) For resistance management: Do not apply EXIREL more than twice to any generation of diamondback moth within any 30 day period. After the second application of EXIREL for diamondback moth, rotate to another effective insecticide with a different mode of action. Do not apply less than 7 fl oz of EXIREL per application per acre for diamondback moth control. Do not make more than 6 total applications per calendar year of any cyantraniliprole containing products for control of diamondback moth at the same farm location.

*Kryocide*, 8 to 16 lb. (7 days)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Larvin 3.2*, 24 to 40 fl oz. (7 days) (RUP)

*Lorsban 75 WG*, 0.67 to 1.33 lb. (21 days) (RUP)

*Malathion 5*, 2 pt.. (2 days)

Methomyl

- *Lannate LV* (1.5 to 3 pt.) or *Lannate SP* (0.5 to 1 lb.) (3 days) (RUP)

• *Nudrin LV* (1.5 to 3 pt.) or *Nudrin SP* (0.5 to 1 lb.) (3 days) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

## Broccoli

### Permethrin

- *Ambush* 25 W, 3.2 to 6.4 oz. (1 day) (RUP)
- *Perm-UP* 25DF (3.2 to 6.4 oz.) or *Perm-UP* 3.2 EC (2 to 4 oz.) (1 day) (RUP)
- *Pounce* 25 WP, 3.2 to 12.8 oz. (1 day) (RUP)
- Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)
- Pyrenone*, 1 to 12 fl oz. (0 days)
- Radiant* SC, 5 to 10 fl oz. (1 day)
- Rimon* 0.83EC, 6 to 12 fl oz. (7 days)
- Carbaryl* 4L, 1 to 2 qt. (3 days)
- Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (3 days)
- Vetica*, 10 to 20 fl oz. (1 day)
- Voliam* Flexi, 4 to 7 oz. (3 days)

CABBAGE LOOPERS: Apply treatments if: 1) >10% of transplants are infested with any type of cabbage "worm", 2) if >5% of plants are infested before flowering, or 3) if 10% of plants are infested at or after 1st flowering. Most controls are less effective on larger worms.

*Avaunt*, 2.5 to 3.5 oz. (3 days) Add a wetting agent to improve spray coverage.

### Bacillus thuringiensis

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *Biobit* HP, 0.5 to 1 lb. (0 days)
- *DiPel* DF (0.5 to 1 lb.) or *DiPel* ES (1 to 2 pt.) (0 days)
- *Javelin* WG, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid* XL, 1.6 to 2.4 fl oz. (0 days) (RUP)

### Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @* 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (3 days) (RUP)

### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

*Confirm* 2F, 6 to 8 fl oz. (7 days)

*Coragen*, 3.5 to 5 fl oz. (3 days)

### Cypermethrin

- *Ammo* 2.5 EC, 3.75 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 3.75 to 5 fl oz. (1 day) (RUP)
- *Holster*, 3.75 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde* 2.5 EC, 3.75 to 5 fl oz. (1 day) (RUP)

*Danitol* 2.4 EC, 10.66 to 16 fl oz. (7 days) (RUP)

*Dibrom* 8 Emulsive, 2 pt. (1 day) (RUP)

*Endigo* ZC, 4 fl oz. (1 day) (RUP)

### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Exirel*, 10-17 oz/A. (1)

*Intrepid* 2F, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

*Kryocide*, 8 to 16 lb. (7 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (1 day) (RUP)

*Larvin* 3.2, 24 to 40 fl oz. (7 days) (RUP)

*Leverage* 360, 3 fl oz. (7 days) (RUP)

### Malathion

- *Malathion* 5, *Malathion* 5 EC, or *Malathion* 57 EC (1 to 2 pt.) or *Malathion* 8 (1.5 to 2.5 pt.) or *Malathion* 8 Aquamul (1.25 pt.) (3 days for *Malathion* 5 EC & 8; 2 days for all others)

### Methomyl

- *Lannate* LV (1.5 to 3 pt.) or *Lannate* SP (0.5 to 1 lb.) (3 days) (RUP)
  - *Nudrin* LV (1.5 to 3 pt.) or *Nudrin* SP (0.5 to 1 lb.) (3 days) (RUP)
- Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

### Permethrin

- *Ambush* 25 W, 3.2 to 6.4 oz. (1 day) (RUP)
- *Perm-UP* 25DF (3.2 to 6.4 oz.) or *Perm-UP* 3.2 EC (2 to 4 oz.) (1 day) (RUP)
- *Pounce* 25 WP, 3.2 to 12.8 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (1 day) (RUP)

*Proclaim*, 3.2 to 4.8 oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 5 to 10 fl oz. (1 day)

*Rimon* 0.83EC, 6 to 12 fl oz. (7 days)

### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (1 day)

*Vetica*, 10 to 20 fl oz. (1 day)

*Voliam* Flexi, 4 to 7 oz. (3 days)

APHIDS: Apply if there are >100 aphids per plant before flowering or >5/plant at flowering or beyond.

### Acetamiprid

- *Assail* 30 SG (2 to 4 oz.) or *Assail* 70WP (0.8 to 1.7 oz.) (7 days)
- Actara*, 1.5 to 3 oz. (0 days) Do not exceed 11.0 oz/Acre per season.
- Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)
- Beleaf* 50 SG, 2 to 2.8 oz. (0 days)

### Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @* 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (7 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (7 days) (RUP)

### Chlorpyrifos

- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced (1 to 2 pt.) or *Lorsban* 75 WG (0.67 to 1.33 lb.) (21 days) (RUP)
- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

*Diazinon* AG 500, 0.5 to 1 pt. (7 days) (RUP)

*Dibrom* 8 Emulsive, 1 pt. (1 day) (RUP)

### Dimethoate

- *Dimethoate* 4 EC, *Dimethoate* 400, *Dimethoate* 4E, 0.5 to 1 pt. (7 days)

*Endigo* ZC, 4 to 4.5 fl oz. (1 day) (RUP)

*Fulfill*, 2.75 oz. (7 days) May require 5 to 7 days for aphid mortality.  
Imidacloprid. Additional generic brands available.

- *Admire Pro*, 1.3 fl oz. (7 days)
- *Nuprid 1.6 F*, 3.8 fl oz. (7 days)

Do not use if Imidacloprid was used at planting. Do not exceed 19.2 oz/Acre per season.

*Leverage 360*, 3 fl oz. (7 days) (RUP)

Malathion

- *Malathion 5* (1.5 to 2 pt.) or *Malathion 5 EC* (1 to 2 pt.) or *Malathion 57 EC* (1 to 2 pt.) or *Malathion 8* (1.5 to 2.5 pt.) or *Malathion 8 Aquamul* (1.25 pt.) (3 days for Malathion 5 EC & 8; 2 days for all others)

*Movento*, 4 to 5 fl oz. (1 day) Must be tank mixed with adjuvant having spreading and penetrating properties.

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 7 - 12 fl oz/A.

*Voliam Flexi*, 4 to 7 oz. (3 days)

CUTWORM:

\* Cypermethrin

- *Ammo 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Holster*, 2.5 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)

\* *Empower*, 3.5 to 8.7 lb. (7 days) (RUP)

Bacillus thuringiensis

- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF*, 0.5 to 1 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid XL*, 0.8 to 1.6 fl oz. (0 days) (RUP)

Esfenvalerate

- *Adjourm*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (1 day) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (1 day) (RUP)

*Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

THRIPS:

Acetamiprid

- *Assail 30 SG* (4 oz.) or *Assail 70WP* (1.7 oz.) (7 days)

*Actara*, 3 to 5.5 oz. (0 days)

*Baythroid XL*, 0.8 to 1.6 fl oz. (0 days) (RUP)

Bifenthrin

- *Bifenxure 10 DF*, 5.3 to 16 oz/A. (7 days)
- *Bifenxure EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @ 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)

Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

Cypermethrin

- *Ammo 2.5 EC*, 3.75 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 3.75 to 5 fl oz. (1 day) (RUP)
- *Holster*, 3.75 to 5 fl oz. (1 day) (RUP)

- *UP-Cyde 2.5 EC*, 3.75 to 5 fl oz. (1 day) (RUP)

*Leverage 360*, 3 fl oz. (7 days) (RUP)

Permethrin

- *Perm-UP 25DF* (3.2 to 6.4 oz.) or *Perm-UP 3.2 EC* (2 to 4 oz.) (1 day) (RUP)

- *Pounce 25 WP*, 3.2 to 12.8 oz. (1 day) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Radiant SC*, 6 to 10 fl oz. (1 day) Minimum of 4 days between applications; do not apply more than 34 fl oz. per season.

*Rimon 0.83EC*, 12 fl oz. (7 days)

*Scorpion 35SL*, 2 to 7 fl oz. (1 day)

Spinosad

- *Entrust* (1.25 to 3 oz.) or *Entrust SC* (4 to 10 fl oz.) (1 day)

*Voliam Flexi*, 4 to 7 oz. (3 days)

ARMYWORM:

\* Cypermethrin

- *Ammo 2.5 EC*, 3.75 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 3.75 to 5 fl oz. (1 day) (RUP)
- *Holster*, 3.75 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde 2.5 EC*, 3.75 to 5 fl oz. (1 day) (RUP)

*Avaunt*, 3.5 oz. (3 days) Add a wetting agent to improve spray coverage.

Bacillus thuringiensis

- *Agree WG*, 0.5 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 2 lb. (0 days)
- *DiPel DF* (1 to 2 lb.) or *DiPel ES* (2 to 4 pt.) (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

*Baythroid XL*, 2.4 to 3.2 fl oz. (0 days) (RUP)

Carbaryl

- *Carbaryl 4L*, 1 to 2 qt. (3 days)
- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

*Confirm 2F*, 6 to 8 fl oz. (7 days)

*Coragen*, 3.5 to 5 fl oz. (3 days)

*Danitol 2.4 EC*, 10.66 to 16 fl oz. (7 days) (RUP)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

*Intrepid 2F*, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Larvin 3.2*, 16 to 32 fl oz. (7 days) (RUP)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

Permethrin

- *Perm-UP 25DF* (3.2 to 6.4 oz.) or *Perm-UP 3.2 EC* (2 to 4 oz.) (1 day) (RUP)

- *Pounce 25 WP*, 3.2 to 12.8 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (1 day) (RUP)

*Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)

*Radiant SC*, 5 to 10 fl oz. (1 day)

*Rimon 0.83EC*, 6 to 12 fl oz. (7 days)

*Carbaryl 4L*, 1 to 2 qt. (3 days)

*Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

Spinosad

- *Entrust* (1.25 to 3 oz.) or *Entrust SC* (4 to 10 fl oz.) (1 day)

*Voliam Flexi*, 4 to 7 oz. (3 days)

WHITEFLIES:

Acetamiprid

- *Assail 30 SG* (2.5 to 4 oz/A) or *Assail 70WP* (1.1 to 1.7 oz/A) (7 days)

## Broccoli

*Exirel*, 13.5-20.5 oz/A. (1)

*Movento*, 4.0 to 5.0 fl oz. (1 day) Due to the wide variety and composition of spray adjuvants that may be used in combination with MOVENTO, only use a spreading-penetrating adjuvant that is known to be safe to the target crop.

*Sivanto*, 10.5 - 14 fl oz/A.

### LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

## MITES

### Bifenthrin

- *Bifenture* EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Bifenture* 10 DF, 12.8 to 16 oz/A. (7 days)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (7 days) (RUP)
- *Capture 2* EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Discipline 2EC*, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero* EW (11.2 oz.) (7 days) (RUP)

## DISEASES

### SEED TREATMENT:

BLACK LEG (*Phoma lingam*), DAMPING OFF, WIRE STEM (*Pythium* spp., *Rhizoctonia* spp.):

#### Captan

- *Captan* 4 Flowable, 2.2 fl oz/100 lb seed.

#### Fludioxinil

- *Maxim* 4 FS, 0.08 to 0.16 fl oz/100 lb seed. Commercial seed treatment plants only (*Rhizoctonia*).

#### Thiram

- 42-S Thiram, *Thiram* 480DP, *Thiram* 50 WP Dyed, 8 oz/100 lb seed.

### SEEDBED TREATMENT:

CLUBROOT (*Plasmiodiophora brassicae*):

#### Fluazinam

- *Omega* 500 F, 2.6 pt. (50 days)

DAMPING OFF (*Pythium* spp.), BASAL ROT (*Phytophthora* spp.):

Mefenoxam. Apply as a broadcast preplant incorporation or surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone after planting with 1/2 to 1 in. of sprinkler irrigation.

- *Ridomil* Gold SL, 0.25-0.5 pt (*Pythium*) 1-2 pt (*Phytophthora*).
- *Ultra* Flourish, 0.5 to 1.0 pt (*Pythium*), 2 to 4 pt (*Phytophthora*).

### GREENHOUSE PREPLANT INCORPORATION:

DAMPING OFF (*Pythium* spp.), ROOT ROT (*Rhizoctonia* spp.):

#### Gliocladium virens GL-21

- *SoilGard* 12 G, 1 to 1.5 lb per cubic yard. Biological control product that needs to be applied before disease development. Control may be limited under heavy disease pressure.

### TRANSPLANT DRENCH:

CLUBROOT (*Plasmiodiophora brassicae*):

#### Fluazinam

- *Omega* 500 F, 6.45 fl oz. (50 days)

### FOLIAR TREATMENT:

BLACK ROT (*Xanthomonas campestris*): Apply treatment (lowest rates) in fields as soon as transplants are established.

#### Acibenzolar-S-methyl

- *Actigard*, 0.5 to 1 oz per 20 gal (ground) or 10 gal (aerial) of water. (7 days) Do not apply more than 4 applications per crop per year.

#### Copper Ammonium Carbonate

- *Copper* Count N, 1 to 2 qt. (0 days) **Note:** Reddening of older leaves may occur.

#### Copper Hydroxide

- *Champ* DP Dry Prill, 1/3 to 2/3 lb. (0 days)
- *Champ* Formula 2 F, 1/3 to 2/3 pt. (0 days)
- *Champ* WG, 1.06 lb. (0 days)
- *ChampION*, 0.5 to 0.75 lb. (0 days)
- *Champion* WP, 1 to 2 lb. (0 days)
- *Kocide* 2000, 3/4 to 1 1/2 lb. (0 days)
- *Kocide* 3000, 0.5-0.75 lb. (0 day)
- *Nu-Cop* 50 DF, 1 lb. (0 days)

#### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 1.8 pt. (0 days)
- *Badge* X2, 0.5 to 1.8 lb. (0 days)

#### Copper Oxychloride + Copper Sulfate

- C-O-C-S WDG, 0.5 to 1.0 lb. (0 days)

#### Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 3/4 to 1 1/4 lb. (0 days)

ALTERNARIA LEAF SPOT (*Alternaria brassicae*): Apply when conditions favor disease and repeat every 7 to 10 days.

#### \* Azoxystrobin

- *Quadris*, 6.2 to 15.4 fl oz. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

#### \* Azoxystrobin + Difenoconazole

- *Quadris* Top, 12 to 14 fl oz. (1 day)

#### \* Chlorothalonil

- *Bravo* Ultrex, 1.4 lb. (7 days)
- *Bravo* Weather Stik, *Equus* 720 SST, 1 to 1.5 pt. (7 days)
- *Echo* 720, 1.5 pt. (7 days)
- *Echo* 90 DF, 1.25 lb. (7 days)
- *Equus* DF, 1.4 to 1.8 lb. (7 days)

#### \* Difenoconazole + Cyprodinil

- *Inspire* Super, 16 to 20 fl oz. (7 days)

#### Boscalid

- *Endura*, 6 to 9 oz. (0 days)

#### Copper Ammonium Carbonate

- *Copper* Count N, 1 to 2 qt. (0 days) **Note:** Reddening of older leaves may occur.

#### Copper Hydroxide

- *Champ* DP Dry Prill, 1/3 to 2/3 lb. (0 days)
- *Champ* Formula 2 F, 1/3 to 2/3 pt. (0 days)
- *Champ* WG, 1.06 lb. (0 days)
- *Champion* WP, 1 to 2 lb. (0 days)
- *Kocide* 2000, 3/4 to 1 1/2 lb. (0 days)

#### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 1.8 pt. (0 days)
- *Badge* X2, 0.5 to 1.8 lb. (0 days)

#### Copper Sulfate

- *Basicop*, 1 to 3 lb. (0 days)
- *Cuprofix* Ultra 40 Disperss, 3/4 to 1 1/4 lb. (0 days)

Cyprodinil + Fludioxonil

- *Switch* 62.5 WG, 11 to 14 oz. (7 days)

Mancozeb

- *Manzate* Pro-Stick, 1.6 to 2.1 lb. (7 days)

Mancozeb

- *Koverall*, 1.6 - 2.1 lb. (7 days)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Penthiopyrad

- *Fontelis*, 14 - 30 fl oz. (0 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 4 pt. (7 days)

Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days)

BLACK LEG (*Phoma lingam*):

Iprodione. Apply immediately after thinning (2 to 4 leaf stage) as a directed spray to the base of the plant and adjacent soil surface. If disease persists or recurs a second application may be made up to day of harvest. **Note:** See label for permissible crop rotations.

- *Iprodione* 4L AG, 2 pt. (0 days)
- *Meteor*, 2 pt. (14 days)
- *Rovral*, 2 lb. (0 days)
- *Rovral* 4 Flowable, 2 pt. (0 days)

DOWNY MILDEW (*Peronospora parasitica*): Begin applications when conditions are favorable for disease but before infection.

\* Ametoctradin + Dimethomorph

- *Zapro*, 14 fl. oz. (7 days)

\* Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days) Must tank mix with other fungicide.

\* Fosetyl-Aluminum

- *Aliette* WDG, 2 to 5 lb. (3 days) Apply at 7 to 10 day intervals. Do not tank mix with copper fungicides.

\* Mefenoxam + Chlorothalonil

- *Ridomil* Gold Bravo, 1 1/2 lb. (7 days) Apply at 14 day intervals (maximum 4 applications/crop).

Acibenzolar-S-methyl

- *Actigard*, 0.5 to 1 oz per 20 gal (ground) or 10 gal (aerial) of water. (7 days) Do not apply more than 4 applications per crop per year.

Copper Hydroxide + Copper Oxchloride

- *Badge* SC, 1 to 1.8 pt. (0 days)
- *Badge* X2, 0.5 to 1.8 lb. (0 days)

Dimethomorph

- *Forum*, 6 fl oz. (7 days)

Fenamidone

- *Reason* 500 SC, 5.5 to 8.2 fl oz. (2 days) No more than 1 application before alternating.

Mancozeb

- *Koverall*, 1.6 - 2.1 lb. (7 days)

Mancozeb

- *Manzate* Pro-Stick, 1.6 to 2.1 lb. (7 days)

Mandipropamid

- *Revus*, 8 fl oz. (1 day)

Mefenoxam

- *Ridomil* Gold SL, 0.125-0.25 pt. (7 days)

Mono-, dibasic sodium salts of phosphorous acid

- *Fosphite*, 1 to 3 qt. (0 days)

Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 2.5 to 5 pt. (0 days) Every 7-21 days
- *Prophyt*, 2 to 4 pt. (0 days)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 4 pt. (7 days)

**Note:** Most fungicides that protect against *Alternaria* may also provide limited downy mildew protection.

## WHITE RUST:

Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days)

CERCOSPORA LEAF SPOT (*Cercospora beticola*):

Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days)

## Brussels Sprouts

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

Sugar beet cyst, root-knot and lesion nematodes can reduce Brussels sprouts yield. Fields with soil or root problems of undetermined cause should be tested for nematodes (see Appendix C). If the plant-parasitic nematodes are present in population densities above the economic threshold for Brussels sprouts, crop rotation or application of a nematicide is recommended. The following nematicide is suitable for control of sugar beet cyst, root-knot and lesion nematodes in Brussels sprouts production.

### FALL SOIL FUMIGATION (BROADCAST):

1,3-D

- *Telone* II, 25 gal/A (muck soil), 9-18 gal/A (mineral soil).

Fumigate in the fall when soil temperatures at a 6-inch depth are above 50F. Inject fumigant to a soil depth of 6 to 8 inches and lightly seal the soil immediately after application. Use soil fumigants only as directed on the label. In some limited situations soil fumigants may be applied in the spring in Michigan.

Correct soil moisture, temperature and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or by immediate tarping.

### INSECTS

#### SOIL TREATMENT:

## APHIDS:

Imidacloprid

- *Admire* Pro, 4.4 to 10.5 fl oz. (21 days)
- *Nuprid* 2 F, 10 to 24 fl oz. (21 days)

*Sivanto*, 7 - 12 fl oz/A.

*Verimark*, 6.75-13.5 oz/A. (0 days)

## FLEA BEETLE:

*Platinum*, 5 to 11 fl oz. (30 days) See label for application methods.

*Verimark*, 6.75-13.5 oz/A. (0 days)

## CABBAGE MAGGOT:

Diazinon

- *Diazinon* 50 W (4 to 6 lb.) or *Diazinon* AG 500 (2 to 3 qt.) or *Diazinon* AG600 (51 to 76.5 fl oz.) (RUP)
- Verimark*, 10-13.5 oz/A. (0 days)

## CUTWORM:

Diazinon

- *Diazinon* 50 W (4 to 8 lb.) or *Diazinon* AG 500 (2 to 4 qt.) or *Diazinon* AG600 (51 to 102 fl oz.) (RUP)

## Brussels Sprouts

### LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

### WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

**TRANSPLANT WATER TREATMENT:** Treatments applied in water around roots at time plants are set in the field.

### CABBAGE MAGGOT:

#### Diazinon

- *Diazinon* 50 W (1 to 2 lb/200 gal.) or *Diazinon* AG 500 (4 to 8 oz/50 gal.) or *Diazinon* AG600 (3.25 to 6.5 fl oz/50 gal.) Use only as directed. (RUP)

Treatment rates are given in amount of formulation per 100 gal of water. Apply at rate of 1 cup of solution per plant. Frequent agitation is needed with wettable powders.

*Verimark*, 10-13.5 oz/A. (0 days)

### ARMYWORM, CABBAGE LOOPERS, DIAMONDBACK MOTH, IMPORTED CABBAGE WORM:

*Coragen*, 3.5 to 5 fl oz. (3 days) See label for application methods.

*Verimark*, 5-10 oz/A. (0 days)

### APHIDS, FLEA BEETLE, THRIPS:

#### Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum* 75 SG (1.66 to 3.67 oz.) (30 days) See label for application methods.

*Verimark*, 6.75-13.5 oz/A. (0 days)

**PLANTING TREATMENT:** Treatments are applied at seeding.

### CABBAGE MAGGOT:

#### Bifenthrin

- *Bifenture* 10 DF, 8 to 16 oz/A.
- *Brigade* WSB, 8 to 16 oz. (RUP)
- *Capture* LFR, 3.4 to 6.8 fl oz. See label for application methods. (RUP)

#### Chlorpyrifos

- *Chlorpyrifos* 15G (4.6 to 9.3 oz/1000 row ft.) or *Chlorpyrifos* 4E AG (1.6 to 2.75 fl oz/1000 row ft.) (30 days) (RUP)
- *Govern*, 1.6 to 2.75 fl oz/1000 row ft. (30 days) (RUP)
- *Hatchet*, 1.6 to 2.75 fl oz/1000 row ft. (30 days) (RUP)
- *Lorsban* 15 G (4.6 to 9.2 oz /1,000 row ft.) or *Lorsban* 4 E / *Lorsban* Advanced (1.6 to 2.75 fl oz / 1,000 row ft.) or *Lorsban* 75 WG (1.1 to 1.8 oz/1000 row ft.) Use only as directed. Apply in a 4-inch band over row at time of seeding. (RUP)
- *Nufos* 4E, 1.6 to 2.75 fl oz/1,000 row ft. (30 days) (RUP)
- *Saurus*, 4.6 to 9.2 oz/1000 row ft. (30 days)
- *Vulcan*, 1.6 to 2.75 fl oz/1,000 row ft. (30 days) (RUP)
- *Warhawk*, 1.6 to 2.75 fl oz/1,000 row ft. (30 days) (RUP)
- *Whirlwind*, 1.6 to 2.75 fl oz/1,000 row ft. (30 days) (RUP)

*Verimark*, 10-13.5 oz/A. (0 days)

### APHIDS, FLEA BEETLE, THRIPS:

*Belay* 50 WDG, 4.8 to 6.4 oz.

*Scorpion* 35SL, 9 to 10.5 fl oz. (21 days)

#### Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum* 75 SG (1.66 to 3.67 oz.) (30 days) See label for application method.

*Verimark*, 6.75-13.5 oz/A. (0 days)

### ARMYWORM, IMPORTED CABBAGE WORM, DIAMONDBACK MOTH, CABBAGE LOOPERS:

*Coragen*, 3.5 to 5.0 fl oz. (3 days) See label for application methods.

*Durivo*, 10 to 13 fl oz. (30 days)

*Verimark*, 5-10 oz/A. (0 days)

### ARMYWORM, CUTWORM:

*Capture* LFR, 3.4 to 6.8 fl oz. (RUP)

### GRUBS, WIREWORMS:

*Bifenture* 10 DF, 8 to 16 oz/A.

### LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

### APHIDS:

*Sivanto*, 7 - 12 fl oz/A.

### WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

**SOIL TREATMENT AFTER TRANSPLANTING:** Apply to the soil at base of plants after transplanting. Apply water to wet soil surface.

APHIDS: Apply as a post-seeding drench, transplant drench, or hill drench, or as a sidedress after plants are established.

#### Imidacloprid

- *Admire* Pro, 4.4 to 10.5 fl oz. (21 days)
- *Nuprid* 2 F, 10 to 24 oz. (21 days)

*Sivanto*, 7 - 12 fl oz/A.

### CABBAGE MAGGOT:

#### Chlorpyrifos

- *Lorsban* 15 G (4.6 to 9.2 oz /1,000 row ft.) or *Lorsban* 4 E / *Lorsban* Advanced (1.6 to 2.75 fl oz / 1,000 row ft) Apply in a 4-inch band over row at time of seeding. Use only as directed. (RUP)

### ARMYWORM, CABBAGE LOOPERS, DIAMONDBACK MOTH, IMPORTED CABBAGE WORM:

*Coragen*, 3.5 to 5 fl oz. (3 days)

*Durivo*, 10 to 13 fl oz. (30 days)

### APHIDS, FLEA BEETLE, THRIPS:

*Durivo*, 10 to 13 fl oz. (30 days)

#### Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum* 75 SG (1.66 to 3.67 oz.) (30 days) See label for application methods.

### LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

### WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

### FOLIAR TREATMENT:

FLEA BEETLE: Apply as needed soon after plants come up when field seeded.

*Actara*, 1.5 to 3 oz. (0 days) Do not exceed 11.0 oz/Acre per season.

*Baythroid* XL, 2.4 to 3.2 fl oz. (0 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

#### Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)
- *Bifenture* EC, 2.1 to 6.4 oz. (7 days) (RUP)
- *Brigade* @ 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (7 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)
- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)

#### Carbaryl

- *Carbaryl* 4L, 0.5 to 1 qt. (3 days)
- *Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* 80 WSP (0.67 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (3 days)

#### Chlorpyrifos

- *Chlorpyrifos* 4E AG, 1 to 2 pt. (21 days) (RUP)
- *Govern*, 1 to 2 pt. (21 days) (RUP)
- *Hatchet*, 1 to 2 pt. (21 days) (RUP)

- *Lorsban 4 E / Lorsban Advanced* (1 to 2 pt.) or *Lorsban 75* WG (0.67 to 1.33 lb.) (21 days) (RUP)
- *Nufos 4E*, 1 to 2 pt. (21 days) (RUP)
- *Stallion*, 6.5 to 11.75 oz. (21 days) (RUP)
- *Vulcan*, 1 to 2 pt. (21 days) (RUP)
- *Warhawk*, 1 to 2 pt. (21 days) (RUP)
- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

Chlorpyrifos + Gamma-cyhalothrin

- *Bolton*, 13 to 23 fl oz. (21 days) (RUP)
- *Cobalt*, 19 to 38 fl oz. (21 days) (RUP)

Cypermethrin

- *Ammo 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Holster*, 2.5 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)

Dinotefuran

- *Scorpion 35SL* (2 to 7 fl oz.) or *Venom* (3 to 4 oz.) (1 day)

*Exirel*, 13.5-20.5 oz/A. (1)

Imidacloprid

- *Admire Pro*, 1.3 fl oz. (7 days)
- *Nuprid 1.6 F*, 3.8 fl oz. (7 days) Do not exceed 19.2 oz/Acre per season.

*Kryocide*, 8 to 16 lb. (7 days)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Leverage 360*, 3 fl oz. (7 days) (RUP)

Malathion

- *Malathion 8* (1.5 to 2.5 pt.) or *Malathion 8 Aquamul* (1.25 pt.) (7 days for Malathion 8; 2 days for Malathion 8 Aquamul)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

*Perm-UP 3.2 EC*, 2 to 4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl 4L*, 0.5 to 1 qt. (3 days)

*Sevin 4 F* (0.5 to 1 qt.) or *Sevin 80 S* (0.63 to 1.25 lb.) or *Sevin 80* WSP (0.67 to 1.25 lb.) or *Sevin XLR Plus* (0.5 to 1 qt.) (3 days)

*Voliam Flexi*, 4 to 7 oz. (3 days)

CUTWORM, ARMYWORM: Apply when damage is first seen. Repeat as needed.

\* Bifenthrin

- *Bifenture 10 DF*, 5.3 to 16 oz/A. (7 days)
- *Bifenture EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade WSB* (5.3 to 16 oz.) (7 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)

Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

Chlorpyrifos

- *Chlorpyrifos 4E AG*, 1 to 2 pt. (21 days) (RUP)
- *Govern*, 1 to 2 pt. (21 days) (RUP)
- *Hatchet*, 1 to 2 pt. (21 days) (RUP)

- *Lorsban 4 E / Lorsban Advanced* (1 to 2 pt.) or *Lorsban 75* WG (0.67 to 1.33 lb.) (21 days) (RUP)

- *Nufos 4E*, 1 to 2 pt. (21 days) (RUP)

- *Vulcan*, 1 to 2 pt. (21 days) (RUP)

- *Warhawk*, 1 to 2 pt. (21 days) (RUP)

- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

*Javelin WG*, 0.12 to 1.5 lb. (0 days)

*Kryocide*, 8 to 16 lb. (7 days)

*Leverage 360*, 3 fl oz. (7 days) (RUP)

Permethrin

- *Ambush 25 W*, 6.4 oz. (1 day) (RUP)
- *Perm-UP 3.2 EC*, *Pounce 25 WP*, 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Vetiva*, 10 to 20 fl oz. (1 day)

IMPORTED CABBAGE WORM: Apply treatments if >10% of plants are infested with any cabbage "worm".

Acephate

- *Acephate 90 WDG* (1.11 lb.) or *Acephate 90 WSP* (1.1 lb.) or *Acephate 97* (1 lb.) or *Acephate 97 UP* (1 lb.) (14 days)

- *Bracket 97*, 16 oz. (14 days)

- *Orthene 97*, 16 oz. (14 days)

*Avaunt*, 2.5 to 3.5 oz. (3 days) Add a wetting agent to improve spray coverage.

Bacillus thuringiensis

- *Agree WG*, 0.5 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF* (0.25 to 1 lb.) or *DiPel ES* (1 to 2 pt.) (0 days)
- *Javelin WG*, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid XL*, 1.6 to 2.4 fl oz. (0 days) (RUP)

Bifenthrin

- *Bifenture 10 DF*, 5.3 to 16 oz/A. (7 days)
- *Bifenture EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade WSB* (5.3 to 16 oz.) (7 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)

Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

Carbaryl

- *Carbaryl 4L*, 0.5 to 1 qt. (3 days)
- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80* WSP (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

Chlorpyrifos

- *Chlorpyrifos 4E AG*, 1 to 2 pt. (21 days) (RUP)
- *Govern*, 1 to 2 pt. (21 days) (RUP)
- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban 4 E / Lorsban Advanced* (1 to 2 pt.) or *Lorsban 75* WG (0.67 to 1.33 lb.) (21 days) (RUP)
- *Nufos 4E*, 1 to 2 pt. (21 days) (RUP)
- *Stallion*, 6.5 to 11.75 oz. (21 days) (RUP)
- *Vulcan*, 1 to 2 pt. (21 days) (RUP)
- *Warhawk*, 1 to 2 pt. (21 days) (RUP)
- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

## Brussels Sprouts

### Chlorpyrifos + Gamma-cyhalothrin

- *Bolton*, 9 to 18 fl oz. (21 days) (RUP)
- *Cobalt*, 13 to 26 fl oz. (21 days) (RUP)

*Confirm* 2F, 6 to 8 fl oz. (7 days)

*Coragen*, 3.5 to 5 fl oz. (3 days)

### Cypermethrin

- *Ammo* 2.5 EC, 2.5 to 5 fl oz. (7 days) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Holster*, 2.5 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde* 2.5 EC, 2.5 to 5 fl oz. (1 day) (RUP)

*Danitol* 2.4 EC, 10 2/3 to 16 fl oz. (7 days) (RUP)

*Diazinon* AG 500, 0.5 to 1 pt. (7 days) (RUP)

*Dibrom* 8 Emulsive, 1 pt. (1 day) (RUP)

*Endigo* ZC, 4 fl oz. (1 day) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

*Intrepid* 2F, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

*Kryocide*, 8 to 16 lb. (7 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (RUP)
- *Warrior* II with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (1 day) (RUP)

*Leverage* 360, 3 fl oz. (7 days) (RUP)

### Malathion

- *Malathion* 5 (2 pt.) or *Malathion* 57 EC (1 to 2 pt.) or *Malathion* 8 (1.5 to 2.5 pt.) or *Malathion* 8 Aquamul (1.25 pt.) (7 days for *Malathion* 8; 2 days for others)

### Methomyl

- *Lannate* LV (1.5 to 3 pt.) or *Lannate* SP (0.5 to 1 lb.) (3 days) (RUP)
  - *Nudrin* LV (1.5 to 3 pt.) or *Nudrin* SP (0.5 to 1 lb.) (3 days) (RUP)
- Mustang* Max, 2.24 to 4 oz. (1 day) (RUP)

### Permethrin

- *Ambush* 25 W, 3.2 to 6.4 oz. (1 day) (RUP)
- *Perm-UP* 25DF (3.2 to 6.4 oz.) or *Perm-UP* 3.2 EC (2 to 4 fl oz.) (1 day) (RUP)
- *Pounce* 25 WP, 3.2 to 6.4 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (1 day) (RUP)

*Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 5 to 10 fl oz. (1 day)

*Rimon* 0.83EC, 6 to 12 fl oz. (7 days)

*Carbaryl* 4L, 1 to 2 qt. (3 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (3 days)

### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (1 day)
- *Vetica*, 10 to 20 fl oz. (1 day)
- *Voliam* Flexi, 4 to 7 oz. (3 days)

DIAMONDBACK MOTH: Apply if >10% of plants are infested with any cabbage "worm". Use *Bacillus thuringiensis* to avoid killing important natural enemies of diamondback "moth".

### \* *Bacillus thuringiensis*

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *Biobit* HP, 0.5 to 1 lb. (0 days)
- *DiPel* DF (0.25 to 1 lb.) or *DiPel* ES (1 to 2 pt.) (0 days)
- *Javelin* WG, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

### \* Spinosad

- *Entrust* (0.5 to 1.25 oz.) or *Entrust* SC (1.5 to 4 fl oz.) (1 day)

### Acephate

- *Acephate* 90 WDG (1.11 lb.) or *Acephate* 90 WSP (1.1 lb.) or *Acephate* 97 (1 lb.) or *Acephate* 97 UP (1 lb.) (14 days)
- *Bracket* 97, 16 oz. (14 days)
- *Orthene* 97, 16 oz. (14 days)

*Avaunt*, 3.5 oz. (3 days) Add a wetting agent to improve spray coverage.

*Baythroid* XL, 2.4 to 3.2 fl oz. (0 days) (RUP)

### Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @* 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (7 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

### Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (3 days)
- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (3 days)

*Coragen*, 3.5 to 5 fl oz. (3 days)

*Diazinon* AG 500, 0.5 to 1 pt. (7 days) (RUP)

*Dibrom* 8 Emulsive, 1 pt. (1 day) (RUP)

*Endigo* ZC, 4 to 4.5 fl oz. (1 day) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

*Kryocide*, 8 to 16 lb. (7 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (RUP)
  - *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)
- Lorsban* 75 WG, 0.67 to 1.33 lb. (21 days) (RUP)

### Malathion

- *Malathion* 5 (2 pt.) or *Malathion* 8 (1.5 to 2.5 pt.) (7 days for *Malathion* 8; 2 days for *Malathion* 5)

### Methomyl

- *Lannate* LV (1.5 to 3 pt.) or *Lannate* SP (0.5 to 1 lb.) (3 days) (RUP)
  - *Nudrin* LV (1.5 to 3 pt.) or *Nudrin* SP (0.5 to 1 lb.) (3 days) (RUP)
- Mustang* Max, 2.24 to 4 oz. (1 day) (RUP)

### Permethrin

- *Ambush* 25 W, 3.2 to 6.4 oz. (1 day) (RUP)
- *Perm-UP* 25DF (3.2 to 6.4 oz.) or *Perm-UP* 3.2 EC (2 to 4 fl oz.) (1 day) (RUP)
- *Pounce* 25 WP, 3.2 to 6.4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 5 to 10 fl oz. (1 day)

*Rimon* 0.83EC, 6 to 12 fl oz. (7 days)

*Carbaryl* 4L, 1 to 2 qt. (3 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (3 days)

*Vetica*, 10 to 20 fl oz. (1 day)

*Voliam* Flexi, 4 to 7 oz. (3 days)

CABBAGE LOOPERS: Apply if >10% of plants are infested with any cabbage "worm". Most controls are less effective on larger worms.

#### Acephate

- *Acephate* 90 WDG (1.11 lb.) or *Acephate* 90 WSP (1.1 lb.) or *Acephate* 97 (1 lb.) or *Acephate* 97 UP (1 lb.) (14 days)
- *Bracket* 97, 16 oz. (14 days)
- *Orthene* 97, 16 oz. (14 days)

*Avaunt*, 2.5 to 3.5 oz. (3 days) Add a wetting agent to improve spray coverage.

#### Bacillus thuringiensis

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *Biobit* HP, 0.5 to 1 lb. (0 days)
- *DiPel* DF (0.5 to 1 lb.) or *DiPel* ES (1 to 2 pt.) (0 days)
- *Javelin* WG, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid* XL, 1.6 to 2.4 fl oz. (0 days) (RUP)

#### Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (7 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

#### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

#### Chlorpyrifos + Gamma-cyhalothrin

- *Bolton*, 13 to 23 fl oz. (21 days) (RUP)
- *Cobalt*, 19 to 38 fl oz. (21 days) (RUP)

*Confirm* 2F, 6 to 8 fl oz. (7 days)

*Coragen*, 3.5 to 5 fl oz. (3 days)

#### Cypermethrin

- *Ammo* 2.5 EC, 3.75 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 3.75 to 5 fl oz. (1 day) (RUP)
- *Holster*, 3.75 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde* 2.5 EC, 3.75 to 5 fl oz. (1 day) (RUP)

*Danitol* 2.4 EC, 10 2/3 to 16 fl oz. (7 days) (RUP)

*Dibrom* 8 Emulsive, 2 pt. (1 day) (RUP)

*Endigo* ZC, 4 fl oz. (1 day) (RUP)

*Exirel*, 10-17 oz/A. (1)

*Intrepid* 2F, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

*Kryocide*, 8 to 16 lb. (7 days)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (RUP)
- *Warrior* II with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (1 day) (RUP)

*Leverage* 360, 3 fl oz. (7 days) (RUP)

#### Malathion

- *Malathion* 5, or *Malathion* 57 EC (1 to 2 pt.) or *Malathion* 8 (1.5 to 2.5 pt.) or *Malathion* 8 Aquamul (1.25 pt.) (7 days for *Malathion* 8; 2 days for others)

#### Methomyl

- *Lannate* LV (1.5 to 3 pt.) or *Lannate* SP (0.5 to 1 lb.) (3 days) (RUP)
- *Nudrin* LV (1.5 to 3 pt.) or *Nudrin* SP (0.5 to 1 lb.) (3 days) (RUP)

*Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

#### Permethrin

- *Ambush* 25 W, 3.2 to 6.4 oz. (1 day) (RUP)
- *Perm-UP* 25DF (3.2 to 6.4 oz.) or *Perm-UP* 3.2 EC (2 to 4 fl oz.) (1 day) (RUP)

- *Pounce* 25 WP, 3.2 to 6.4 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (1 day) (RUP)

*Proclaim*, 3.2 to 4.8 oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 5 to 10 fl oz. (1 day)

*Rimon* 0.83EC, 6 to 12 fl oz. (7 days)

#### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (1 day)

*Stallion*, 9.5 to 11.75 oz. (21 days) (RUP)

*Vetiva*, 10 to 20 fl oz. (1 day)

*Voliam* Flexi, 4 to 7 oz. (3 days)

APHIDS: Apply if needed to prevent infestations on edible parts.

#### Acephate

- *Acephate* 90 WDG (0.55 to 1.11 lb.) or *Acephate* 90 WSP (0.5 to 1.1 lb.) or *Acephate* 97 (0.5 to 1 lb.) or *Acephate* 97 UP (0.5 to 1 lb.) (14 days)

- *Bracket* 97, 8 to 16 oz. (14 days)

- *Orthene* 97, 8 to 16 oz. (14 days)

#### Acetamiprid

- *Assail* 30 SG (2 to 4 oz.) or *Assail* 70WP (0.8 to 1.7 oz.) (7 days)

*Actara*, 1.5 to 3 oz. (0 days)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

*Beleaf* 50 SG, 2 to 2.8 oz. (0 days)

#### Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (7 days) (RUP)

- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

#### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

#### Chlorpyrifos

- *Chlorpyrifos* 4E AG, 1 to 2 pt. (21 days) (RUP)

- *Govern*, 1 to 2 pt. (21 days) (RUP)

- *Hatchet*, 1 to 2 pt. (21 days) (RUP)

- *Lorsban* 4 E / *Lorsban* Advanced (1 to 2 pt.) or *Lorsban* 75 WG (0.67 to 1.33 lb.) (21 days) (RUP)

- *Nufos* 4E, 1 to 2 pt. (21 days) (RUP)

- *Stallion*, 9.5 to 11.75 oz. (21 days) (RUP)

- *Vulcan*, 1 to 2 pt. (21 days) (RUP)

- *Warhawk*, 1 to 2 pt. (21 days) (RUP)

- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

#### Chlorpyrifos + Gamma-cyhalothrin

- *Bolton*, 9 to 13 fl oz. (21 days) (RUP)

- *Cobalt*, 13 to 19 fl oz. (21 days) (RUP)

*Diazinon* AG 500, 0.5 to 1 pt. (7 days) (RUP)

*Dibrom* 8 Emulsive, 1 pt. (1 day) (RUP)

#### Dimethoate

- *Dimethoate* 400, *Dimethoate* 4E, 1 pt. (10 days)

## Brussels Sprouts

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

*Fulfill*, 2.75 oz. (7 days) May require 5 to 7 days for aphid mortality.

### Imidacloprid

- *Admire Pro*, 1.3 fl oz. (7 days)

- *Nuprid 1.6 F*, 3.8 fl oz. (7 days) Do not use if Imidacloprid was used at planting. Do not exceed 19.2 oz/Acre per season.

*Leverage 360*, 3 fl oz. (7 days) (RUP)

### Malathion

- *Malathion 5* (1.5 to 2 pt.) or *Malathion 5 EC* (1 to 2 pt.) or *Malathion 57 EC* (1 to 2 pt.) or *Malathion 8* (1.5 to 2.5 pt.) or *Malathion 8 Aquamul* (1.25 pt.) (7 days for Malathion 5 EC & 8; 2 days for all others)

*Movento*, 4 to 5 fl oz. (1 day) Must be tank mixed with adjuvant having spreading and penetrating properties.

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 7 - 12 fl oz/A.

*Voliam Flexi*, 4 to 7 oz. (3 days)

### THRIPS:

#### Acetamiprid

- *Assail 30 SG* (4 oz.) or *Assail 70WP* (1.7 oz.) (7 days)

*Actara*, 3 to 5.5 oz. (0 days)

*Baythroid XL*, 0.8 to 1.6 fl oz. (0 days) (RUP)

#### Bifenthrin

- *Bifenture 10 DF*, 5.3 to 16 oz/A. (7 days)
- *Bifenture EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @ 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)

#### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

#### Cypermethrin

- *Ammo 2.5 EC*, 3.75 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 3.75 to 5 fl oz. (1 day) (RUP)
- *Holster*, 3.75 to 5 fl oz. (1 day) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

*Leverage 360*, 3 fl oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant SC*, 6 to 10 fl oz. (1 day) Minimum of 4 days between applications; do not apply more than 34 fl oz. per season.

*Rimon 0.83EC*, 12 fl oz. (7 days)

*Scorpion 35SL*, 2 to 7 fl oz. (1 day)

#### Spinosad

- *Entrust* (1.25 to 3 oz.) or *Entrust SC* (4 to 10 fl oz.) (1 day)
- *Stallion*, 9.5 to 11.75 oz. (21 days) (RUP)
- *Voliam Flexi*, 4 to 7 oz. (3 days)

### ARMYWORM:

*Avaunt*, 3.5 oz. (3 days) Add a wetting agent to improve spray coverage.

#### Bacillus thuringiensis

- *Agree WG*, 0.5 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 2 lb. (0 days)
- *DiPel DF* (1 to 2 lb.) or *DiPel ES* (1 to 2 pt.) (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

*Baythroid XL*, 2.4 to 3.2 fl oz. (0 days) (RUP)

#### Carbaryl

- *Carbaryl 4L*, 1 to 2 qt. (3 days)

- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

#### Chlorpyrifos + Gamma-cyhalothrin

- *Bolton*, 9 to 23 fl oz. (21 days) (RUP)
- *Cobalt*, 13 to 38 fl oz. (21 days) (RUP)

*Confirm 2F*, 6 to 8 fl oz. (7 days)

*Coragen*, 3.5 to 5 fl oz. (3 days)

#### Cypermethrin

- *Ammo 2.5 EC*, 3.75 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 3.75 to 5 fl oz. (1 day) (RUP)
- *Holster*, 3.75 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde 2.5 EC*, 3.75 to 5 fl oz. (1 day) (RUP)

*Danitol 2.4 EC*, 10.66 to 16 fl oz. (7 days) (RUP)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

*Intrepid 2F*, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)

*Radiant SC*, 5 to 10 fl oz. (1 day)

*Rimon 0.83EC*, 6 to 12 fl oz. (7 days)

*Carbaryl 4L*, 1 to 2 qt. (3 days)

*Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

#### Spinosad

- *Entrust* (1.25 to 3 oz.) or *Entrust SC* (4 to 10 fl oz.) (1 day)
- *Stallion*, 9.5 to 11.75 oz. (21 days) (RUP)
- *Voliam Flexi*, 4 to 7 oz. (3 days)

### CUTWORM:

#### Bacillus thuringiensis

- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF*, 0.5 to 1 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid XL*, 0.8 to 1.6 fl oz. (0 days) (RUP)

#### Chlorpyrifos + Gamma-cyhalothrin

- *Bolton*, 9 to 18 fl oz. (21 days) (RUP)
- *Cobalt*, 13 to 26 fl oz. (21 days) (RUP)

#### Cypermethrin

- *Ammo 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Holster*, 2.5 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)

*Empower*, 3.5 to 8.7 lb. (7 days) (RUP)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (1 day) (RUP)

#### Methomyl

- *Lannate LV* (1.5 pt.) or *Lannate SP* (0.5 lb.) (3 days) (RUP)
- *Nudrin LV* (1.5 pt.) or *Nudrin SP* (0.5 lb.) (3 days) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (1 day) (RUP)

*Stallion*, 6.5 to 11.75 oz. (21 days) (RUP)

### LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

### WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

**MITES**Bifenthrin

- *Bifenture* EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Bifenture* 10 DF, 12.8 to 16 oz/A. (7 days)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (7 days) (RUP)
- *Capture* 2 EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero* EW (11.2 oz.) (7 days) (RUP)

**DISEASES****SEED TREATMENT:**

DAMPING OFF, WIRE STEM (*Pythium* spp., *Rhizoctonia* spp.):

Captan

- *Captan* 4 Flowable, 2.2 fl oz/100 lb seed.

Fludioxonil

- *Maxim* 4 FS, 0.08 to 0.16 fl oz/100 lb seed. Commercial seed treatment plants only (*Rhizoctonia*).

Mefenoxam

- *Apron* XL, 0.085 to 0.64 fl oz/100 lb seed (*Pythium*). (0 days)

Thiram

- 42-S Thiram, *Thiram* 480DP, *Thiram* 50 WP Dyed, 8 oz/100 lb seed.

**SEEDBED TREATMENT:**

CLUBROOT (*Plasmiodiophora brassicae*):

Fluazinam

- *Omega* 500 F, 2.6 pt. (50 days)

**TRANSPLANT DRENCH:**

CLUBROOT (*Plasmiodiophora brassicae*):

Fluazinam

- *Omega* 500 F, 6.45 fl oz. (50 days)

**FOLIAR TREATMENT:**

BLACK ROT (*Xanthomonas campestris*): Apply treatment (lowest rate) in fields as soon as transplants are established.

\* Copper Ammonium Carbonate

- *Copper* Count N, 1 to 2 qt. (0 days)

Acibenzolar-S-methyl

- *Actigard*, 0.5 to 1 oz per 20 gal (ground) or 10 gal (aerial) of water. (7 days) Do not apply more than 4 applications per crop per year.

Copper Hydroxide

- *Champ* DP Dry Prill, 1/3 to 2/3 lb. (0 days)
- *Champ* Formula 2 FFlowable, 1/3 to 2/3 pt. (0 days)
- *Champ* WG, 1.06 lb. (0 days)
- *Champ* WP, 1 to 2 lb. (0 days)
- *Champion*, 0.5 to 0.75 lb. (0 days)
- *Kocide* 2000, 3/4 to 1 1/2 lb. (0 days)
- *Kocide* 3000, 0.5-0.75 lb. (0 day)
- *Nu-Cop* 50 DF, 1 lb. (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 1.8 pt. (0 days)
- *Badge* X2, 0.5 to 0.75 lb. (0 days)

Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 3/4 to 1 1/4 lb. (0 days)

BLACK LEG (*Phoma lingam*): There are presently no chemicals registered for use on this disease.

ALTERNARIA LEAF SPOT (*Alternaria brassicae*): Apply when conditions favor disease development and repeat every 7 to 10 days.

\* Azoxyystrobin

- *Quadris*, 6.2 to 15.4 fl oz. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

\* Azoxyystrobin + Difenconazole

- *Quadris* Top, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

\* Chlorothalonil

- *Bravo* Ultrex, 1.4 lb. (7 days)
- *Bravo* Weather Stik, *Equus* 720 SST, 1.5 pt. (7 days)

\* Difenconazole + Cyprodinil

- *Inspire* Super, 16 to 20 fl oz. (7 days)

Boscalid

- *Endura*, 6 to 9 oz. (0 days)

Copper Ammonium Carbonate

- *Copper* Count N, 2 qt. (0 days)

Copper Hydroxide

- *Champ* DP Dry Prill, 0.33 to 0.67 lb. (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 1.8 pt. (0 days)
- *Badge* X2, 0.5 to 0.75 lb. (0 days)

Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 3/4 to 1 1/4 lb. (0 days)

Cyprodinil + Fludioxonil

- *Switch* 62.5 WG, 11 to 14 oz. (7 days)

Mefenoxam + Chlorothalonil

- *Ridomil* Gold Bravo, 1 1/2 pt, 14-day intervals. (7 days)

Penthiopyrad

- *Fontelis*, 14 - 30 fl oz. (0 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 4 pt. (7 days)

Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days)

DOWNY MILDEW (*Peronospora parasitica*): Apply when conditions favor disease development and repeat every 7 to 10 days.

\* Ametoctradin + Dimethomorph

- *Zapro*, 14 fl. oz. (7 days)

\* Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days) Must tank mix with other fungicide.

\* Fosetyl-Aluminum

- *Aliette* WDG, 2 to 5 lb, 7- to 21-day intervals. (3 days) **Note:** Do not tank mix with copper fungicides.

\* Mefenoxam + Chlorothalonil

- *Ridomil* Gold Bravo, 1 1/2 pt, 14-day intervals. (7 days)

Acibenzolar-S-methyl

- *Actigard*, 0.5 to 1 oz per 20 gal (ground) or 10 gal (aerial) of water. (7 days) Do not apply more than 4 applications per crop per year.

Copper Hydroxide

- *Champ* DP Dry Prill, 0.33 to 0.67 lb. (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 1.8 pt. (0 days)
- *Badge* X2, 0.5 to 0.75 lb. (0 days)

Dimethomorph

- *Forum*, 6 fl oz. (7 days)

Fenamidone

- *Reason* 500 SC, 5.5 - 8.2 fl oz. (2 days) No more than 1 application before alternating. 12 hr REI.

## Cabbage

### Mandipropamid

- *Revus*, 8 fl oz. (1 day)

### Mefenoxam

- *Ridomil* Gold SL, 0.125-0.25 pt. (7 days)

### Mono-, dibasic sodium salts of phosphorous acid

- *Fosphite*, 1 to 3 qt per 20 gal (ground) or 10 gal (aerial) of water. (0 days)

### Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 2.5 to 5 pt every 7 - 21 days. (0 days)
- *Prophyt*, 2 to 4 pt. (0 days)

### Potassium phosphite/chlorothalonil

- *Catamaran*, 4 pt. (7 days)

**Note:** Fungicides that protect against *Alternaria* also provide limited downy mildew protection.

### CERCOSPORA LEAF SPOT (*Cercospora beticola*):

#### Fenamidon

- *Reason* 500 SC, 8.2 fl oz. (2 days) Suppression. 12 hr REI.

#### Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days)

### WHITE RUST:

#### Fenamidon

- *Reason* 500 SC, 8.2 fl oz. (2 days) 12 hr REI.

#### Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days)

## Cabbage

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

Sugar beet cyst, northern root-knot and root-lesion nematodes can reduce cabbage yields. Fields with soil or root problems of undetermined cause should be tested for nematodes (see Appendix C). If the plant-parasitic nematodes are present in population densities above the economic threshold for cabbage, crop rotation or application of a nematicide is recommended. The following nematicides are suitable for control of sugar beet cyst, root-knot and lesion nematodes in cabbage production. It is best not to plant cabbage on land infested with sugar beet cyst nematodes.

### FALL SOIL FUMIGATION (BROADCAST):

#### 1,3-D

- *Telone* II, 25 gal/A (muck soil), 9-18 gal/A (mineral soil). Fumigate in the fall when soil temperatures at a 6-inch depth are above 50F. Inject the fumigant to a soil depth of 8 inches and lightly seal the soil immediately after application.

Use soil fumigants only as directed on the label. In some limited situations soil fumigants can be applied in the spring in Michigan. Correct soil moisture, temperature and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or by immediate tarping.

### PREPLANT SOIL TREATMENT:

#### Ethoprop

- *Mocap* 15 G, . Apply 34 lb/A up to one week before planting and incorporate to a depth of 3 inches. (RUP)

### SOIL TREATMENT AT PLANTING:

#### Ethoprop

- *Mocap* 15 G, 13 lb. (36 inch row spacing) Apply in a 12- to 15-inch band over the row. Do not allow material to contact the seed. (RUP)

### INSECTS

**SEEDBED TREATMENT:** Apply treatments to soil according to directions to protect young seedlings in the seedbed before transplanting in field.

**CABBAGE MAGGOT:** Apply to seedbed surface and incorporate to 3 to 4 inches.

#### Diazinon

- *Diazinon* 50 W (4 to 6 lb.) or *Diazinon* AG 500 (2 to 3 qt.) or *Diazinon* AG600 (51 to 76.5 fl oz.) Apply only as directed. (RUP)

*Verimark*, 10-13.5 oz/A. (0 days)

#### CUTWORM:

#### Diazinon

- *Diazinon* 50 W (4 to 8 lb.) or *Diazinon* AG 500 (2 to 4 qt.) or *Diazinon* AG600 (51 to 102 fl oz.) (RUP)

### SOIL TREATMENT:

#### APHIDS:

*Platinum*, 5 to 11 fl oz. (30 days) See label for application methods.

*Sivanto*, 7 - 12 fl oz/A.

*Verimark*, 6.75-13.5 oz/A. (0 days)

#### FLEA BEETLE, THRIPS:

*Scorpion* 35SL, 9 to 10.5 fl oz. (21 days) See label for application methods.

*Verimark*, 6.75-13.5 oz/A. (0 days)

#### APHIDS and THRIPS:

#### Imidacloprid

- *Admire* Pro, 4.4 to 10.5 fl oz. (21 days)
- *Nuprid* 2 F, 10 to 24 fl oz. (21 days)

#### LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

#### WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

**TRANSPLANT WATER TREATMENT:** Treatments are applied in water around roots at time plants are set in field.

#### CABBAGE MAGGOT:

#### Diazinon

- *Diazinon* 50 W (1 to 2 lb/200 gal) or *Diazinon* AG 500 (4 to 8 oz/50 gal) or *Diazinon* AG600 (3.25 to 6.5 fl oz/50 gal) Use only as directed. (RUP)

*Verimark*, 10-13.5 oz/A. (0 days)

#### ARMYWORM, CABBAGE LOOPERS, DIAMONDBACK MOTH,

#### IMPORTED CABBAGE WORM:

*Coragen*, 3.5 to 5 fl oz. (3 days) See label for application methods.

*Verimark*, 5-10 oz/A. (0 days)

**PLANTING TREATMENT:** Treatments applied at seeding.

#### CABBAGE MAGGOT:

#### Bifenthrin

- *Bifenture* 10 DF, 8 to 16 oz/A.
- *Brigade* WSB, 8 to 16 oz. Apply in furrow with seed or transplant. (RUP)

#### Chlorpyrifos

- *Chlorpyrifos* 15G (4.6 to 9.3 oz/1000 row ft.) or *Chlorpyrifos* 4E AG (1.6 to 2.75 fl oz/1000 row ft.) (30 days) (RUP)
- *Govern*, 1.6 to 2.75 fl oz/1000 row ft. (30 days) (RUP)
- *Hatchet*, 1.6 to 2.75 fl oz/1000 row ft. (30 days) (RUP)
- *Lorsban* 15 G (4.6 to 9.2 oz /1,000 row ft.) or *Lorsban* 4 E / *Lorsban* Advanced (1.6 to 2.75 fl oz / 1,000 row ft.) or *Lorsban* 75

WG (1.1 to 1.8 oz/1000 row ft.) See label for application methods. (RUP)

- *Nufos* 4E, 1.6 to 2.75 fl oz/1,000 row ft. (30 days) (RUP)
- *Saurus*, 4.6 to 9.2 oz/1000 row ft. (30 days)
- *Vulcan*, 1.6 to 2.75 fl oz/1,000 row ft. (30 days) (RUP)
- *Warhawk*, 1.6 to 2.75 fl oz/1,000 row ft. (30 days) (RUP)
- *Whirlwind*, 1.6 to 2.75 fl oz/1,000 row ft. (30 days) (RUP)

ARMYWORM, IMPORTED CABBAGE WORM, DIAMONDBACK MOTH, CABBAGE LOOPERS:

*Coragen*, 3.5 to 5 fl oz. (3 days) See label for application methods.

*Durivo*, 10 to 13 fl oz. (30 days)

*Verimark*, 5-10 oz/A. (0 days)

APHIDS, FLEA BEETLE, THRIPS:

*Belay* 50 WDG, 4.8 to 6.4 oz.

*Scorpion* 35SL, 9 to 10.5 fl oz. (21 days)

Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum* 75 SG (1.66 to 3.67 oz.) (30 days)

*Verimark*, 6.75-13.5 oz/A. (0 days)

APHIDS:

Chlorpyrifos

- *Chlorpyrifos* 4E AG, 1.2 fl oz/1000 row ft. (30 days) (RUP)
- *Govern*, 1.2 fl oz/1000 row ft. (30 days) (RUP)
- *Hatchet*, 1.2 fl oz/1000 row ft. (30 days) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced (1.2 fl oz/1000 row ft.) or *Lorsban* 75 WG (0.8 oz/1000 row ft.) (30 days) (RUP)
- *Nufos* 4E, 1.2 fl oz/1000 row ft. (30 days) (RUP)
- *Vulcan*, 1.2 fl oz/1000 row ft. (30 days) (RUP)
- *Warhawk*, 1.2 fl oz/1000 row ft. (30 days) (RUP)
- *Whirlwind*, 1.2 fl oz/1000 row ft. (30 days) (RUP)

*Sivanto*, 7 - 12 fl oz/A.

*Verimark*, 6.75-13.5 oz/A. (0 days)

GRUBS, WIREWORMS:

*Bifenture* 10 DF, 8 to 16 oz/A.

ARMYWORM, CUTWORM:

*Capture* LFR, 3.4 to 6.8 oz. (RUP)

LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

#### SOIL TREATMENT AFTER TRANSPLANTING:

APHIDS: Apply as a post-seeding drench, transplant drench, or hill drench, or as a sidedress after plants are established.

Imidacloprid. Additional generic brands available.

- *Admire* Pro, 4.4 to 10.5 fl oz. (21 days)
- *Nuprid* 2 F, 10 to 24 oz. (21 days)

*Sivanto*, 7 - 12 fl oz/A.

CABBAGE MAGGOT: Apply to the soil at base of plants after transplanting. Apply water to wet soil surface.

Chlorpyrifos

- *Lorsban* 15 G (4.6 to 9.2 oz /1,000 row ft.) or *Lorsban* 4 E / *Lorsban* Advanced (1.6 to 2.75 fl oz / 1,000 row ft.) Apply in a 4-inch band over row at time of seeding. Use only as directed. (RUP)

ARMYWORM, CABBAGE LOOPERS, CORN EARWORM, DIAMONDBACK MOTH, IMPORTED CABBAGE WORM:

*Coragen*, 3.5 to 5 fl oz. (3 days)

*Durivo*, 10 to 13 fl oz. (30 days)

APHIDS, FLEA BEETLE, THRIPS:

*Durivo*, 10 to 13 fl oz. (30 days)

Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum* 75 SG (1.66 to 3.67 oz.) (30 days)

LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

#### FOLIAR TREATMENT:

FLEA BEETLE: Apply as needed soon after plants come up.

*Actara*, 1.5 to 3 oz. (0 days)

*Baythroid* XL, 2.4 to 3.2 fl oz. (0 days) (RUP)

*Belay*, . (14 days)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade* @ 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (7 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

*Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)

Carbaryl

- *Carbaryl* 4L, 0.5 to 1 qt. (3 days)

- *Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* 80 WSP (0.67 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (3 days)

Chlorpyrifos

- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced (1 to 2 pt.) or *Lorsban* 75 WG (0.67 to 1.33 lb.) (21 days) (RUP)
- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

Cypermethrin

- *Ammo* 2.5 EC, 2.5 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Holster*, 2.5 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde* 2.5 EC, 2.5 to 5 fl oz. (1 day) (RUP)

Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

Imidacloprid. Additional generic brands available.

- *Admire* Pro, 1.3 fl oz. (7 days)
- *Nuprid* 1.6 F, 3.8 fl oz. (7 days)

Do not exceed 19.2 oz/Acre per season.

*Kryocide*, 8 to 16 lb. (14 days)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Larvin* 3.2, 16 to 32 fl oz. (7 days) (RUP)

*Leverage* 360, 3 fl oz. (7 days) (RUP)

Malathion

- *Malathion* 8 (1.5 to 2.5 pt.) or *Malathion* 8 Aquamul (1.25 pt.) (7 days)

*Mustang* Max, 2.24 to 4 oz. (1 day) (RUP)

## Cabbage

### Permethrin

- *Perm-UP 25DF* (6.4 to 12.8 oz.) or *Perm-UP 3.2 EC* (4 to 8 oz.) (1 day) (RUP)
- *Pounce 25 WP*, 6.4 to 12.8 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Scorpion 35SL*, 2 to 7 fl oz. (1 day)

*Carbaryl 4L*, 0.5 to 1 qt. (3 days)

*Sevin 4 F* (0.5 to 1 qt.) or *Sevin 80 S* (0.63 to 1.25 lb.) or *Sevin 80*

*WSP* (0.67 to 1.25 lb.) or *Sevin XLR Plus* (0.5 to 1 qt.) (3 days)

*Voliam Flexi*, 4 to 7 oz. (3 days)

CUTWORM, ARMYWORM: Apply when damage is first seen. Repeat as needed

### \* Bifenthrin

- *Bifenture 10 DF*, 5.3 to 16 oz/A. (7 days)
- *Bifenture EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade WSB* (5.3 to 16 oz.) (7 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)

### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

### Chlorpyrifos

- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban 4 E / Lorsban Advanced* (1 to 2 pt.) or *Lorsban 75 WG* (0.67 to 1.33 lb.) (21 days) (RUP)
- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

*Javelin WG*, 0.12 to 1.5 lb. (0 days)

*Kryocide*, 8 to 16 lb. (14 days)

*Leverage 360*, 3 fl oz. (7 days) (RUP)

### Permethrin

- *Perm-UP 25DF* (6.4 to 12.8 oz.) or *Perm-UP 3.2 EC* (4 to 8 oz.) (1 day) (RUP)
- *Pounce 25 WP*, 6.4 to 12.8 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Vetica*, 10 to 20 fl oz. (1 day)

*Warrior* with Zeon Technology, 2.6 to 3.8 fl oz. (1 day) (RUP)

IMPORTED CABBAGE WORM: Apply if 20% or more are infested with any cabbage "worm" before heading or if >10% are infested at or after heading.

\* *Radiant SC*, 5 to 10 fl oz. (1 day)

*Avaunt*, 2.5 to 3.5 oz. (3 days) Add a wetting agent to improve spray coverage.

### Bacillus thuringiensis

- *Agree WG*, 0.5 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF* (0.25 to 1 lb.) or *DiPel ES* (1 to 2 pt.) (0 days)
- *Javelin WG*, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid XL*, 1.6 to 2.4 fl oz. (0 days) (RUP)

### Bifenthrin

- *Bifenture 10 DF*, 5.3 to 16 oz/A. (7 days)
- *Bifenture EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade WSB* (5.3 to 16 oz.) (7 days) (RUP)

- *Capture 2 EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)

### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

### Carbaryl

- *Carbaryl 4L*, 1 to 2 qt. (3 days)
- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

### Chlorpyrifos

- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban 4 E / Lorsban Advanced* (1 to 2 pt.) or *Lorsban 75 WG* (0.67 to 1.33 lb.) (21 days) (RUP)
- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

*Confirm 2F*, 6 to 8 fl oz. (7 days)

*Coragen*, 3.5 to 5 fl oz. (3 days)

### Cypermethrin

- *Ammo 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Holster*, 2.5 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)

*Danitol 2.4 EC*, 10.66 to 16 fl oz. (7 days) (RUP)

*Diazinon AG 500*, 0.5 to 1 pt. (21 days) (RUP)

*Dibrom 8 Emulsive*, 1 pt. (1 day) (RUP)

*Endigo ZC*, 4 fl oz. (1 day) (RUP)

### Esfenvalerate

- *Adjourn*, 2.9 to 5.8 fl oz. (3 days) (RUP)
- *Asana XL*, 2.9 to 5.8 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 2.9 to 5.8 fl oz. (3 days) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

*Intrepid 2F*, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

*Kryocide*, 8 to 16 lb. (14 days)

*Kryocide*, 8 to 16 lb. (14 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (1 day) (RUP)

*Larvin 3.2*, 16 to 32 fl oz. (7 days) (RUP)

*Leverage 360*, 3 fl oz. (7 days) (RUP)

### Malathion

- *Malathion 5 EC*, or *Malathion 57 EC* (1 to 2 pt.) or *Malathion 8* (1.5 to 2.5 pt.) or *Malathion 8 Aquamul* (1.25 pt.) (7 days)

### Methomyl

- *Lannate LV* (0.75 to 3 pt.) or *Lannate SP* (0.25 to 1 lb.) (1 day) (RUP)
- *Nudrin LV* (0.75 to 3 pt.) or *Nudrin SP* (0.25 to 1 lb.) (1 day) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

### Permethrin

- *Ambush 25 W*, 3.2 to 12.8 oz. (1 day) (RUP)
  - *Perm-UP 25DF* (3.2 to 12.8 oz.) or *Perm-UP 3.2 EC* (2 to 8 oz.) (1 day) (RUP)
  - *Pounce 25 WP*, 3.2 to 12.8 oz. (1 day) (RUP)
- Proaxis*, 1.92 to 3.2 fl oz. (1 day) (RUP)
- Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)

*Pyrethrin*, 1 to 12 fl oz. (0 days)

*Rimon* 0.83EC, 6 to 12 fl oz. (7 days)

*Carbaryl* 4L, 1 to 2 qt. (3 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (3 days)

#### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (1 day)

*Vetiva*, 10 to 20 fl oz. (1 day)

*Voliam* Flexi, 4 to 7 oz. (3 days)

DIAMONDBACK MOTH: Apply if 20% or more are infested with any cabbage "worm" before heading or if >10% are infested at or after heading. Use *Bacillus thuringiensis* to avoid killing important natural enemies of diamondback moth.

\* *Avaunt*, 3.5 oz. (3 days) Add a wetting agent to improve spray coverage.

\* *Coragen*, 3.5 to 5 fl oz. (3 days)

\* *Entrust*, 0.5 to 1.25 oz. (1 day)

#### Acetamiprid

- *Assail* 30 SG, 4 oz.. (7 days) Suppression only
- *Assail* 70WP, 1.7 oz.. (7 days) Suppression only

#### *Bacillus thuringiensis*

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *Biobit* HP, 0.5 to 1 lb. (0 days)
- *DiPel* DF (0.25 to 1 lb.) or *DiPel* ES (1 to 2 pt.) (0 days)
- *Javelin* WG, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid* XL, 2.4 to 3.2 fl oz. (0 days) (RUP)

#### Bifenthrin

- *Bifenture* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (7 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

#### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

*Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)

#### Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (3 days)
- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (3 days)

*Diazinon* AG 500, 0.5 to 1 pt. (21 days) (RUP)

*Dibrom* 8 Emulsive, 1 pt. (1 day) (RUP)

*Endigo* ZC, 4 to 4.5 fl oz. (1 day) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

*Kryocide*, 8 to 16 lb. (14 days)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Larvin* 3.2, 24 to 40 fl oz. (7 days) (RUP)

*Lorsban* 75 WG, 0.67 to 1.33 lb. (21 days) (RUP)

#### Malathion

- *Malathion* 5, *Malathion* 5 EC, 2 pt.. (7 days)

#### Methomyl

- *Lannate* LV (1.5 to 3 pt.) or *Lannate* SP (0.5 to 1 lb.) (1 day) (RUP)

- *Nudrin* LV (1.5 to 3 pt.) or *Nudrin* SP (0.5 to 1 lb.) (1 day) (RUP)

*Mustang* Max, 2.24 to 4 oz. (1 day) (RUP)

#### Permethrin

- *Ambush* 25 W, 3.2 to 12.8 oz. (1 day) (RUP)

- *Perm-UP* 25DF (3.2 to 12.8 oz.) or *Perm-UP* 3.2 EC (2 to 8 oz.) (1 day) (RUP)

- *Pounce* 25 WP, 3.2 to 12.8 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)

*Pyrethrin*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 5 to 10 fl oz. (1 day)

*Rimon* 0.83EC, 6 to 12 fl oz. (7 days)

*Carbaryl* 4L, 1 to 2 qt. (3 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (3 days)

#### Spinosad

- *Entrust* (0.5 to 1.25 oz.) or *Entrust* SC (1.5 to 4 fl oz.) (1 day)

*Vetiva*, 10 to 20 fl oz. (1 day)

*Voliam* Flexi, 4 to 7 oz. (3 days)

CABBAGE LOOPERS: Apply if 20% or more are infested with any cabbage "worm" before heading or if >10% are infested at or after heading. Most controls are less effective on larger worms.

\* *Coragen*, 3.5 to 5 fl oz. (3 days)

\* *Radiant* SC, 5 to 10 fl oz. (1 day)

*Avaunt*, 2.5 to 3.5 oz. (3 days) Add a wetting agent to improve spray coverage.

#### *Bacillus thuringiensis*

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *Biobit* HP, 0.5 to 1 lb. (0 days)
- *DiPel* DF (0.5 to 1 lb.) or *DiPel* ES (1 to 2 pt.) (0 days)
- *Javelin* WG, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid* XL, 1.6 to 2.4 fl oz. (0 days) (RUP)

#### Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (7 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

#### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

*Confirm* 2F, 6 to 8 fl oz. (7 days)

#### Cypermethrin

- *Ammo* 2.5 EC, 3.75 to 5 fl oz. (7 days) (RUP)
- *Cypermethrin*, 3.75 to 5 fl oz. (7 days) (RUP)
- *Holster*, 3.75 to 5 fl oz. (7 days) (RUP)
- *UP-Cyde* 2.5 EC, 3.75 to 5 fl oz. (7 days) (RUP)

*Danitol* 2.4 EC, 10.66 to 16 fl oz. (7 days) (RUP)

*Dibrom* 8 Emulsive, 2 pt. (1 day) (RUP)

*Endigo* ZC, 4 fl oz. (1 day) (RUP)

## Cabbage

### Esfenvalerate

- *Adjour*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (1 day) (RUP)

*Exirel*, 10-17 oz/A. (1)

*Intrepid 2F*, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

*Kryocide*, 8 to 16 lb. (14 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (1 day) (RUP)

*Latrin 3.2*, 24 to 40 fl oz. (7 days) (RUP)

*Leverage 360*, 3 fl oz. (7 days) (RUP)

### Malathion

- *Malathion 5*, *Malathion 5 EC*, or *Malathion 57 EC* (1 to 2 pt.) or *Malathion 8* (1.5 to 2.5 pt.) or *Malathion 8 Aquamul* (1.25 pt.) (7 days)

### Methomyl

- *Lannate LV* (1.5 to 3 pt.) or *Lannate SP* (0.5 to 1 lb.) (1 day) (RUP)
- *Nudrin LV* (1.5 to 3 pt.) or *Nudrin SP* (0.5 to 1 lb.) (1 day) (RUP)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

### Permethrin

- *Ambush 25 W*, 3.2 to 12.8 oz. (1 day) (RUP)
- *Perm-UP 25DF* (3.2 to 12.8 oz.) or *Perm-UP 3.2 EC* (2 to 8 oz.) (1 day) (RUP)
- *Pounce 25 WP*, 3.2 to 12.8 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (1 day) (RUP)

*Proclaim*, 3.2 to 4.8 oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Rimon 0.83EC*, 6 to 12 fl oz. (7 days)

### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust SC* (3 to 6 fl oz.) (1 day)

*Vetica*, 10 to 20 fl oz. (1 day)

*Voliam Flexi*, 4 to 7 oz. (3 days)

APHIDS: Apply if there are >5 per plant.

### Acetamiprid

- *Assail 30 SG* (2 to 4 oz.) or *Assail 70WP* (0.8 to 1.7 oz.) (7 days)

*Actara*, 1.5 to 3 oz. (0 days)

*Actara*, 1.5 to 3 oz. (0 days)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

*Beleaf 50 SG*, 2 to 2.8 oz. (0 days)

### Bifenthrin

- *Bifenture EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade WSB* (5.3 to 16 oz.) (7 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)

### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

### Chlorpyrifos

- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban 4 E / Lorsban Advanced* (1 to 2 pt.) or *Lorsban 75 WG* (0.67 to 1.33 lb.) (21 days) (RUP)

- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

*Diazinon AG 500*, 0.5 to 1 pt. (21 days) (RUP)

*Dibrom 8 Emulsive*, 1 pt. (1 day) (RUP)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

*Fulfill*, 2.75 oz. (7 days) May require 5 to 7 days for aphid mortality.

Imidacloprid. Additional generic brands available.

- *Admire Pro*, 1.3 fl oz. (7 days)

- *Nuprid 1.6 F*, 3.8 fl oz. (7 days)

Do not use if Imidacloprid was used at planting. Do not exceed 19.2 oz/Acre per season.

*Leverage 360*, 3 fl oz. (7 days) (RUP)

### Malathion

- *Malathion 5* (1.5 to 2 pt.) or *Malathion 5 EC* (1 to 2 pt.) or *Malathion 57 EC* (1 to 2 pt.) or *Malathion 8* (1.5 to 2.5 pt.) or *Malathion 8 Aquamul* (1.25 pt.) (7 days)

*Movento*, 4 to 5 fl oz. (1 day) Must be tank mixed with adjuvant having spreading and penetrating properties.

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 7 - 12 fl oz/A.

*Voliam Flexi*, 4 to 7 oz. (3 days)

THRIPS: Apply insecticide if thrips are present at cupping. Use resistant cabbage varieties.

### Acetamiprid

- *Assail 30 SG* (4 oz.) or *Assail 70WP* (1.7 oz.) (7 days)

*Actara*, 3 to 5.5 oz. (0 days)

*Baythroid XL*, 0.8 to 1.6 fl oz. (0 days) (RUP)

### Bifenthrin

- *Bifenture 10 DF*, 5.3 to 16 oz/A. (7 days)
- *Bifenture EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @ 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)

### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

### Cypermethrin

- *Ammo 2.5 EC*, 3.75 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 3.75 to 5 fl oz. (1 day) (RUP)
- *Holster*, 3.75 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde 2.5 EC*, 3.75 to 5 fl oz. (1 day) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

*Hero*, 10.3 oz. (7 days) (RUP)

*Leverage 360*, 3 fl oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant SC*, 6 to 10 fl oz. (1 day) Minimum of 4 days between applications; do not apply more than 34 fl oz. per season.

*Rimon 0.83EC*, 12 fl oz. (7 days)

*Scorpion 35SL*, 2 to 7 fl oz. (1 day)

### Spinosad

- *Entrust* (1.25 to 3 oz.) or *Entrust SC* (4 to 10 fl oz.) (1 day)

*Voliam Flexi*, 4 to 7 oz. (3 days)

### CUTWORM:

#### Bacillus thuringiensis

- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF*, 0.5 to 1 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid XL*, 0.8 to 1.6 fl oz. (0 days) (RUP)

Cypermethrin

- *Ammo 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Holster*, 2.5 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)

*Empower*, 3.5 to 8.7 lb. (7 days) (RUP)

Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (1 day) (RUP)

Methomyl

- *Lannate LV* (1.5 pt.) or *Lannate SP* (0.5 lb.) (1 day) (RUP)
- *Nudrin LV* (1.5 pt.) or *Nudrin SP* (0.5 lb.) (1 day) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (1 day) (RUP)

*Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

## ARMYWORM:

*Avaunt*, 3.5 oz. (3 days) Add a wetting agent to improve spray coverage.

Bacillus thuringiensis

- *Agree WG*, 0.5 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 2 lb. (0 days)
- *DiPel DF* (1 to 2 lb.) or *DiPel ES* (2 to 4 pt.) (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

*Baythroid XL*, 2.4 to 3.2 fl oz. (0 days) (RUP)

Carbaryl

- *Carbaryl 4L*, 1 to 2 qt. (3 days)
- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

*Confirm 2F*, 6 to 8 fl oz. (7 days)

*Coragen*, 3.5 to 5 fl oz. (3 days)

Cypermethrin

- *Ammo 2.5 EC*, 3.75 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 3.75 to 5 fl oz. (1 day) (RUP)
- *Holster*, 3.75 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde 2.5 EC*, 3.75 to 5 fl oz. (1 day) (RUP)

*Danitol 2.4 EC*, 10.66 to 16 fl oz. (7 days) (RUP)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

*Intrepid 2F*, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Larvin 3.2*, 16 to 32 fl oz. (7 days) (RUP)

Methomyl

- *Lannate LV* (1.5 to 3 pt.) or *Lannate SP* (0.5 to 1 lb.) (1 day) (RUP)
- *Nudrin LV* (1.5 to 3 pt.) or *Nudrin SP* (0.5 to 1 lb.) (1 day) (RUP)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)

*Radiant SC*, 5 to 10 fl oz. (1 day)

*Rimon 0.83EC*, 6 to 12 fl oz. (7 days)

*Carbaryl 4L*, 1 to 2 qt. (3 days)

*Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

Spinosad

- *Entrust* (1.25 to 3 oz.) or *Entrust SC* (4 to 10 fl oz.) (1 day)
- *Voliam Flexi*, 4 to 7 oz. (3 days)

SWEET POTATO WHITEFLY, SILVER LEAF WHITEFLY:

Acetamiprid

- *Assail 30 SG*, 2.5 to 4 oz. (7 days)
- *Assail 70WP*, 1.1 to 1.7 oz. (7 days)

*Exirel*, 13.5-20.5 oz/A. (1)

LEAFHOPPER:

*Sivanto*, 7 - 10.5 fl oz/A.

WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

## MITES

Bifenthrin

- *Bifenture EC*, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Bifenture 10 DF*, 12.8 to 16 oz/A. (7 days)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade WSB* (12.8 to 16 oz.) (7 days) (RUP)
- *Capture 2 EC*, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Discipline 2EC*, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Tundra EC*, 5.12 to 6.4 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero EW* (11.2 oz.) (7 days) (RUP)

## SLUGS

*Deadline M-Ps 4%* (20 to 40 lb) or *Metaldehyde 3.5 G* (30 to 40 lb) Apply between rows. Avoid contact to edible product.

## DISEASES

## SEED TREATMENT:

DAMPING OFF, WIRE STEM (*Pythium* spp., *Rhizoctonia solani*):

Captan

- *Captan 4 Flowable*, 2.2 fl oz/100 lb seed.

Fludioxinil

- *Maxim 4 FS*, 0.08 to 0.16 fl oz/100 lb seed. Commercial seed treatment plants only (*Rhizoctonia*).

Mefenoxam

- *Apron XL*, 0.085 - 0.64 fl oz/100 lb seed (*Pythium*). (0 days)

Thiram

- *42-S Thiram*, *Thiram 480DP*, *Thiram 50 WP Dyed*, 8 oz/100 lb seed.

BLACK LEG (*Phoma lingam*): There are presently no chemicals registered for use on this disease.

SEEDBED TREATMENT: Apply treatments to soil according to directions to protect young seedlings in the seedbed before transplanting in field.

CLUBROOT (*Plasmodiophora brassicae*):

Fluazinam

- *Omega 500 F*, 2.6 pt. (50 days)

DAMPING OFF (*Pythium* spp.), BASAL STEM ROT (*Phytophthora* spp.):

Mefenoxam. Apply as a broadcast preplant incorporation or surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone after planting with 1/2 to 1 in. of sprinkler irrigation.

- *Ridomil Gold SL*, 0.25-0.5 pt (*Pythium*) 1-2 pt (*Phytophthora*).
- *Ridomil Gold WSP*, 1 to 2 lb (1/4 to 1/2 lb, surface application, *Pythium* only).

## Cabbage

### TRANSPLANT DRENCH:

CLUBROOT (*Plasmiodiophora brassicae*):

#### Fluazinam

- Omega 500 F, 6.45 fl oz. (50 days)

### FOLIAR TREATMENT:

BLACK ROT (*Xanthomonas campestris*): Apply treatment (lowest rate) in the field as soon as transplants are established.

#### Acibenzolar-S-methyl

- Actigard, 1 oz per 20 gal (ground) or 10 gal (aerial) of water. (7 days) Do not apply more than 4 applications per crop per year.

#### Copper Ammonium Carbonate

- Copper Count N, 1 to 2 qt. (0 days) Flecking of wrapper leaves may occur.

#### Copper Hydroxide

- Champ DP Dry Prill, 0.33 to 0.67 lb. (0 days)
- Champ Formula 2 F, 0.33 to 0.66 pt. Flecking of wrapper leaves may occur.
- Champ WG, 1.06 lb. (0 days)
- ChampION, 0.5 to 0.75 lb. (0 days)
- Kocide 2000, 3/4 to 1 1/2 lb. (0 days)
- Kocide 3000, 0.5-0.75 lb. (0 day)
- Nu-Cop 3 L, 2/3 to 1 1/3 pt. (0 days)
- Nu-Cop 50 DF, 1 lb. (0 days) Flecking of wrapper leaves may occur.

#### Copper Hydroxide + Copper Oxychloride

- Badge SC, 1 to 1.8 pt. (0 days)
- Badge X2, 0.5 to 0.75 lb. (0 days)

ALTERNARIA LEAF SPOT (*Alternaria brassicae*): Apply when conditions favor disease development and repeat every 7 to 10 days.

#### \* Azoxystrobin

- Quadris, 6.2 to 15.4 fl oz. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

#### \* Azoxystrobin + Difenconazole

- Quadris Top, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

#### \* Chlorothalonil

- Bravo Ultrex, 1.4 lb. (7 days)
- Bravo Weather Stik, Equus 720 SST, 1.5 pt. (7 days)

#### \* Difenconazole + Cyprodinil

- Inspire Super, 16 to 20 fl oz. (7 days)

#### Boscalid

- Endura, 6 to 9 oz. (0 days)

#### Copper Ammonium Carbonate

- Copper Count N, 1 to 2 qt. (0 days) Flecking of wrapper leaves may occur.

#### Copper Hydroxide

- Champ DP Dry Prill, 0.33 to 0.67 lb. (0 days)
- Champ Formula 2 F, 0.33 to 0.66 pt. (0 days) Flecking of wrapper leaves may occur.
- Kocide 2000, 3/4 to 1 1/2 lb. (0 days)
- Kocide 3000, 0.5-0.75 lb. (0 day)
- Nu-Cop 3 L, 2/3 to 1 1/3 pt. (0 days) Minimum of 25 GPA.
- Nu-Cop 50 DF, 1 lb. (0 days) Flecking of wrapper leaves may occur.

#### Copper Hydroxide + Copper Oxychloride

- Badge SC, 1 to 1.8 pt. (0 days)
- Badge X2, 0.5 to 0.75 lb. (0 days)

#### Copper Sulfate

- Cuprofix Ultra 40 Disperss, 3/4 to 1 1/4 lb. (0 days)

#### Cyprodinil + Fludioxonil

- Switch 62.5 WG, 11 to 14 oz. (7 days)

#### Mancozeb

- Manzate Pro-Stick, 1.6 to 2.1 lb. (7 days)

#### Mefenoxam + Chlorothalonil

- Ridomil Gold Bravo, 1 1/2 pt, 14-day intervals. (7 days) Cabbage and tight-headed Chinese cabbage. Do not tank mix with copper fungicides.

#### Penthiopyrad

- Fontelis, 14 - 30 fl oz. (0 days)

#### Potassium phosphite/chlorothalonil

- Catamaran, 4 pt. (7 days)

#### Pyraclostrobin

- Cabrio, 12-16 oz. (0 days)

DOWNY MILDEW (*Peronospora parasitica*): Apply when conditions favor disease development and repeat every 7 to 10 days.

#### \* Ametoctradin + Dimethomorph

- Zampro, 14 fl. oz. (7 days)

#### \* Fluopicolide

- Presidio, 3-4 fl oz. (2 days) Must tank mix with other fungicide.

#### \* Fosetyl-Aluminum

- Aliette WDG, 2 to 5 lb, 7- to 21-day intervals. (3 days) Do not tank mix with copper fungicides.

#### \* Mefenoxam + Chlorothalonil

- Ridomil Gold Bravo, 1 1/2 pt, 14-day intervals. (7 days) Cabbage and tight-headed Chinese cabbage. Maximum 4 applications.

#### Acibenzolar-S-methyl

- Actigard, 1 oz per 20 gal (ground) or 10 gal (aerial) of water. (7 days) Do not apply more than 4 applications per crop per year.

#### Copper Hydroxide + Copper Oxychloride

- Badge SC, 1 to 1.8 pt. or Badge X2, 0.5 to 0.75 lb. (0 days)

#### Dimethomorph

- Forum, 6 fl oz. (7 days)

#### Fenamidone

- Reason 500 SC, 5.5 - 8.2 fl oz. (2 days) No more than 1 application before alternating. 12 hr REI.

#### Mancozeb

- Manzate Pro-Stick, 1.6 to 2.1 lb. (7 days)

#### Mandipropamid

- Revus, 8 fl oz. (1 day)

#### Mefenoxam

- Ridomil Gold SL, 0.125-0.25 pt. (7 days)

#### Mono-, dibasic sodium salts of phosphorous acid

- Fosphite, 1 to 3 qt per 20 gal (ground) or 10 gal (aerial) of water. (0 days)

#### Mono-, dibasic sodium, potassium and ammonium phosphites

- Phostrol, 2.5 to 5 pt every 7 - 21 days.
- Prophyt, 2 to 4 pt. (0 days)

#### Potassium phosphite/chlorothalonil

- Catamaran, 4 pt. (7 days)

**Note:** Fungicides that protect against Alternaria also provide limited downy mildew protection.

CERCOSPORA LEAF SPOT (*Cercospora beticola*):

#### Fenamidone

- Reason 500 SC, 8.2 fl oz. (2 days) Suppression. 12 hr REI.

#### Pyraclostrobin

- Cabrio, 12-16 oz. (0 days)

WHITE RUST:

#### Fenamidone

- Reason 500 SC, 8.2 fl oz. (2 days) 12 hr REI.

#### Pyraclostrobin

- Cabrio, 12-16 oz. (0 days)

# Carrots

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

## NEMATODES

Northern root-knot, pin and carrot cyst nematodes severely reduce carrot quality and yields. Crop rotation is an essential part of nematode management in carrot production in Michigan. Fields with soil or root problems of undetermined cause should be tested for nematodes (see Appendix C). If the plant-parasitic nematodes are present, crop rotation or application of a nematicide will be recommended. The following nematicides are suitable for control of root-knot nematodes in carrot production.

### FALL SOIL FUMIGATION (BROADCAST):

#### 1,3-D

- *Telone II*, 25 gal/A (muck soil), 9-18 gal/A (mineral soil).

Fumigate in the fall when soil temperatures at a 6-inch depth are above 50F. Inject the fumigant to a soil depth of 8 inches and lightly seal the soil immediately after application. Use soil fumigants only as directed on the label. In some limited situations, soil fumigants can be applied in the spring in Michigan.

Correct soil moisture, temperature and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or by immediate tarping.

### PREPLANT TREATMENT:

#### Oxamyl

- *Vydate L*, Broadcast. Apply 2 gal in a minimum of 20 gallons of water as a broadcast treatment. Apply within one week of planting and thoroughly incorporate to a depth of 4 to 6 inches. (RUP)

### PLANTING TREATMENT:

#### Oxamyl

- *Vydate L*, in-row. Apply 1 to 2 gal in a minimum of 20 gallons of water in the seed furrow at planting. (RUP)

### POST-PLANT TREATMENT:

#### Oxamyl

- *Vydate L*, Broadcast. Apply 2 gal/A in at least 20 gal water/A before emergence. Incorporate into the soil. (RUP)

## INSECTS

### SOIL TREATMENT:

APHIDS, LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

### PRE-PLANT TREATMENT:

WIREWORM: May be found in grassy or weedy fields. If wireworm are present, apply evenly to the soil surface and incorporate 4 to 8 inches deep prior to planting.

#### Diazinon

- *Diazinon 50 W* (6 to 8 lb.) or *Diazinon AG 500* (3 to 4 qt.) or *Diazinon AG600* (76.5 to 102 fl oz.) Preplant soil application only. (RUP)

CUTWORM:

#### Diazinon

- *Diazinon 50 W* (4 to 8 lb.) or *Diazinon AG 500* (2 to 4 qt.) or *Diazinon AG600* (51 to 102 fl oz.) Use only as directed. (RUP)

APHIDS, FLEA BEETLE, LEAFHOPPERS:

#### Imidacloprid

- *Admire Pro*, 4.4 to 10.5 fl oz. (21 days)
- *Nuprid 2 F*, 10 to 24 fl oz. (21 days)

#### Thiamethoxam

- *Platinum* (5 to 12 fl oz.) or *Platinum 75 SG* (1.7 to 4.01 oz.)

### FOLIAR TREATMENT:

CUTWORM: Apply when cutworm are first seen.

\* *Baythroid XL*, 1.6 to 2.8 fl oz. (0 days) (RUP)

#### \* Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (7 days) Ground application only. (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (7 days) (RUP)

#### Bacillus thuringiensis

- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF* (0.5 to 1 lb.) or *DiPel ES* (1 to 2 pt.) (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (2.6 to 6.1 oz.) or *Hero EW* (2.8 to 6.7 oz.) (21 days) (RUP)
- *Steed*, 2.5 to 3.5 fl oz. (21 days) (RUP)
- *Leverage 360*, 2.4 to 2.8 fl oz. (7 days) (RUP)

#### Methomyl

- *Lannate LV* (0.75 to 1.5 pt.) or *Lannate SP* (0.25 to 0.5 lb.) (1 day) (RUP)
- *Nudrin LV* (0.75 to 1.5 pt.) or *Nudrin SP* (0.25 to 0.5 lb.) (1 day) (RUP)

*Mustang Max*, 1.28 to 4 oz. (1 day) (RUP)

CARROT WEEVIL ADULTS: Apply early in the spring when adults are first detected. Repeat weekly as needed.

\* *Baythroid XL*, 2.8 fl oz. (0 days) (RUP)

#### \* Esfenvalerate

- *Asana XL*, 9.6 fl oz. (7 days) Ground application only. (RUP)
- *S-FenvaloStar*, 9.6 fl oz. (7 days) (RUP)
- *S-FenvaloStar*, 9.6 fl oz. (7 days) (RUP)
- *Leverage 360*, 2.4 to 2.8 fl oz. (7 days) (RUP)
- *Pyrenone*, 1 to 12 fl oz. (0 days)

CARROT WEEVIL LARVAE: Apply when larvae are first seen or 3 to 5 days after appearance of first eggs. Repeat in 2 to 3 weeks, up to 3 applications.

*Baythroid XL*, 2.8 fl oz. (0 days) (RUP)

*Leverage 360*, 2.4 to 2.8 fl oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Vydate L*, 2 to 4 pt. (14 days) (RUP)

LEAFHOPPERS (*Aster yellows*): Treat fields if numbers exceed 20/100 sweeps. Repeat as needed (every 3 to 6 days) depending on the number of leafhoppers.

\* *Baythroid XL*, 1.6 to 2.8 fl oz. (0 days) (RUP)

#### \* Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (7 days) Ground application only. (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (7 days) (RUP)

*Actara*, 1.5 to 3 oz. (7 days)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

#### Carbaryl

- *Carbaryl 4L*, 1 to 2 qt. (7 days)
- *Sevin 4 F* (0.5 to 2 qt.) or *Sevin 80 S* (0.63 to 2.5 lb.) or *Sevin XLR Plus* (0.5 to 2 qt.) (0 days)

## Carrots

*Endosulfan 3 EC*, 0.66 to 1.33 qt. (7 days) Only 1 application per year. (RUP)

### Imidacloprid

- *Admire Pro*, 1.2 fl oz. (7 days)
- *Nuprid 1.6 F*, 3.5 fl oz. (7 days)

*Leverage 360*, 2.4 to 2.8 fl oz. (7 days) (RUP)

### Malathion

- *Malathion 57 EC* (2 pt.) or *Malathion 8 Aquamul* (1 to 1.25 pt.) (7 days)

### Methomyl

- *Lannate LV* (1.5 to 3 pt.) or *Lannate SP* (0.5 to 1 lb.) (1 day) (RUP)
- *Nudrin LV* (1.5 to 3 pt.) or *Nudrin SP* (0.5 to 1 lb.) (1 day) (RUP)

*Mustang Max*, 1.76 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl 4L*, 1 to 2 qt. (7 days)

*Sevin 4 F* (0.5 to 2 qt.) or *Sevin 80 S* (0.63 to 2.5 lb.) or *Sevin XLR Plus* (0.5 to 2 qt.) (0 days)

APHIDS: Apply if needed.

*Actara*, 1.5 to 3 oz. (7 days)

*Beleaf 50 SG*, 2 to 2.8 oz. (3 days)

### Bifenthrin

- *Bifenture 10 DF*, 8 to 16 oz/A. (21 days)
- *Bifenture EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade WSB* (12.8 to 16 oz.) (21 days) (RUP)
- *Fanfare 2EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Tundra EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

*Diazinon AG 500*, 1 pt. (14 days) (RUP)

*Endosulfan 3 EC*, 0.66 to 1.33 qt. (7 days) Only 1 application per year. (RUP)

Imidacloprid. Additional generic brands available.

- *Admire Pro*, 1.2 fl oz. (7 days)
- *Nuprid 1.6 F*, 3.5 fl oz. (7 days)

Do not exceed 10.5 oz/Acre per season.

*Leverage 360*, 2.4 to 2.8 fl oz. (7 days) (RUP)

### Malathion

- *Malathion 57 EC* (1.5 to 2 pt.) or *Malathion 8 Aquamul* (1 to 1.25 pt.) (7 days)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 7 - 10.5 fl oz/A.

FLEA BEETLE:

*Actara*, 1.5 to 3 oz. (7 days)

*Baythroid XL*, 1.6 to 2.8 fl oz. (0 days) (RUP)

### Bifenthrin

- *Bifenture 10 DF*, 12.8 to 16 oz/A. (21 days)
- *Bifenture EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade WSB* (12.8 to 16 oz.) (21 days) (RUP)
- *Fanfare 2EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Tundra EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (2.6 to 6.1 oz.) or *Hero EW* (2.8 to 6.7 oz.) (21 days) (RUP)
- *Steed*, 2.5 to 3.5 fl oz. (21 days) (RUP)

### Carbaryl

- *Carbaryl 4L*, 0.5 to 1 qt. (7 days)

- *Sevin 4 F* (0.5 to 1 qt.) or *Sevin 80 S* (0.63 to 1.25 lb.) or *Sevin XLR Plus* (0.5 to 1 qt.) (7 days)

*Endosulfan 3 EC*, 1.33 qt. (7 days) (RUP)

### Imidacloprid

- *Admire Pro*, 1.2 fl oz. (7 days)
- *Nuprid 1.6 F*, 3.5 fl oz. (7 days)

*Leverage 360*, 2.4 to 2.8 fl oz. (7 days) (RUP)

*Mustang Max*, 1.76 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl 4L*, 0.5 to 1 qt. (7 days)

*Sevin 4 F* (0.5 to 1 qt.) or *Sevin 80 S* (0.63 to 1.25 lb.) or *Sevin XLR Plus* (0.5 to 1 qt.) (7 days)

### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust SC* (3 to 6 fl oz.) (3 days)

TARNISHED PLANT BUG:

*Beleaf 50 SG*, 2 to 2.8 oz. (3 days)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero EW* (11.2 oz.) (21 days) (RUP)

### Carbaryl

- *Carbaryl 4L*, 1 to 2 qt. (7 days)
- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (7 days)

*Leverage 360*, 2.4 to 2.8 fl oz. (7 days) (RUP)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl 4L*, 1 to 2 qt. (7 days)

*Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (7 days)

ARMYWORM:

### Bacillus thuringiensis

- *Biobit HP*, 0.5 to 2 lb. (0 days)
- *DiPel DF* (1 to 2 lb.) or *DiPel ES* (2 to 4 pt.) (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

*Coragen*, 3.5 to 5 fl oz. (1 day)

*Intrepid 2F*, 6 to 16 fl oz. (14 days) 4 to 10 fl oz with PHI of 1 day when harvesting leaves.

### Methomyl

- *Lannate LV* (1.5 to 3 pt.) or *Lannate SP* (0.5 to 1 lb.) (1 day) (RUP)

- *Nudrin LV* (1.5 to 3 pt.) or *Nudrin SP* (0.5 to 1 lb.) (1 day) (RUP)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Radiant SC*, 6 to 8 fl oz. (3 days) See label for treating and harvesting of leaves.

### Spinosad

- *Blackhawk* (1.7-3.3 oz/A) or *Entrust* (1 to 2 oz.) or *Entrust SC* (3 to 6 fl oz.) (7 days)

ARMYWORM, CUTWORM:

### Bifenthrin

- *Bifenture 10 DF*, 12.8 to 16 oz/A. (21 days)
- *Bifenture EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade WSB* (12.8 to 16 oz.) (21 days) (RUP)
- *Fanfare 2EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Tundra EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)

### Carbaryl

- *Carbaryl 4L*, 1 to 2 qt. (7 days)
- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (7 days)

*Javelin* WG, 0.12 to 1.5 lb. (0 days)  
*Pyrenone*, 1 to 12 fl oz. (0 days)  
*Carbaryl* 4L, 1 to 2 qt. (7 days)  
*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (7 days)

**THRIPS:**

*Blackhawk*, 1.7-3.3 oz/A. (7 days) Add adjuvant

**LEAFHOPPERS:**

*Sivanto*, 7 - 10.5 fl oz/A.

**WHITEFLIES:**

*Sivanto*, 10.5 - 14 fl oz/A.

**MITES**Bifenthrin

- *Bifenture* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Bifenture* 10 DF, 12.8 to 16 oz/A. (21 days)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (21 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero* EW (11.2 oz.) (21 days) (RUP)

**DISEASES****SEED TREATMENT:**

**DAMPING OFF** (*Pythium* spp., *Rhizoctonia solani*): Use only as directed; overtreatment may cause injury.

Fludioxinil

- *Maxim* 4 FS, 0.08 to 0.16 fl oz/100 lb seed. Commercial seed treatment plants only (*Rhizoctonia*).

Fludioxinil + mefenoxam

- *Maxim* XL, 0.167 to 0.334 fl oz/100 lb seed.

Mefenoxam

- *Apron* XL LS, 0.32 to 0.64 fl oz/100 lb seed (*Pythium*).

Metalaxyl

- *Allegiance-FL*, 0.75 fl oz/100 lb seed.

Thiram

- 42-S Thiram, *Thiram* 480DP, *Thiram* 50 WP Dyed, 8 oz/100 lb seed.

**PREPLANT INCORPORATED:**

**CAVITY SPOT** (*Pythium violae*):

Fluopicolide

- *Presidio*, 4 fl oz/100 lb seed. (7 days) Must be tanked mixed with labeled product active against target pathogen.

Mefenoxam

- *Ridomil* Gold SL, 0.5-1.3 pt.

**PREPLANT OR PLANTING TREATMENT:**

**CAVITY SPOT** (*Pythium* spp. and *Phytophthora* spp.):

Mefenoxam

- *Ridomil* Gold SL, 1-2 pt. Please see label for application procedures
- *Ultra* Flourish, 2 to 4 pt.

**FOLIAR TREATMENT:**

**POWDERY MILDEW** (*Sphaerotheca fuliginea* or *Erysiphe cichoracearum*): Apply at early leaf stage and repeat every 14 days.

\* Penthiopyrad

- *Fontelis*, 16 - 30 fl oz. (0 days)

\* Pyraclostrobin/Boscalid

- *Pristine*, 8 to 10.5 oz. (0 days)

\* Trifloxystrobin

- *Flint*, 2 to 3 oz. (7 days) Do not apply more than three sequential foliar applications of strobilurin fungicides before alternating with a fungicide that has a different mode of action.

Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 4 - 5.5 fl oz. (7 days)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Propiconazole

- *Propimax* EC, 4 fl oz. (14 days)
- *Tilt*, 4 fl oz. (14 days)

Sulfur

- *Kumulus* DF, *Micro* Sulf, *Microthiol* Disperss, *Thiolux*, 3 to 10 lb. (0 days)

**ALTERNARIA LEAF BLIGHT** (*Alternaria dauci*): Apply every 7 to 14 days after emergence.

\* Azoxystrobin

- *Quadris*, 6.2 - 15.4 fl oz every 7 - 14 days. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

\* Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 2.4 pt every 7-14 days. (0 days)

\* Azoxystrobin + Propiconazole

- *Quilt*, *Quilt* Xcel, 14 fl oz. (14 days)

\* Boscalid

- *Endura*, 4.5 oz. (0 days)

\* Chlorothalonil

- *Bravo* Ultrex, *Equus* DF, 1.4 to 1.8 lb every 7 to 10 days. (0 days)
- *Bravo* Weather Stik, *Echo* 720, *Equus* 720 SST, 1.5 to 2 pt. (0 days)
- *Echo* 90 DF, 1.25 to 1.625 lb. (0 days)

\* Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 4 - 5.5 fl oz. (7 days)

\* Iprodione

- *Iprodione* 4L AG, *Rovral* 4 Flowable, 1 to 2 pt. (0 days) Maximum 4 applications. See label for permissible rotation crops. Or 1 pt as a tank mix with another fungicide, maximum 10 applications.

\* Penthiopyrad

- *Fontelis*, 16 - 30 fl oz. (0 days)

\* Pyraclostrobin

- *Cabrio*, 8-12 oz. (0 days) Do not apply more than one application before alternating with another chemical.

\* Pyraclostrobin/Boscalid

- *Pristine*, 8 to 10.5 oz. (0 days)

\* Trifloxystrobin

- *Flint*, 2 to 3 oz. (7 days) Do not apply more than three sequential foliar applications of strobilurin fungicides before alternating with a fungicide that has a different mode of action.

Copper Ammonium Carbonate

- *Copper* Count N, 2 to 3 qt. (0 days)

Copper Hydroxide

- *Badge* X2, 0.75 - 3.57 lb. (0 days)
- *Champ* DP Dry Prill, 1 1/3 lb. (0 days)
- *Champ* Formula 2 F, 1 1/3 pt. (0 days)
- *Champ* ION, 0.75 to 1.5 lb. (0 days)
- *Kocide* 2000, 1 1/2 lb. (0 days)
- *Kocide* 3000, 0.75-1.5 lb. (0 day)

Copper Hydroxide + Copper Oxychloride

- *Badge* X2, 0.75 - 3.57 lb. (0 days)

## Cauliflower

- *Champ* DP Dry Prill, 1 1/3 lb. (0 days)
- *Champ* Formula 2 F, 1 1/3 pt. (0 days)
- *Champ*ION, 0.75 to 1.5 lb. (0 days)
- *Kocide* 2000, 1 1/2 lb. (0 days)
- *Kocide* 3000, 0.75-1.5 lb. (0 day)

### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 1.8 pt. (0 days)

### Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 1.25 lb. (0 days)

### Cyprodinil + Fludioxonil

- *Switch* 62.5 WG, 11 to 14 oz. (7 days)

### Iprodione

- *Meteor*, 1 - 2 pt. (0 days)

### Neem Oil

- *Trilogy*, 2 pt. (0 days)

### Potassium phosphite/chlorothalonil

- *Catamaran*, 4 pt. (0 days)

### Propiconazole

- *Propimax* EC, 4 fl oz. (14 days)
- *Tilt*, 4 fl oz. (14 days)

WHITE MOLD (*Sclerotinia sclerotiorum*): Apply when disease first appears and repeat every 7 to 10 days.

### Neem Oil

- *Trilogy*, 2 pt. (0 days)

CERCOSPORA LEAF SPOT (*Cercospora carotae*): Apply every 7 to 14 days after emergence.

### \* Azoxystrobin

- *Quadris*, 9.2 to 15.4 fl oz. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

### \* Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 2.4 pt every 7-14 days. (0 days)

### \* Azoxystrobin + Propiconazole

- *Quilt*, *Quilt* Xcel, 14 fl oz. (14 days)

### \* Chlorothalonil

- *Bravo* Ultrex, *Equus* DF, 1.4 to 1.8 lb. (0 days) May be applied through sprinkler irrigation equipment.
- *Bravo* Weather Stik, *Echo* 720, *Equus* 720 SST, 1.5 to 2 pt. (0 days)
- *Echo* 90 DF, 1.3 to 1.5 lb. (0 days)

### \* Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 5.5 fl oz. (7 days)

### \* Penthiopyrad

- *Fontelis*, 16 - 30 fl oz. (0 days)

### \* Pyraclostrobin

- *Cabrio*, 8-12 oz. (0 days) Do not apply more than one application before alternating with another chemical.

### \* Pyraclostrobin/Boscalid

- *Pristine*, 8 to 10.5 oz. (0 days)

### \* Trifloxystrobin

- *Flint*, 2 to 3 oz. (7 days) Do not apply more than three sequential foliar applications of strobilurin fungicides before alternating with a fungicide that has a different mode of action.

### Copper Ammonium Carbonate

- *Copper* Count N, 2 to 3 qt. (0 days)

### Copper Hydroxide

- *Badge* X2, 0.75 - 3.57 lb.
- *Champ* DP Dry Prill, 1 1/3 lb. (0 days)
- *Champ* Formula 2 F, 1 1/3 pt. (0 days)
- *Champ* WG, 2.0 lb. (0 days)
- *Champ*ION, 0.75 to 1.5 lb. (0 days)

- *Champion* WP, *Nu-Cop* 50 DF, 2 lb. (0 days)
- *Kocide* 2000, 1 1/2 lb. (0 days)
- *Kocide* 3000, 0.75-1.5 lb. (0 day)
- *Nu-Cop* 3 L, 1 1/3 to 2 2/3 pt. (0 days)

### Copper Hydroxide + Copper Oxychloride

- *Badge* X2, 0.75 - 3.57 lb.
- *Champ* DP Dry Prill, 1 1/3 lb. (0 days)
- *Champ* Formula 2 F, 1 1/3 pt. (0 days)
- *Champ* WG, 2.0 lb. (0 days)
- *Champ*ION, 0.75 to 1.5 lb. (0 days)
- *Champion* WP, *Nu-Cop* 50 DF, 2 lb. (0 days)
- *Kocide* 2000, 1 1/2 lb. (0 days)
- *Kocide* 3000, 0.75-1.5 lb. (0 day)
- *Nu-Cop* 3 L, 1 1/3 to 2 2/3 pt. (0 days)

### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 1.8 pt. (0 days)

### Copper Sulfate

- *Basic* Copper 53, 1.0 to 1.9 lb. (0 days)
- *Basicop*, 3 to 4 lb. (1 day)
- *Cuprofix* Ultra 40 Disperss, 1.25 lb. (0 days)

### Neem Oil

- *Trilogy*, 2 pt. (0 days)

### Potassium phosphite/chlorothalonil

- *Catamaran*, 4 pt. (0 days)

### Propiconazole

- *Propimax* EC, 4 fl oz. (14 days)
- *Tilt*, 4 fl oz. (14 days)

BACTERIAL LEAF BLIGHT (*Xanthomonas campestris* pv. *carotae*): Apply every 7 to 10 days after first appearance.

### Copper Hydroxide

- *Champ* Formula 2 F, 2/3 to 2 pt. (0 days)
- *Champion* WP, 1 to 3 lb. (0 days)

CAVITY SPOT (*Pythium violae*): Apply 2 to 4 times at 14-day intervals beginning 40-50 days after Ridomil at-planting treatment. Maximum 4 applications.

### Fenamidon

- *Reason* 500 SC, 8.2 fl oz. (14 days) Alternate with mefenoxam-containing fungicide.

### Fluopicolide

- *Presidio*, 4 fl oz/100 lb seed. (7 days) Must be tanked mixed with labeled product active against target pathogen.

### Mefenoxam

- *Ridomil* Gold SL, 0.2 pt. (7 days)

### Mefenoxam + Chlorothalonil

- *Ridomil* Gold Bravo, 1 1/2 to 2 pt. (7 days)

### Mefenoxam + Copper Hydroxide

- *Ridomil* Gold Copper, 2 lb. (7 days)

ALTERNARIA LEAF SPOT:

### \* Iprodione

- *Meteor*, 1 - 2 pt. (0 days)

## Cauliflower

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

#### FALL SOIL FUMIGATION (BROADCAST):

SUGAR BEET CYST, ROOT-KNOT and LESION NEMATODES: Sugar beet cyst, root-knot and lesion nematodes can reduce cauliflower

yields. Fields with soil or root problems of undetermined cause should be tested for nematodes (see Appendix C). If the plant-parasitic nematodes are present in population densities above the economic threshold for cauliflower, crop rotation or application of a nematicide is recommended. The following nematicide is suitable for control of sugar beet cyst, root-knot and lesion nematodes in cauliflower production.

#### 1.3-D

- *Telone II*, 25 gal/A (muck soil), 9-18 gal/A (mineral soil).

Fumigate in the fall when soil temperatures at a 6-inch depth are above 50F. Inject the fumigant to a soil depth of 8 inches and lightly seal the soil immediately after application. Use soil fumigants only as directed on the label. In some situations soil fumigation can be applied in the spring in Michigan.

Correct soil moisture, temperature and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or by immediate tarping.

## INSECTS

**SEEDBED TREATMENT:** Apply treatments to the soil according to directions to protect young seedlings in the seedbed before transplanting in field.

**CABBAGE MAGGOT:** Apply equivalent amount to seedbed surface and incorporate to 3 to 4 inches.

#### Diazinon

- *Diazinon 50 W* (4 to 6 lb.) or *Diazinon AG 500* (2 to 3 qt.) or *Diazinon AG600* (51 to 76.5 fl oz.) Apply only as directed. (RUP)

*Verimark*, 10-13.5 oz/A. (0 days)

**CUTWORM:**

#### Diazinon

- *Diazinon 50 W* (4 to 8 lb.) or *Diazinon AG 500* (2 to 4 qt.) or *Diazinon AG600* (51 to 102 fl oz.) (RUP)

## SOIL TREATMENT:

**APHIDS:**

#### Imidacloprid

- *Admire Pro*, 4.4 to 10.5 fl oz. (21 days)
- *Nuprid 2 F*, 10 to 24 fl oz. (21 days)

*Sivanto*, 7 - 12 fl oz/A.

**LEAFHOPPERS:**

*Sivanto*, 7 - 10.5 fl oz/A.

**WHITEFLIES:**

*Sivanto*, 10.5 - 14 fl oz/A.

**TRANSPLANT WATER TREATMENT:** Treatments are applied in water around roots at time plants are being set in the field.

**CABBAGE MAGGOT:**

#### Diazinon

- *Diazinon 50 W* (1 lb/100 gal) or *Diazinon AG 500* (1/2 to 1 pt/100 gal) Use only as directed. (RUP)

Treatment rates are given in the amount of formulation per 100 gals of water. Apply at rate of 1 cup solution/plant. Frequent agitation is needed with wetttable powders.

*Verimark*, 10-13.5 oz/A. (0 days)

**ARMYWORM, IMPORTED CABBAGE WORM, DIAMONDBACK**

**MOTH, CABBAGE LOOPERS:**

*Coragen*, 3.5 to 5.0 fl oz. (3 days) See label for application methods.

*Verimark*, 5-10 oz/A. (0 days)

**APHIDS, FLEA BEETLES, and THRIPS:**

#### Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum 75 SG* (1.66 to 3.67 oz.) (30 days) See label for application methods.

*Verimark*, 6.75-13.5 oz/A. (0 days)

**PLANTING TREATMENT:** Treatments applied at seeding.

**CABBAGE MAGGOT:** Apply in a 4 inch band over row at time of seeding.

#### Bifenthrin

- *Bifenture* 10 DF, 8 to 16 oz/A.
- *Capture LFR*, 3.4 to 6.8 oz. See label for application methods. (RUP)

#### Chlorpyrifos

- *Chlorpyrifos 15G* (4.6 to 9.3 oz/1000 row ft.) or *Chlorpyrifos 4E AG* (1.6 to 2.4 fl oz/1000 row ft.) (21 days for 15G, 30 days for 4E AG) (RUP)
- *Govern*, 1.6 to 2.4 fl oz/1,000 row ft. (30 days) (RUP)
- *Govern 4E*, 1.6 to 2.4 fl oz/1,000 row ft (30 days)(RUP). (30 days) (RUP)
- *Hatchet*, 1.6 to 2.4 fl oz/1,000 row ft. (30 days) (RUP)
- *Lorsban 15 G* (4.6 to 9.2 oz /1,000 row ft.) or *Lorsban 4 E / Lorsban Advanced* (1.6 to 2.4 fl oz/1,000 row ft.) or *Lorsban 75 WG* (1.1 to 1.6 oz/1000 row ft.) (RUP)
- *Nufos 4E*, 1.2 fl oz/1000 row ft. (30 days) (RUP)
- *Saurus*, 4.6 to 9.2 oz/1000 row ft. (30 days)
- *Vulcan*, 1.6 to 2.4 fl oz/1,000 row ft. (30 days) (RUP)
- *Warhawk*, 1.6 to 2.4 fl oz/1,000 row ft. (30 days) (RUP)
- *Whirlwind*, 1.6 to 2.4 fl oz/1,000 row ft. (30 days) (RUP)

*Verimark*, 10-13.5 oz/A. (0 days)

**APHIDS and FLEA BEETLE:**

*Belay 50 WDG*, 4.8 to 6.4 oz.

#### Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum 75 SG* (1.66 to 3.67 oz.) (30 days) See label for application methods.

**ARMYWORM, IMPORTED CABBAGE WORM, DIAMONDBACK**

**MOTH, CABBAGE LOOPERS:**

*Coragen*, 3.5 to 5.0 fl oz. (3 days) See label for application methods.

*Durivo*, 10 to 13 fl oz. (30 days)

*Verimark*, 5-10 oz/A. (0 days)

**FLEA BEETLE:**

*Scorpion 35SL*, 9 to 10.5 fl oz. (21 days)

*Verimark*, 6.75-13.5 oz/A. (0 days)

**GRUBS, WIREWORMS:**

*Bifenture* 10 DF, 8 to 16 oz/A. (0 days)

**LEAFHOPPERS:**

*Sivanto*, 7 - 10.5 fl oz/A.

**APHIDS:**

*Sivanto*, 7 - 12 fl oz/A.

**WHITEFLIES:**

*Sivanto*, 10.5 - 14 fl oz/A.

## SOIL TREATMENT AFTER TRANSPLANTING:

**APHIDS:** Apply as a post-seeding drench, transplant drench, or hill drench, or as a sidedress after plants are established.

#### Imidacloprid

- *Admire Pro*, 4.4 to 10.5 fl oz. (21 days)
- *Nuprid 2 F*, 10 to 24 fl oz. (21 days)

*Sivanto*, 7 - 12 fl oz/A.

#### Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum 75 SG* (1.66 to 3.67 oz.) (30 days) See label for application methods.

**CABBAGE MAGGOT:** Apply to the soil at base of plants after

transplanting. Apply water to wet soil surface.

*Lorsban 4 E / Lorsban Advanced*, 1.6 to 2.4 fl oz/1,000 ft of row. (RUP)

**APHIDS, ARMYWORM, CABBAGE LOOPERS, DIAMONDBACK**

**MOTH, FLEA BEETLE, IMPORTED CABBAGE WORM:**

*Durivo*, 10 to 13 fl oz. (30 days)

## Cauliflower

### LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

### WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

### FOLIAR TREATMENT:

FLEA BEETLE: Apply as needed soon after plants come up.

*Actara*, 1.5 to 3 oz. (0 days)

*Baythroid XL*, 1.6 to 2.4 fl oz. (0 days) (RUP)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

#### Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)
- *Bifenture* EC, 2.1 to 6.4 oz. (7 days) (RUP)
- *Brigade @ 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (7 days) (RUP)
  - *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)
- Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)

#### Carbaryl

- *Carbaryl* 4L, 0.5 to 1 qt. (3 days)
- *Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* 80 WSP (0.67 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (3 days)

#### Chlorpyrifos

- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced, 1 to 2 pt. (21 days) (RUP)

#### Cypermethrin

- *Ammo* 2.5 EC, 2.5 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Holster*, 2.5 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde* 2.5 EC, 2.5 to 5 fl oz. (1 day) (RUP)

#### Dinotefuran

- *Scorpion* 35SL (2 to 7 fl oz.) or *Venom* (3 to 4 oz.) (1 day)

*Entrust* SC, 4 to 8 fl oz. (1 day) Suppression only

#### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

#### Imidacloprid

- *Admire* Pro, 1.3 fl oz. (7 days)
- *Nuprid* 1.6 F, 3.8 fl oz. (7 days) Do not exceed 19.2 oz/Acre per season.

*Kryocide*, 8 to 16 lb. (7 days)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Larvin* 3.2, 16 to 32 fl oz. (7 days) (RUP)

*Leverage* 360, 3 fl oz. (7 days) (RUP)

#### Malathion

- *Malathion* 8 (1.5 to 2.5 pt.) or *Malathion* 8 Aquamul (1.25 pt.) (7 days for *Malathion* 8; 2 days for *Malathion* 8 Aquamul)

*Mustang* Max, 2.24 to 4 oz. (1 day) (RUP)

*Perm-UP* 3.2 EC, 2 to 4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 0.5 to 1 qt. (3 days)

*Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* 80 WSP (0.67 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (3 days)

*Voliam* Flexi, 4 to 7 oz. (3 days)

IMPORTED CABBAGE WORM: Apply if: 1) >10% of transplants are infested with any type of cabbage "worm", 2) >50% of plants are infested before flowering, or 3) >10% of plants are infested at or after 1st flowering.

#### Acephate

- *Acephate* 90 WDG (1.11 lb.) or *Acephate* 90 WSP (1.1 lb.) or *Acephate* 97 (1 lb.) or *Acephate* 97 UP (1 lb.) (14 days)
- *Bracket* 97, 16 oz. (14 days)
- *Orthene* 97, 16 oz. (14 days)

*Avaunt*, 2.5 to 3.5 oz. (3 days) Add a wetting agent to improve spray coverage.

#### Bacillus thuringiensis

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *Biobit* HP, 0.5 to 1 lb. (0 days)
- *DiPel* DF (0.25 to 1 lb.) or *DiPel* ES (1 to 2 pt.) (0 days)
- *Javelin* WG, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid* XL, 1.6 to 2.4 fl oz. (0 days) (RUP)

#### Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)
- *Bifenture* EC, 2.1 to 6.4 oz. (7 days) (RUP)
- *Brigade @ 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

#### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

#### Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (3 days)
- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (3 days)

#### Chlorpyrifos

- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced, 1 to 2 pt. (21 days) (RUP)

*Confirm* 2F, 6 to 8 fl oz. (7 days)

*Coragen*, 3.5 to 5.0 fl oz. (3 days) Minimum of 3 days between applications; do not apply more than 15.4 fl oz. per season.

#### Cypermethrin

- *Ammo* 2.5 EC, 2.5 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Holster*, 2.5 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde* 2.5 EC, 2.5 to 5 fl oz. (1 day) (RUP)

*Danitol* 2.4 EC, 2.4 EC, 10.66 to 16 fl oz. (7 days) (RUP)

*Dibrom* 8 Emulsive, 1 pt. (1 day) Allow a minimum of 7 days between applications. Do not apply more than 10 pts per acre per season. (RUP)

*Endigo* ZC, 4 fl oz. (1 day) (RUP)

#### Esfenvalerate

- *Adjourn*, 2.9 to 5.8 fl oz. (3 days) (RUP)
- *Asana* XL, 2.9 to 5.8 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 2.9 to 5.8 fl oz. (3 days) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

*Intrepid 2F*, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)  
*Kryocide*, 8 to 16 lb. (7 days)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (RUP)
- *Warrior II* with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (1 day) (RUP)

*Larvin 3.2*, 16 to 32 fl oz. (7 days) (RUP)

*Leverage 360*, 3 fl oz. (7 days) (RUP)

#### Malathion

- *Malathion 5* (2 pt.) or *Malathion 57 EC* (1 to 2 pt.) or *Malathion 8* (1.5 to 2.5 pt.) or *Malathion 8 Aquamul* (1.25 pt.) (7 days for *Malathion 8*; 2 days for others)

#### Methomyl

- *Lannate LV* (0.75 to 3 pt.) or *Lannate SP* (0.25 to 1 lb.) (3 days) (RUP)
- *Nudrin LV* (0.75 to 3 pt.) or *Nudrin SP* (0.25 to 1 lb.) (3 days) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

#### Permethrin

- *Ambush 25 W*, 3.2 to 6.4 oz. (1 day) (RUP)
- *Perm-UP 25DF* (3.2 to 6.4 oz.) or *Perm-UP 3.2 EC* (2 to 4 fl oz.) (1 day) (RUP)
- *Pounce 25 WP*, 3.2 to 6.4 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (1 day) (RUP)

*Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant SC*, 5 to 10 fl oz. (1 day)

*Rimon 0.83EC*, 6 to 12 fl oz. (7 days)

*Carbaryl 4L*, 1 to 2 qt. (3 days)

*Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

#### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust SC* (3 to 6 fl oz.) (1 day)

#### Thiamethoxam + Chlorantraniliprole

- *Durivo* (10 to 13 fl oz) or *Voliam Flexi* (4 to 7 oz) (3 days)

*Vetica*, 10 to 20 fl oz. (1 day)

DIAMONDBACK MOTH: Apply if: 1) >10% of transplants are infested with any type of cabbage "worm", 2) >50% of plants are infested before flowering, or 3) >10% of plants are infested at or after 1st flowering. Use *Bacillus thuringiensis* to avoid killing important natural enemies of diamondback moth.

#### \* *Bacillus thuringiensis*

- *Agree WG*, 0.5 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF* (0.25 to 1 lb.) or *DiPel ES* (1 to 2 pt.) (0 days)
- *Javelin WG*, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

#### \* Spinosad

- *Entrust* (0.5 to 1.25 oz.) or *Entrust SC* (1.5 to 4 fl oz.) (1 day)

#### Acephate

- *Acephate 90 WDG* (1.11 lb.) or *Acephate 90 WSP* (1.1 lb.) or *Acephate 97* (1 lb.) or *Acephate 97 UP* (1 lb.) (14 days)
- *Bracket 97*, 16 oz. (14 days)
- *Orthene 97*, 16 oz. (14 days)

*Avaunt*, 3.5 oz. (3 days) Add a wetting agent to improve spray coverage.

*Baythroid XL*, 2.4 to 3.2 fl oz. (0 days) (RUP)

#### Bifenthrin

- *Bifenture EC*, 2.1 to 6.4 oz. (7 days) (RUP)
- *Brigade @ 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Discipline 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)

#### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

#### Carbaryl

- *Carbaryl 4L*, 1 to 2 qt. (3 days)
- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

*Coragen*, 3.5 to 5.0 fl oz. (3 days) Minimum of 3 days between applications; do not apply more than 15.4 fl oz. per season.

*Diazinon AG 500*, 0.5 to 1 pt. (5 days) (RUP)

*Dibrom 8 Emulsive*, 1 pt. (1 day) Allow a minimum of 7 days between applications. Do not apply more than 10 pts per acre per season (RUP)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

*Intrepid 2F*, 12 to 16 oz. (1 day) Suppression only. Infestation and crop damage are reduced when applied at initiation of egg laying.

*Kryocide*, 8 to 16 lb. (14 days)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz) (1 day) (RUP)

*Larvin 3.2*, 24 to 40 fl oz. (7 days) (RUP)

*Lorsban 75 WG*, 0.67 to 1.33 lb. (21 days) (RUP)

#### Malathion

- *Malathion 5* (2 pt.) or *Malathion 5 EC* (2 to 4 pt.) (7 days for *Malathion 5 EC*; 2 days for *Malathion 5*)

#### Methomyl

- *Lannate LV* (1.5 to 3 pt.) or *Lannate SP* (0.5 to 1 lb.) (3 days) (RUP)

- *Nudrin LV* (1.5 to 3 pt.) or *Nudrin SP* (0.5 to 1 lb.) (3 days) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

#### Permethrin

- *Ambush 25 W*, 3.2 to 6.4 oz. (1 day) (RUP)
- *Perm-UP 25DF* (3.2 to 6.4 oz.) or *Perm-UP 3.2 EC* (2 to 4 fl oz.) (1 day) (RUP)

- *Pounce 25 WP*, 3.2 to 6.4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant SC*, 5 to 10 fl oz. (1 day)

*Rimon 0.83EC*, 6 to 12 fl oz. (7 days)

*Carbaryl 4L*, 1 to 2 qt. (3 days)

*Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

#### Thiamethoxam + Chlorantraniliprole

- *Durivo* (10 to 13 fl oz) or *Voliam Flexi* (4 to 7 oz) (30 days)

*Vetica*, 10 to 20 fl oz. (1 day)

CABBAGE LOOPERS: Apply if: 1) >10% of transplants are infested with any type of cabbage "worm", 2) >50% of plants are infested before flowering, or 3) >10% of plants are infested at or after 1st flowering. Most controls are less effective on larger worms.

#### Acephate

- *Acephate 90 WDG* (1.11 lb.) or *Acephate 90 WSP* (1.1 lb.) or *Acephate 97* (1 lb.) or *Acephate 97 UP* (1 lb.) (14 days)

## Cauliflower

- *Bracket 97*, 16 oz. (14 days)
- *Orthene 97*, 16 oz. (14 days)

*Avant*, 2.5 to 3.5 oz. (3 days) Add a wetting agent to improve spray coverage.

### *Bacillus thuringiensis*

- *Agree WG*, 0.5 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF* (0.5 to 1 lb.) or *DiPel ES* (1 to 2 pt.) (0 days)
- *Javelin WG*, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb.

*Baythroid XL*, 1.6 to 2.4 fl oz. (0 days) (RUP)

### Bifenthrin

- *Bifenture 10 DF*, 5.3 to 16 oz/A. (7 days)
- *Bifenture EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @ 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)

### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

*Confirm 2F*, 6 to 8 fl oz. (7 days)

*Coragen*, 3.5 to 5.0 fl oz. (3 days) Minimum of 3 days between applications; do not apply more than 15.4 fl oz. per season.

### Cypermethrin

- *Ammo 2.5 EC*, 3.75 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 3.75 to 5 fl oz. (1 day) (RUP)
- *Holster*, 3.75 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde 2.5 EC*, 3.75 to 5 fl oz. (1 day) (RUP)

*Danitol 2.4 EC*, 2.4 EC, 10 2/3 to 16 fl oz. (7 days) (RUP)

*Dibrom 8 Emulsive*, 2 pt. (1 day) Allow a minimum of 7 days between applications. Do not apply more than 10 pts per acre per season (RUP)

*Endigo ZC*, 4 fl oz. (1 day) (RUP)

### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Exirel*, 10-17 oz/A. (1)

*Intrepid 2F*, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

*Kryocide*, 8 to 16 lb. (7 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (1 day) (RUP)

*Larvin 3.2*, 24 to 40 fl oz. (7 days) (RUP)

*Leverage 360*, 3 fl oz. (7 days) (RUP)

### Malathion

- *Malathion 5*, or *Malathion 57 EC* (1 to 2 pt.) or *Malathion 8* (1.5 to 2.5 pt.) or *Malathion 8 Aquamul* (1.25 pt.) (7 days for Malathion 8; 2 days for others)

### Methomyl

- *Lannate LV* (1.5 to 3 pt.) or *Lannate SP* (0.5 to 1 lb.) (3 days) (RUP)
- *Nudrin LV* (1.5 to 3 pt.) or *Nudrin SP* (0.5 to 1 lb.) (3 days) (RUP)
- *Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

### Permethrin

- *Ambush 25 W*, 3.2 to 6.4 oz. (1 day) (RUP)
- *Perm-UP 25DF* (3.2 to 6.4 oz.) or *Perm-UP 3.2 EC* (2 to 4 fl oz.) (1 day) (RUP)

- *Pounce 25 WP*, 3.2 to 6.4 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (1 day) (RUP)

*Proclaim*, 3.2 to 4.8 oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant SC*, 5 to 10 fl oz. (1 day)

*Rimon 0.83EC*, 6 to 12 fl oz. (7 days)

### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust SC* (3 to 6 fl oz.) (1 day)

### Thiamethoxam + Chlorantraniliprole

- *Durivo* (10 to 13 fl oz) or *Voliam Flexi* (4 to 7 oz) (30 days)
- *Vetica*, 10 to 20 fl oz. (1 day)

APHIDS: Apply if there are >100 aphids per plant before flowering or >5/plant at flowering or beyond.

### Acephate

- *Acephate 90 WDG* (0.55 to 1.11 lb.) or *Acephate 90 WSP* (0.5 to 1.1 lb.) or *Acephate 97* (0.5 to 1 lb.) or *Acephate 97 UP* (0.5 to 1 lb.) (14 days)

- *Bracket 97*, 8 to 16 oz. (14 days)

- *Orthene 97*, 8 to 16 oz. (14 days)

### Acetamiprid

- *Assail 30 SG* (2 to 4 oz.) or *Assail 70WP* (0.8 to 1.7 oz.) (7 days)

*Actara*, 1.5 to 3 oz. (0 days)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

*Beleaf 50 SG*, 2 to 2.8 oz. (0 days)

### Bifenthrin

- *Bifenture 10 DF*, 5.3 to 16 oz/A. (7 days)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)

### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 8.48 to 12.2 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

### Chlorpyrifos

- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban 4 E / Lorsban Advanced* (1 to 2 pt.) or *Lorsban 75 WG* (0.67 to 1.33 lb.) (21 days) (RUP)

*Diazinon AG 500*, 0.5 to 1 pt. (5 days) (RUP)

*Dibrom 8 Emulsive*, 1 pt. (1 day) Allow a minimum of 7 days between applications. Do not apply more than 10 pts per acre per season (RUP)

### Dimethoate

- *Dimethoate 4 EC*, *Dimethoate 400*, *Dimethoate 4E*, 0.5 to 1 pt. (7 days)

*Endosulfan 3 EC*, 1 to 1.33 qt. (14 days) Consult label for rotation restrictions. (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

*Fulfill*, 2.75 oz. (170 days)

### Imidacloprid

- *Admire Pro*, 1.3 fl oz. (7 days)
- *Nuprid 1.6 F*, 3.8 fl oz. (7 days) Do not use if Imidacloprid was used at planting. Do not exceed 19.2 oz/Acre per season.

*Leverage 360*, 3 fl oz. (7 days) (RUP)

**Malathion**

- *Malathion* 5 (1.5 to 2 pt.) or *Malathion* 5 EC (1 to 2 pt.) or *Malathion* 57 EC (1 to 2 pt.) or *Malathion* 8 (1.5 to 2.5 pt.) or *Malathion* 8 Aquamul (1.25 pt.) (7 days for Malathion 5 EC & 8; 2 days for all others)

*Movento*, 4 to 5 fl oz. (1 day) Must be tank mixed with adjuvant having spreading and penetrating properties.

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Perm-UP 25DF*, 3.2 to 6.4 oz.. (1 day) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 7 - 12 fl oz/A.

**Thiamethoxam + Chlorantraniliprole**

- *Durivo* (10 to 13 fl oz) or *Vollam Flexi* (4 to 7 oz) (30 days)

**ARMYWORM:**

*Avaunt*, 3.5 oz. (3 days) Add a wetting agent to improve spray coverage.

***Bacillus thuringiensis***

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *Biobit* HP, 0.5 to 2 lb. (0 days)
- *DiPel* DF (1 to 2 lb.) or *DiPel* ES (2 to 4 pt.) (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

*Baythroid XL*, 2.4 to 3.2 fl oz. (0 days) (RUP)

**Carbaryl**

- *Carbaryl* 4L, 1 to 2 qt. (3 days)
- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (3 days)

*Confirm* 2F, 6 to 8 fl oz. (7 days)

*Coragen*, 3.5 to 5.0 fl oz. (3 days) Minimum of 3 days between applications; do not apply more than 15.4 fl oz. per season.

**Cypermethrin**

- *Ammo* 2.5 EC, 3.75 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 3.75 to 5 fl oz. (1 day) (RUP)
- *Holster*, 3.75 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde* 2.5 EC, 3.75 to 5 fl oz. (1 day) (RUP)

*Danitol* 2.4 EC, 10.66 to 16 fl oz. (7 days) (RUP)

*Endigo* ZC, 4 to 4.5 fl oz. (1 day) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

*Intrepid* 2F, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

**Lambda-cyhalothrin**

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Latrin* 3.2, 16 to 32 fl oz. (7 days) (RUP)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

**Permethrin**

- *Perm-UP 25DF*, 3.2 to 6.4 oz.. (1 day) (RUP)
- *Perm-UP 25DF*, 3.2 to 6.4 oz.. (1 day) (RUP)
- *Perm-UP 3.2 EC*, 2 to 4 fl oz.. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)

*Radiant* SC, 5 to 10 fl oz. (1 day)

*Rimon* 0.83EC, 6 to 12 fl oz. (7 days)

*Carbaryl* 4L, 1 to 2 qt. (3 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (3 days)

**Spinosad**

- *Entrust* (1.25 to 3 oz.) or *Entrust* SC (4 to 10 fl oz.) (1 day)
- *Vetiva*, 10 to 20 fl oz. (1 day)
- *Vollam Flexi*, 4 to 7 oz. (3 days)

**CUTWORM:*****Bacillus thuringiensis***

- *Biobit* HP, 0.5 to 1 lb. (0 days)
- *DiPel* DF, 0.5 to 1 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid XL*, 0.8 to 1.6 fl oz. (0 days) (RUP)

**Cypermethrin**

- *Ammo* 2.5 EC, 2.5 to 5 fl oz. (1 day) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (1 day) (RUP)
- *Holster*, 2.5 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde* 2.5 EC, 2.5 to 5 fl oz. (1 day) (RUP)

**Esfenvalerate**

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

**Lambda-cyhalothrin**

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (1 day) (RUP)

**Methomyl**

- *Lannate* LV (1.5 pt.) or *Lannate* SP (0.5 lb.) (3 days) (RUP)
- *Nudrin* LV (1.5 pt.) or *Nudrin* SP (0.5 lb.) (3 days) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (1 day) (RUP)

**LEAFHOPPERS:**

*Sivanto*, 7 - 10.5 fl oz/A.

**WHITEFLIES:**

*Sivanto*, 10.5 - 14 fl oz/A.

**MITES*****Bifenthrin***

- *Bifenture* EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Bifenture* 10 DF, 12.8 to 16 oz/A. (7 days)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (7 days) (RUP)
- *Capture* 2 EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (7 days) (RUP)

***Bifenthrin + Zeta-Cypermethrin***

- *Hero* (10.3 oz.) or *Hero* EW (11.2 oz.) (7 days) (RUP)

**DISEASES****SEED TREATMENT:**

DAMPING OFF, WIRE STEM (*Pythium* spp., *Rhizoctonia solani*):

***Captan***

- *Captan* 4 Flowable, 2.2 fl oz/100 lb seed.

***Fludioxinil***

- *Maxim* 4 FS, 0.08 to 0.16 fl oz/100 lb seed (*Rhizoctonia*). Commercial seed treatment plants only.

***Mefenoxam***

- *Apron* XL, 0.085 - 0.64 fl oz/100 lb seed. (0 days)

***Thiram***

- 42-S *Thiram*, *Thiram* 480DP, *Thiram* 50 WP Dyed, 8 oz/100 lb seed.

BLACK LEG (*Phoma lingam*): There are presently no chemicals registered for use on this disease.

## Cauliflower

**SEEDBED TREATMENT:** Apply treatments to the soil according to directions to protect young seedlings in the seedbed before transplanting in field.

CLUBROOT (*Plasmiodiophora brassicae*): Sterilize seedbed before planting (Appendix A) or apply to soil surface as a drench.

### Fluazinam

- Omega 500 F, 2.6 pt. (50 days)

DAMPING OFF (*Pythium* spp.):

Mefenoxam. Apply as a broadcast preplant incorporation or a surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone with 1/2 to 1 in. of sprinkler irrigation.

- Ridomil Gold SL, 0.25-0.5 pt.

### **TRANSPLANT DRENCH:**

CLUBROOT (*Plasmiodiophora brassicae*):

### Fluazinam

- Omega 500 F, 6.45 fl oz. (50 days)

### **FOLIAR TREATMENT:**

BLACK ROT (*Xanthomonas campestris*): Apply treatment (lowest rates) in the field as soon as transplants are established.

### Acibenzolar-S-methyl

- Actigard, 0.5 to 1 oz per 20 gal (ground) or 10 gal (aerial) of water. (7 days) Do not apply more than 4 applications per crop per year.

### Copper Ammonium Carbonate

- Copper Count N, 1 - 2 qt. (0 days)

### Copper Hydroxide

- Champ DP Dry Prill, 1/3 to 2/3 lb. (0 days)
- Champ Formula 2 FLOWable, 1/3 to 2/3 pt. (0 days)
- Champ WG, 1.06 lb. (0 days)
- ChampION, 0.5 to 0.75 lb. (0 days)
- Kocide 2000, 3/4 to 1 1/2 lb. (0 days)
- Kocide 3000, 0.5-0.75 lb. (0 day)

### Copper Hydroxide + Copper Oxychloride

- Badge SC, 1 to 1.8 pt. (0 days)
- Badge X2, 0.5 to 0.75 lb. (0 days)

### Copper Sulfate

- Cuprofix Ultra 40 Disperss, 3/4 to 1 1/4 lb. (0 days)

ALTERNARIA LEAF SPOT (*Alternaria brassicae*): Apply when conditions favor disease and repeat every 7 to 10 days.

### \* Azoxystrobin

- Quadris, 6.2 to 15.4 fl oz.

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

### \* Azoxystrobin + Difenconazole

- Quadris Top, 14 fl oz. (1 day) One application before alternating with another chemical.

### \* Boscalid

- Endura, 6 to 9 oz. (0 days)

### \* Chlorothalonil

- Bravo Ultrex, 1.4 lb. (7 days)
- Bravo Weather Stik, Equus 720 SST, 1.5 pt. (7 days)

### \* Difenconazole + Cyprodinil

- Inspire Super, 16 to 20 fl oz. (7 days)

### \* Pyraclostrobin

- Cabrio, 12-16 oz. (0 days)

### Copper Ammonium Carbonate

- Copper Count N, 1 to 2 qt. (0 days)

### Copper Hydroxide

- Kocide 2000, 3/4 to 1 1/2 lb. (0 days)
- Kocide 3000, 0.5-0.75 lb. (0 day)

### Copper Hydroxide + Copper Oxychloride

- Badge SC, 1 to 1.8 pt. (0 days)
- Badge X2, 0.5 to 0.75 lb. (0 days)

### Copper Sulfate

- Cuprofix Ultra 40 Disperss, 3/4 to 1 1/4 lb. (0 days)

### Cyprodinil + Fludioxonil

- Switch 62.5 WG, 11 to 14 oz. (7 days)

### Mefenoxam + Chlorothalonil

- Ridomil Gold Bravo, 1 1/2 pt. (7 days) Apply at 14-day intervals.

### Penthiopyrad

- Fontelis, 14 - 30 fl oz. (0 days)

### Potassium phosphite/chlorothalonil

- Catamaran, 4 pt. (7 days)

DOWNY MILDEW (*Peronospora parasitica*): Apply when conditions favor disease.

### \* Ametoctradin + Dimethomorph

- Zampro, 14 fl. oz. (7 days)

### \* Fluopicolide

- Presidio, 3-4 fl oz. (2 days) Must tank mix with other fungicide.

### \* Fosetyl-Aluminum

- Aliette WDG, 2 to 5 lb, 7- to 21-day intervals. (3 days) **Note:** Do not tank mix with copper fungicides.

### \* Mefenoxam + Chlorothalonil

- Ridomil Gold Bravo, 1 1/2 pt, 14-day intervalst. (7 days)

### Acibenzolar-S-methyl

- Actigard, 1 oz per 20 gal (ground) or 10 gal (aerial) of water. (7 days) Do not apply more than 4 applications per crop per year.

### Copper Hydroxide + Copper Oxychloride

- Badge SC, 1 to 1.8 pt. (0 days)
- Badge X2, 0.5 to 0.75 lb. (0 days)

### Dimethomorph

- Forum, 6 fl oz. (7 days)

### Fenamidone

- Reason 500 SC, 5.5 - 8.2 fl oz. (2 days) No more than 1 application before alternating.

### Mandipropamid

- Revus, 8 fl oz. (1 day)

### Mefenoxam

- Ridomil Gold SL, 0.125-0.25 pt. (7 days)

### Mono-, dibasic sodium, potassium and ammonium phosphites

- Phostrol, 2.5 to 5 pt every 7 - 21 days.
- Prophyt, 2 to 4 pt. (0 days)

### Potassium phosphite/chlorothalonil

- Catamaran, 4 pt. (0 days)

**Note:** Fungicides that protect against Alternaria also provide limited downy mildew protection.

CERCOSPORA LEAF SPOT (*Cercospora beticola*):

### Pyraclostrobin

- Cabrio, 12-16 oz. (0 days)

WHITE RUST:

### Pyraclostrobin

- Cabrio, 12-16 oz. (0 days)

# Celery

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

## NEMATODES

Root-knot, pin, needle and root-lesion nematodes can reduce celery yields. Fields with root problems of undetermined cause should be tested for nematodes (see Appendix C). If the plant-parasitic nematodes are present in population densities above the economic threshold for celery, crop rotation or application of a nematicide is recommended. The following nematicides are suitable for control of root-knot, pin, needle and lesion nematodes in celery production. Nematode-free transplants must be used to prevent serious losses.

### FALL SOIL FUMIGATION (BROADCAST):

#### 1,3-D

- *Telone II*, 25 gal/A (muck soil), 9-18 gal/A (mineral soil).

Fumigate in the fall when soil temperatures at a 6-inch depth are above 50F. Inject the fumigant to a soil depth of 8 inches and lightly seal the soil immediately after application. Use soil fumigants only as directed on the label. In some limited situations soil fumigants can be applied in the spring in Michigan.

Correct soil moisture, temperature and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or by immediate tarping.

### PREPLANT TREATMENT:

#### Oxamyl

- *Vydate L*, Apply 2 gal/acre in 20 gal of water in 8- to 16-inch band. Incorporate to a depth of 4 inches. (RUP)

### PLANTING TREATMENT:

#### Oxamyl

- *Vydate L*, apply 0.5 to 1 gal/acre in at least 100 gal of water immediately after transplanting seedlings in the field. (RUP)

### POST-PLANT TREATMENT:

#### Oxamyl

- *Vydate L*, apply 1 gal/acre in at least 100 gal of water as a foliar spray 3 weeks after transplanting. Apply again 3 weeks after first treatment. (RUP)

## INSECTS

### SOIL TREATMENT:

LEAF MINERS, LEAFHOPPER:

*Venom*, 5 to 6 oz. (21 days)

See label for application methods.

CABBAGE LOOPERS, ARMYWORM:

*Coragen*, 3.5 to 5 fl oz. (1 day) See label for application methods.

VEGETABLE LEAFMINER:

*Coragen*, 5 to 7.5 fl oz. (1 day) See label for application methods.

*Verimark*, 6.75-13.5 oz/A. (0 days)

LEAFHOPPERS:

*Belay 50 WDG*, 4.8 to 6.4 oz.

#### Imidacloprid

- *Admire Pro*, 4.4 to 10.5 fl oz. (45 days)
- *Nuprid 2 F*, 10 to 24 fl oz. (45 days)

*Sivanto*, 7 - 10.5 fl oz/A.

#### Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum 75 SG* (1.66 to 3.67 oz.) (30 days)

APHIDS, ARMYWORM, CABBAGE LOOPERS, LEAFHOPPERS:

*Durivo*, 10 to 13 fl oz. (30 days)

ARMYWORM, CORN EARWORM, DIAMONDBACK MOTH, :

LOOPERS, APHIDS, LEAFMINERS:

*Verimark*, 6.75-13.5 oz/A. (0 days)

APHIDS:

*Sivanto*, 10.5 - 12 fl oz/A.

WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

### FOLIAR TREATMENT:

CUTWORM, ARMYWORM: Apply preventive treatments within 4 weeks of harvest.

#### \* Permethrin

- *Ambush 25 W*, 6.4 to 12.8 oz. (1 day) (RUP)
- *Perm-UP 25DF* (6.4 to 12.8 oz.) or *Perm-UP 3.2 EC* (4 to 8 oz.) (1 day) (RUP)
- *Pounce 25 WP*, 6.4 to 12.8 oz. (1 day) (RUP)

*Belt SC*, 1.5 fl oz. (1 day)

#### Bifenthrin

- *Bifenture 10 DF*, 5.3 to 16 oz/A. (7 days)
- *Brigade WSB*, 5.3 to 16 oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)

*Javelin WG*, 0.12 to 1.5 lb. (0 days)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Vetiva*, 12 to 17 fl oz. (7 days)

CARROT WEEVIL LARVAE: Apply as a directed spray. Start when eggs or larvae are first seen and repeat in 2 to 3 weeks.

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Vydate L*, 4 pt. (21 days) (RUP)

CARROT WEEVIL ADULTS: Apply when adults are first caught in traps or eggs are first seen. No materials are labeled specifically for this area, however, permethrin at the rates given below will give some control of carrot weevil adults.

*Pyrenone*, 1 to 12 fl oz. (0 days)

ASTER LEAFHOPPER (*Aster yellows*): Apply if numbers exceed 14/100 sweeps. Repeat as needed, depending on number of leafhoppers.

\* *Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

\* Permethrin. Over-treatment with permethrin may cause increased aphid problems.

- *Ambush 25 W*, 6.4 to 12.8 oz. (1 day) (RUP)
- *Perm-UP 25DF* (3.2 to 12.8 oz.) or *Perm-UP 3.2 EC* (2 to 8 oz.) (1 day) (RUP)

- *Pounce 25 WP*, 3.2 to 12.8 oz. (1 day) (RUP)

*Actara*, 1.5 to 3 oz. (7 days)

*Baythroid XL*, 2.4 to 3.2 fl oz. (0 days) (RUP)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

#### Bifenthrin

- *Bifenture 10 DF*, 5.3 to 16 oz/A. (7 days)
- *Brigade WSB*, 5.3 to 16 oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)

#### Carbaryl

- *Sevin 4 F* (0.5 to 2 qt.) or *Sevin 80 S* (0.63 to 2.5 lb.) or *Sevin 80 WSP* (0.67 to 2.5 lb.) or *Sevin XLR Plus* (0.5 to 2 qt.) (14 days)

#### Dinotefuran

- *Scorpion 35SL*, 2 to 5.25 fl oz. (7 days)

- *Venom*, 1 to 3 oz. (7 days)

*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)

## Celery

### Methomyl

- *Lannate* LV (1.5 to 3 pt.) or *Lannate* SP (0.5 to 1 lb.) (7 days) (RUP)
- *Nudrin* LV (1.5 to 3 pt.) or *Nudrin* SP (0.5 to 1 lb.) (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sevin* 4 F (0.5 to 2 qt.) or *Sevin* 80 S (0.63 to 2.5 lb.) or *Sevin* 80 WSP (0.67 to 2.5 lb.) or *Sevin* XLR Plus (0.5 to 2 qt.) (14 days)

*Torac*, 14-21 oz/A. (1) Do not make more than 2 applications per crop cycle.

*Vetica*, 14 to 17 fl oz. (7 days)

*Voliam Flexi*, 4 to 7 oz. (7 days)

TARNISHED PLANT BUG: Apply if numbers exceed 2 to 4 per 20 plants.

*Baythroid* XL, 2.4 to 3.2 fl oz. (0 days) (RUP)

*Beleaf* 50 SG, 2 to 2.8 oz. (0 days)

### Carbaryl

- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (14 days)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (14 days)

*Sniper*, 5.12 to 6.4 fl oz. (7 days) (RUP)

APHIDS: Apply if more than 3% of plants are infested or if there are more than 6/100 sweeps. Over-treatment with pyrethroids may cause increased aphid problems.

\* *Beleaf* 50 SG, 2 to 2.8 oz. (0 days)

\* *Fulfill*, 2.75 oz. (0 days) May require 5 to 7 days for aphid mortality.

\* *Movento*, 4 to 5 fl oz. (3 days) Must be tank mixed with penetrating adjuvant.

### Acephate

- *Acephate* 90 WDG (0.55 to 1.11 lb.) or *Acephate* 90 WSP (0.5 to 1.1 lb.) or *Acephate* 97 (0.5 to 1 lb.) or *Acephate* 97 UP (0.5 to 1 lb.) (21 days)
- *Bracket* 97, 8 to 16 oz. (21 days)
- *Orthene* 97, 8 to 16 oz. (21 days)

### Acetamiprid

- *Assail* 30 SG (2 to 4 oz.) or *Assail* 70WP (0.8 to 1.7 oz.) (7 days)

*Actara*, 1.5 to 3 oz. (7 days)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

### Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)
- *Brigade* WSB, 5.3 to 16 oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)

*Dibrom* 8 Emulsive, 1 to 1.5 pt. (1 day) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

*Gladiator*, 19 fl oz. (7 days) (RUP)

### Malathion

- *Malathion* 5, *Malathion* 5 EC, or *Malathion* 57 EC (1.5 pt.) or *Malathion* 8 (1 to 1.5 pt.) or *Malathion* 8 Aquamul (1 to 1.5 pt.) (7 days)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

### Permethrin

- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (1 day) (RUP)
- *Pounce* 25 WP, 6.4 to 12.8 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 10.5 - 12 fl oz/A.

*Torac*, 17-21 oz/A. (1) Do not make more than 2 applications per crop cycle

*Voliam Flexi*, 4 to 7 oz. (7 days)

LOOPERS (CELERY and CABBAGE): Apply if needed to protect plants within 4 weeks of harvest.

\* *Baythroid* XL, 1.6 to 2.4 fl oz. (0 days) (RUP)

### \* Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (1 day) (RUP)

• *Perm-UP* 25DF (3.2 to 12.8 oz.) or *Perm-UP* 3.2 EC (2 to 8 oz.) (1 day) (RUP)

- *Pounce* 25 WP, 6.4 to 12.8 oz. (1 day) (RUP)

### Acephate

- *Acephate* 90 WDG (1.11 lb.) or *Acephate* 90 WSP (1.1 lb.) or *Acephate* 97 (1 lb.) or *Acephate* 97 UP (1 lb.) (21 days)

- *Bracket* 97, 16 oz. (21 days)

- *Orthene* 97, 16 oz. (21 days)

*Avaunt*, 3.5 oz. (3 days)

### Bacillus thuringiensis

- *Agree* WG, 0.5 to 2 lb. (0 days)

- *Biobit* HP, 0.5 to 1 lb. (0 days)

- *DiPel* DF (0.5 to 1 lb.) or *DiPel* ES (1 to 2 pt.) (0 days)

- *Javelin* WG, 0.12 to 1.5 lb. (0 days)

- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Belt* SC, 1.5 fl oz. (1 day)

### Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)

- *Brigade* WSB, 5.3 to 16 oz. (7 days) (RUP)

- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)

*Confirm* 2F, 6 to 8 fl oz. (7 days)

*Coragen*, 3.5 to 5 fl oz. (1 day) Minimum of 3 days between applications; do not apply more than 15.4 fl oz. per season.

*Dibrom* 8 Emulsive, 1 to 1.5 pt. (1 day) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

*Intrepid* 2F, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

*Larvin* 3.2, 16 to 30 fl oz. (14 days) (RUP)

### Methomyl

- *Lannate* LV (3 pt.) or *Lannate* SP (1 lb.) (7 days) (RUP)

- *Nudrin* LV (3 pt.) or *Nudrin* SP (1 lb.) (7 days) (RUP)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Proclaim*, 3.2 to 4.8 oz. (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 5 to 10 fl oz. (1 day)

### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (1 day)

*Vetica*, 12 to 17 fl oz. (7 days)

*Voliam Flexi*, 4 to 7 oz. (7 days)

VEGETABLE LEAFMINER: Apply as soon as visible mines appear and repeat every 7 days as needed.

### Abamectin

- *Agri-Mek* 0.15 EC (8 to 16 fl oz.) or *Agri-Mek* SC (1.75 to 3.5 fl oz.) (7 days) Use with a non-ionic surfactant. (RUP)

*Coragen*, 5.0 to 7.5 fl oz. (1 day)

*Dibrom* 8 Emulsive, 1 to 1.5 pt. (1 day) (RUP)

*Dimethoate* 4 EC, 1 pt. (7 days)

### Dinotefuran

- *Scorpion* 35SL, 2 to 5.25 fl oz. (7 days)

- *Venom*, 1 to 3 oz. (7 days)

*Exirel*, 13.5-20.5 oz/A. (1)

*Gladiator*, 19 fl oz. (7 days) (RUP)

### Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (1 day) (RUP)

• *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (1 day) (RUP)

- *Pounce* 25 WP, 6.4 to 12.8 oz. (1 day) (RUP)

Pyrethone, 1 to 12 fl oz. (0 days)

Radiant SC, 6 to 10 fl oz. (1 day)

Spinosad

- *Entrust* (2 to 3 oz.) or *Entrust SC* (6 to 10 fl oz.) (1 day)

*Trigard*, 2.66 oz. (7 days)

ARMYWORM:

\* *Baythroid XL*, 2.4 to 3.2 fl oz. (0 days) (RUP)

Acephate

- *Acephate 90 WDG* (1.11 lb.) or *Acephate 90 WSP* (1.1 lb.) or *Acephate 97* (1 lb.) or *Acephate 97 UP* (1 lb.) (21 days)

- *Bracket 97*, 16 oz. (21 days)

- *Orthene 97*, 16 oz. (21 days)

*Avaunt*, 3.5 oz. (3 days)

Bacillus thuringiensis

- *Agree WG*, 0.5 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 2 lb. (0 days)
- *DiPel DF* (1 to 2 lb.) or *DiPel ES* (2 to 4 pt.) (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

Carbaryl

- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (14 days)

*Confirm 2F*, 6 to 8 fl oz. (7 days)

*Coragen*, 3.5 to 5 fl oz. (1 day)

*Dibrom 8 Emulsive*, 1 to 1.5 pt. (1 day) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

*Intrepid 2F*, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

*Larvin 3.2*, 16 to 30 fl oz. (14 days) (RUP)

Methomyl

- *Lannate LV* (0.75 to 3 pt.) or *Lannate SP* (0.25 to 1 lb.) (7 days) (RUP)

- *Nudrin LV* (0.75 to 3 pt.) or *Nudrin SP* (0.25 to 1 lb.) (7 days) (RUP)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)

*Radiant SC*, 5 to 10 fl oz. (1 day)

*Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (14 days)

Spinosad

- *Entrust* (1.25 to 2.5 oz.) or *Entrust SC* (4 to 8 fl oz.) (1 day)

SUPPRESSION ONLY

*Torac*, 21 oz/A. (1) Do not make more than 2 applications per crop cycle

*Voliam Flexi*, 4 to 7 oz. (7 days)

CUTWORM:

Bacillus thuringiensis

- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF*, 0.5 to 1 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid XL*, 0.8 to 1.6 fl oz. (0 days) (RUP)

*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)

Methomyl

- *Lannate LV* (1.5 pt.) or *Lannate SP* (0.5 lb.) (7 days) (RUP)
- *Nudrin LV* (1.5 pt.) or *Nudrin SP* (0.5 lb.) (7 days) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

SUPPRESSION ONLY

*Torac*, 21 oz/A. (1) Suppression only. Do not make more than 2 applications per crop cycle.

WHITEFLIES:

*Exirel*, 13.5-20.5 oz/A. (1) For best performance, use with an effective adjuvant

*Movento*, 4.0 to 5.0 fl oz. (3 days) Must be tank mixed with adjuvant having spreading and penetrating properties

*Sivanto*, 10.5 - 14 fl oz/A.

*Torac*, 21 oz/A. (1) Do not make more than 2 applications per crop cycle

SWEET POTATO WHITEFLY , SILVER LEAF WHITEFLY:

SUPPRESSION

Acetamiprid

- *Assail 30 SG*, 3 to 4 oz. (7 days)

- *Assail 70WP*, 1.1 to 1.7 oz.. (7 days)

*Torac*, 21 oz/A. (1) Do not make more than 2 applications per crop cycle

DIAMONDBACK MOTH:

*Movento*, 4.0 to 5.0 fl oz/A. (1 day) Must be tank mixed with adjuvant having spreading and penetrating properties

ARMYWORM, CORN EARWORM, DIAMONDBACK MOTH, :

*Exirel*, 7-13.5 oz/A. (1)

THRIPS:

*Exirel*, 13.5-20.5 oz/A. (1)

*Torac*, 21 oz/A. (1) Do not make more than 2 applications per crop cycle

CORN EARWORM:

SUPPRESSION ONLY

*Torac*, 21 oz/A. (1) Suppression only. Do not make more than 2 applications per crop cycle.

LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

MITES

Abamectin

- *Agri-Mek 0.15 EC* (8 to 16 fl oz.) or *Agri-Mek SC* (1.75 to 3.5 fl oz.) (7 days) Use with a non-ionic surfactant. (RUP)

Bifenthrin

- *Bifenture 10 DF*, 12.8 to 16 oz/A. (7 days)

- *Sniper*, 5.12 to 6.4 fl oz. (7 days) (RUP)

Dimethoate

- *Dimethoate 4 EC*, 1 pt. (7 days)

Malathion

- *Malathion 5*, *Malathion 5 EC*, or *Malathion 57 EC* (1.5 pt.) or *Malathion 8* (1 to 1.5 pt.) or *Malathion 8 Aquamul* (1 to 1.5 pt.) (7 days)

Spiromesifen

- *Oberon 2 SC*, 7 to 8.5 fl oz. (7 days) Special Michigan SLN label.

Zeta-Cypermethrin + Avermectin

- *Gladiator*, 19 fl oz. (7 days) (RUP)

SLUGS

*Deadline M-Ps 4%* (20 to 40 lb) or *Metaldehyde 3.5 G* (30 to 40 lb) Apply between rows. Avoid contact to edible product.

DISEASES

PREPLANT TREATMENT:

DAMPING OFF (*Pythium* spp.):

Mefenoxam

- *Ridomil Gold SL*, 1-2 pt.

PLANTING TREATMENT:

DAMPING OFF (*Pythium* spp.):

Mefenoxam. Apply as a broadcast preplant incorporation or a surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone after planting with 1/2 to 1 in. of sprinkler irrigation.

- *Ridomil Gold GR*, 20 to 40 lb.

- *Ultra Flourish*, 2 to 4 pt.

## Celery

### FOLIAR TREATMENT:

CRATER ROT (*Rhizoctonia solani*): Apply as a basal spray after each cultivation.

\* Azoxystrobin. See label.

- *Quadris*, 0.4 to 0.8 fl oz per 1000 row feet. (0 days)

\* Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 2.4 - 3.7 pts every 7-14 days. (7 days)

\* Chlorothalonil

- *Bravo Ultrex*, *Equus DF*, 1.8 to 2.7 lb every 7 days.
- *Bravo Weather Stik*, *Equus 720 SST*, 2 to 3 pt every 7 days. (7 days)
- *Echo 720*, 1 to 1 1/2 pt every 3-5 days or 2 to 3 pt every 7 days. (7 days)
- *Echo 90 DF*, 1 5/8 to 2 1/2 lb every 7 days. (7 days)
- *Echo 90 DF*, 7/8 to 1 1/4 lb every 3 - 5 days. (7 days)
- *Echo Zn*, 1 1/2 to 2 1/8 pt every 3 to 5 days or 3 to 4 1/4 pt every 7 days. (7 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 4-5 pt. (0 days)

PINK ROT (*Sclerotinia sclerotiorum*):

Chlorothalonil

- *Bravo Ultrex*, *Equus DF*, 2.7 lb every 7 days (pink rot suppression). (7 days)
- *Bravo Weather Stik*, *Equus 720 SST*, 3 pt every 7 days (pink rot suppression). (7 days)
- *Echo 90 DF*, 1.7 to 2.4 lb. (7 days)
- *Equus DF*, 1.8 to 2.7 lb. (7 days)

Cyprodinil + Fludioxonil

- *Switch 62.5 WG*, 11 to 14 oz. (0 days)

EARLY BLIGHT (*Cercospora apii*), LATE BLIGHT (*Septoria apiicola*):

Treat every 7 to 10 days beginning after transplanting.

\* Azoxystrobin

- *Quadris*, 9.0 to 15.5 fl oz every 7 - 14 days. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

\* Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 2.4 - 3.7 pt every 7-14 days. (7 days)

\* Azoxystrobin + Propiconazole

- *Quilt*, *Quilt Xcel*, 14 fl oz. (14 days)

\* Chlorothalonil

- *Bravo Ultrex*, *Equus DF*, 1.8 to 2.7 lb every 7 days. (7 days)
- *Bravo Weather Stik*, *Equus 720 SST*, 2 to 3 pt every 7 days. (7 days)
- *Echo 720*, 1 to 1 1/2 pt every 3-5 days or 2 to 3 pt every 7 days. (7 days)
- *Echo 90 DF*, 7/8 to 1 1/4 lb every 5 days or 1 5/8 to 2 1/2 lb every 7 days. (7 days)
- *Echo 90 DF*, 7/8 to 1 1/4 lb every 3 - 5 days. (7 days)
- *Echo Zn*, 1 1/2 to 2 1/8 pt every 5 days or 3 to 4 1/4 pt every 7 days. (7 days)
- *Echo Zn*, 1 1/2 to 2 1/8 pt every 3 - 5 days. (7 days)

\* Fluxapyroxad + Pyraclostrobin

- *Merivon Xemium Brand Fungicide*, 4 - 11 fl oz. (1 day)

\* Propiconazole

- *Propimax EC*, *Tilt*, 4 fl oz. (14 days) Maximum of four applications per season.

\* Trifloxystrobin

- *Flint* (2 to 3 oz) or *Gem 500* (1.9 to 2.9 fl oz) (7 days) Do not apply more than three sequential foliar application of strobilurin fungicide before alternating with a fungicide that has a different mode of action.

Copper Ammonium Carbonate

- *Copper Count N*, 2 to 3 qt. (0 days)

Copper Hydroxide

- *Champ DP Dry Prill*, 1 1/3 lb. (0 days)
- *Champ Formula 2 F*, 1 1/3 pt. (0 days)
- *Champ WG*, 2.0 lb. (0 days)
- *ChampionION*, 0.75 to 1.5 lb. (0 days)
- *Kocide 2000*, 1 1/2 lb. (0 days)
- *Kocide 3000*, 0.75-1.5 lb. (0 day)
- *Nu-Cop 3 L*, 1 1/3 to 2 2/3 pt. (0 days)
- *Nu-Cop 50 DF*, 2 lb, 5- to 7-day intervals. (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge SC*, 1 to 1.8 pt. (0 days)
- *Badge X2*, 0.5 to 0.75 lb. (0 days)

Copper Oxychloride + Copper Sulfate

- *C-O-C-S WDG*, 1.0 to 1.9 lb, 7 days. (0 days)

Copper Sulfate

- *Basic Copper 53*, 1.0 to 1.9 lb. (0 days)
- *Cuprofix Ultra 40 Disperss*, 1.25 lb. (0 days)

Fenamidone

- *Reason 500 SC*, 5.5 - 8.2 fl oz. (2 days) No more than 1 application before alternating.

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Penthiopyrad

- *Fontelis*, 14 - 24 fl oz. (3 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 4 to 5 pt. (7 days)

BACTERIAL LEAF SPOT (*Pseudomonas syringae* pv. *apii*): Treat every 7 to 10 days, beginning after transplanting.

Copper Ammonium Carbonate

- *Copper Count N*, 2 to 3 qt. (0 days)

Copper Hydroxide

- *Champ DP Dry Prill*, 1 1/3 lb. (0 days)
- *Champ Formula 2 F*, 1 1/3 pt. (0 days)
- *Champ WG*, 2.0 lb. (0 days)
- *ChampionION*, 0.75 to 1.5 lb. (0 days)
- *Champion WP*, 2 lb. (0 days)
- *Kocide 2000*, 1 1/2 lb. (0 days)
- *Kocide 3000*, 0.75-1.5 lb. (0 day)
- *Nu-Cop 3 L*, 1 1/3 to 2 2/3 pt. (0 days)
- *Nu-Cop 50 DF*, 2 lb, 5- to 7-day intervals. (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge SC*, 1 to 1.8 pt. (0 days)
- *Badge X2*, 0.5 to 0.75 lb. (0 days)

Copper Oxychloride + Copper Sulfate

- *C-O-C-S WDG*, 1.0 to 1.9 lb, 7 days. (0 days)

Copper Sulfate

- *Basic Copper 53*, 1.0 to 1.9 lb. (0 days)
- *Cuprofix Ultra 40 Disperss*, 1.25 lb. (0 days)

RUST:

\* Fluxapyroxad + Pyraclostrobin

- *Merivon Xemium Brand Fungicide*, 4 - 11 fl oz. (1 day)

Penthiopyrad

- *Fontelis*, 14 - 24 fl oz. (3 days)

Trifloxystrobin

- *Gem 500*, 1.9 to 2.9 fl oz. (7 days)

CERCOSPORA LEAF SPOT (*Cercospora beticola*):

\* Fluxapyroxad + Pyraclostrobin

- *Merivon Xemium Brand Fungicide*, 4 - 11 fl oz. (1 day)

Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days)

SEPTORIA LEAF SPOT (*Septoria lycopersici*):

\* Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 4 - 11 fl oz. (1 day)

Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days)

ANTHRACNOSE (*Colletotrichum* spp.):

\* Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 4 - 11 fl oz. (1 day)

Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days)

## Corn

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

Root-lesion, stunt, stubby-root, lance and dagger nematodes can reduce sweet corn yields. Fields with soil or root problems of undetermined cause should be tested for nematodes (see Appendix C). If the above plant-parasitic nematodes are present in population densities above the economic threshold for sweet corn, crop rotation or application of a nematicide is recommended. The following nematicides are suitable for control of root-lesion, lance, stunt, dagger and stubby-root nematodes in sweet corn production.

#### FALL SOIL FUMIGATION:

1,3-D

- *Telone* II (3 gal in-row for mineral soil) or *Telone* II (9-12 gal/A broadcast for mineral soil)

Fumigate in the fall when soil temperatures at a 6-inch depth are above 50F. Inject the fumigant to a soil depth of 8 inches and lightly seal the soil immediately after application. Use soil fumigants only as directed on the label. In some limited situations, soil fumigants can be applied in the spring in Michigan.

Correct soil moisture, temperature and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or by immediate tarping.

#### PREPLANT TREATMENT:

Ethoprop

- *Mocap* 15 G, broadcast. Apply 40 lb/A 3 days before planting to at-planting. Mix with the top 2-4 inches of soil. (RUP)
- *Mocap* 15 G, band. Add 3/4 to 1 lb per 1,000 row ft in a band 12-15 inches on the row 3 days before planting to at-planting. Mix with the top 2-4 inches of soil. Rate per acre is dependent on row spacing. Rate would be 10-13.3 lb/A at 40-inch row spacings. (RUP)

### INSECTS

**SEED TREATMENT:** Treatments applied to seed prior to planting. Insecticide and fungicide treatments can be combined according to directions.

CORN FLEA BEETLE, WIRE WORM, SEED CORN MAGGOT, CUTWORM, CORN LEAF APHIDS:

- *Avicta*, . See label for rates and application methods. (RUP)
- *Cruiser* 5 FS, Purchase seed treated at 1.28 to 5.1 fl oz / 100 lb seed.

CORN ROOTWORM, FLEA BEETLE, SEED CORN MAGGOT, WIREWORM:

- *Poncho* 600, purchase seed treated commercially at 1.13 to 5.64 fl oz/80,000.

SEED CORN MAGGOT:

- *Lorsban* 50 W, 2 oz/100 lb seed. (0 days) (RUP)

**SOIL TREATMENT:** Apply at cultivation.

CORN ROOTWORM:

Chlorpyrifos

- *Chlorpyrifos* 4E AG, 2 pt. (21 days) (RUP)
- *Warhawk*, 6 pt. (21 days) (RUP)

- *Thimet* 20 G, 4.5 to 6.0 oz/1000 row ft. (30 days) (RUP)

ARMYWORM, CUTWORM:

- *Capture* LFR, 3.4 fl oz (Pre-emergence) or 4 to 5.3 fl oz (Pre-plant incorporated). (RUP)

Chlorpyrifos

- *Govern*, 1 to 2 pt. (21 days) (RUP)
- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced (1 to 2 pt.) or *Lorsban* 75 WG (0.67 to 1.33 lb.) (21 days) (RUP)
- *Nufos* 4E, 1 to 2 pt. (21 days) (RUP)
- *Vulcan*, 1 to 2 pt. (21 days) (RUP)
- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

Chlorpyrifos + Gamma-cyhalothrin

- *Bolton*, 9 to 23 fl oz. (21 days) (RUP)
- *Cobalt*, 13 to 38 fl oz. (21 days) (RUP)

CUTWORM:

- *Mocap* 15 G, 20 lb. See label for application methods. (RUP)
- *Warhawk*, 1 to 4 pt. (21 days) (RUP)

ARMYWORM:

- *Warhawk*, 1 to 2 pt. (21 days) (RUP)

#### PLANTING TREATMENT:

WIREWORM: Broadcast evenly on soil surface and incorporate to 4 to 6 inches or band over the row at planting at reduced rate. **Note:** Consult the labels for other uses of these materials.

- *Aztec* 2.1 G, 6.7 oz/1000 row ft. (RUP)

Chlorpyrifos + Gamma-cyhalothrin

- *Bolton*, . (21 days) (RUP)
- *Cobalt*, . (21 days) (RUP)

Rates dependent on row spacing.

- *Lorsban* 15 G, 8 oz/1000 row ft, banded. (RUP)

- *Mocap* 15 G, 8 oz/1,000 row ft. See label for application methods. (RUP)

- *Pounce* 1.5 G, 8 oz/1000 row ft. (RUP)

Terbufos

- *Counter* 15-G Lock'n Load, or *Counter* 15G Smartbox (6 to 8 oz/1000 row ft.) or *Counter* 20G Smartbox (4.5 to 6 oz/1000 row ft.) (RUP)

- *Thimet* 20 G, 4.5 to 6.0 oz/1000 row ft. (RUP)

SEED CORN MAGGOT:

- *Aztec* 2.1 G, 6.7 oz/1,000 ft of row. (RUP)

Chlorpyrifos + Gamma-cyhalothrin

- *Bolton*, . (21 days) (RUP)
- *Cobalt*, . (21 days) (RUP)

Lambda-cyhalothrin

- *Lambda-Cy*, 0.66 fl oz/1000 row ft. (21 days) (RUP)
- *Warrior* II with Zeon Technology (0.33 fl oz/1000 row ft.) or *Warrior* with Zeon Technology (0.66 fl oz/1000 row ft.) (21 days) (RUP)

- *Lorsban* 15 G, 8 oz/1000 row ft, banded. (RUP)

- *Pounce* 1.5 G, 8 oz/1000 row ft. (RUP)

- *Proaxis*, 0.66 fl oz/1000 row ft. (21 days) (RUP)

## Corn

### Terbufos

- *Counter* 15-G Lock'n Load, or *Counter* 15G Smartbox (6 to 8 oz/1000 row ft.) or *Counter* 20G Smartbox (4.5 to 6 oz/1000 row ft.) (RUP)

*Thimet* 20 G, 4.5 to 6.0 oz/1000 row ft. Do not apply in-furrow. (RUP)

Rates dependent on row spacing.

CORN ROOTWORM: Corn rootworms are a problem only when rotation of crops is not practiced.

*Aztec* 2.1 G, 6.7 oz/1,000 row ft. (RUP)

### Bifenthrin

- *Bifenture* EC, 0.3 fl oz/1000 row ft. (RUP)
- *Brigade @* 2EC, 0.3 fl oz/1000 row ft. (RUP)
- *Capture* 1.15 G (6.4 to 8 oz/1000 row ft.) or *Capture* 2 EC (0.3 fl oz/1000 row ft.) or *Capture* LFR (6.8 to 8.5 fl oz.) (RUP)
- *Empower*, 6.4 to 8.0 oz/1000 row ft. (RUP)
- *Fanfare* 2EC, 0.3 fl oz/1000 row ft. (RUP)
- *Tundra* EC, 0.3 fl oz/1000 row ft. (RUP)

### Chlorpyrifos

- *Chlorpyrifos* 15G, 8 oz/1000 row ft. (21 days)
- *Lorsban* 15 G, 8 oz/1000 row ft, banded. (RUP)
- *Saurus*, 8 oz/1000 row ft. (21 days)

*Force* 3G, 4 to 5 oz/1000 row ft. (RUP)

### Lambda-cyhalothrin

- *Lambda-Cy*, 0.66 fl oz/1000 row ft. (21 days) (RUP)
- *Warrior* II with Zeon Technology (0.33 fl oz/1000 row ft.) or *Warrior* with Zeon Technology (0.66 fl oz/1000 row ft.) (21 days) (RUP)

*Mocap* 15 G, 8 oz/1,000 row ft. See label for application methods. (RUP)

*Proaxis*, 0.66 fl oz/1000 row ft. (21 days) (RUP)

### Terbufos

- *Counter* 15-G Lock'n Load, or *Counter* 15G Smartbox (6 to 8 oz/1000 row ft.) or *Counter* 20G Smartbox (4.5 to 6 oz/1000 row ft.) (RUP)

*Thimet* 20 G, 4.5 to 6.0 oz/1000 row ft. Do not apply in-furrow. (RUP)

CUTWORM, SEED CORN MAGGOT, WIREWORM:

### Bifenthrin

- *Bifenture* EC, 0.15 to 0.3 fl oz/1000 row ft. (RUP)
- *Brigade @* 2EC, 0.15 to 0.3 fl oz/1000 row ft. (RUP)
- *Capture* 1.15 G (3.2 to 8.0 oz/1000 row ft.) or *Capture* 2 EC (0.15 to 0.3 fl oz/1000 row ft.) or *Capture* LFR (3.4 to 6.8 fl oz.) (RUP)
- *Empower*, 3.2 to 8.0 oz/1000 row ft. (RUP)
- *Fanfare* 2EC, 0.15 to 0.3 fl oz/1000 row ft. (RUP)
- *Tundra* EC, 0.15 to 0.3 fl oz/1000 row ft. (RUP)

See label for application methods.

### Chlorpyrifos

- *Chlorpyrifos* 15G, 8 oz/1000 row ft. (21 days)
- *Saurus*, 8 oz/1000 row ft. (21 days)

*Diazinon* AG 500, 2 to 4 qt.; 3-4 qt. for wireworms. Broadcast just before planting and immediately incorporate into soil. See label for specific directions. (RUP)

### Tefluthrin

- *Force* 3G (4 to 5 oz/1000 row ft.) or *Force* CS (0.46 to 0.57 fl oz/1000 row ft.) (RUP)

ARMYWORM:

### Bifenthrin

- *Bifenture* EC, 0.15 to 0.3 fl oz/1000 row ft. (RUP)
- *Brigade @* 2EC, 0.15 to 0.3 fl oz/1000 row ft. (RUP)
- *Capture* LFR, 0.2 to 0.39 fl oz/1000 row ft. (RUP)

- *Fanfare* 2EC, 0.15 to 0.3 fl oz/1000 row ft. (RUP)
- *Tundra* EC, 0.15 to 0.3 fl oz/1000 row ft. (RUP)

See labels for application methods.

### Chlorpyrifos

- *Chlorpyrifos* 4E AG, 1 to 2 pt. (21 days) (RUP)
- *Govern*, 1 to 2 pt. (21 days) (RUP)
- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced (1 to 2 pt.) or *Lorsban* 75 WG (0.67 to 1.33 lb.) (21 days) (RUP)
- *Nufos* 4E, 1 to 2 pt. (21 days) (RUP)
- *Vulcan*, 1 to 2 pt. (21 days) (RUP)
- *Warhawk*, 1 to 2 pt. (21 days) (RUP)
- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

FLEA BEETLE:

*Thimet* 20 G, 4.5 to 6.0 oz/1000 row ft. (RUP)

CUTWORM:

### Chlorpyrifos

- *Chlorpyrifos* 4E AG, 1 to 2 pt. (21 days) (RUP)
- *Govern*, 1 to 2 pt. (21 days) (RUP)
- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced (1 to 2 pt.) or *Lorsban* 75 WG (0.67 to 1.33 lb.) (21 days) (RUP)
- *Nufos* 4E, 1 to 2 pt. (21 days) (RUP)
- *Vulcan*, 1 to 2 pt. (21 days) (RUP)
- *Warhawk*, 1 to 2 pt. (21 days) (RUP)
- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

### Chlorpyrifos + Gamma-cyhalothrin

- *Bolton*, . (21 days) (RUP)
- *Cobalt*, . (21 days) (RUP)

Rates dependent on row spacing.

### Lambda-cyhalothrin

- *Lambda-Cy*, 0.66 fl oz/1000 row ft. (21 days) (RUP)
  - *Warrior* II with Zeon Technology (0.33 fl oz/1000 row ft.) or *Warrior* with Zeon Technology (0.66 fl oz/1000 row ft.) (21 days) (RUP)
- Proaxis*, 0.66 fl oz/1000 row ft. (21 days) (RUP)

FOLIAR TREATMENT:

CUTWORM, ARMYWORM: Apply when they appear. Repeat as needed.

### \* Bifenthrin

- *Bifenture* EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Brigade @* 2EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (1 day) (RUP)

### \* Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (1 day) (RUP)
- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (1 day) (RUP)
- *Pounce* 1.5 G (6.7 to 13.3 lb.) or *Pounce* 25 WP (6.4 to 12.8 oz.) (1 day) (RUP)

*Belt* SC, 2 to 3 fl oz. (1 day)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

### Chlorpyrifos

- *Chlorpyrifos* 4E AG, 1 to 2 pt. (21 days) (RUP)
- *Govern*, 1 to 2 pt. (21 days) (RUP)
- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced (1 to 2 pt.) or *Lorsban* 75 WG (0.67 to 1.33 lb.) (21 days) (RUP)

- *Nufos* 4E, 1 to 2 pt. (21 days) (RUP)
- *Vulcan*, 1 to 2 pt. (21 days) (RUP)
- *Warhawk*, 1 to 2 pt. (21 days) (RUP)
- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

#### Chlorpyrifos + Gamma-cyhalothrin

- *Bolton*, 9 to 18 fl oz. (21 days) (RUP)
- *Cobalt*, 13 to 26 fl oz. (21 days) (RUP)

*Intrepid* 2F, 4 to 16 fl oz. (3 days)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Latrin* 3.2, 20 to 30 fl oz. (0 days) (RUP)

*Pennncap-M*, 2 to 3 pt. (12 days) Do not apply during pollination. (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Radiant* SC, 3 to 6 fl oz. (1 day; 3 days for forage or fodder)

*Tundra* Supreme, 5.6 to 16.8 fl oz. (21 days) (RUP)

CORN FLEA BEETLE: Apply when damage is first seen, especially if Stewart's disease has been a problem. Plant a variety low in susceptibility to Stewart's wilt for best disease control. Some corn rootworm insecticides may give some early-season flea beetle control (see corn rootworm section).

#### Acetamiprid

- *Assail* 30 SG, 4.0 to 5.3. (7 days)
- *Assail* 70WP, 1.7 to 2.3. (7 days)

*Baythroid* XL, 0.8 to 1.6 fl oz. (0 days) (RUP)

#### Bifenthrin

- *Bifenture* EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Brigade @* 2EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (1 day) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

#### Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (2 days)
- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (2 days)

#### Chlorpyrifos

- *Chlorpyrifos* 4E AG, 1 to 2 pt. (21 days) (RUP)
- *Govern*, 1 to 2 pt. (21 days) (RUP)
- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced (1 to 2 pt.) or *Lorsban* 75 WG (1.33 lb.) (21 days) (RUP)
- *Nufos* 4E, 1 to 2 pt. (21 days) (RUP)
- *Stallion*, 9.25 to 11.75 oz. (21 days) (RUP)
- *Vulcan*, 1 to 2 pt. (21 days) (RUP)
- *Warhawk*, 1 to 2 pt. (21 days) (RUP)
- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

#### Chlorpyrifos + Gamma-cyhalothrin

- *Bolton*, 9 to 18 fl oz. (21 days) (RUP)
- *Cobalt*, 13 to 26 fl oz. (21 days) (RUP)

*Diazinon* AG 500, 1 pt. (0 days) (RUP)

#### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (1 day) (RUP)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)

- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

#### Methomyl

- *Lannate* LV (0.75 to 1.5 pt.) or *Lannate* SP (0.25 to 0.5 lb.) (0 days; 3 days for forage; 21 days for fodder) (RUP)
- *Nudrin* LV (0.75 to 1.5 pt.) or *Nudrin* SP (0.25 to 0.5 lb.) (0 days; 3 days for forage; 21 days for fodder) (RUP)

*Mustang* Max, 2.24 to 4 oz. (3 days) (RUP)

*Pennncap-M*, 2 to 3 pt. (12 days) (RUP)

#### Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (1 day) (RUP)
- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (1 day) (RUP)

- *Pounce* 25 WP, 6.4 to 12.8 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Carbaryl* 4L, 1 to 2 qt. (2 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (2 days)

*Tundra* Supreme, 5.6 to 16.8 fl oz. (21 days) (RUP)

EUROPEAN CORN BORER: For early season control, prior to tasseling. Treat if >15% of plants are infested. Direct granules into corn whorls.

*Avaunt*, 2.5 to 3.5 oz. (3 days) Whorl application only.

#### Chlorpyrifos

- *Lorsban* 15 G, 6 to 8 oz/1,000 row ft. (35 days) (RUP)
- *Saurus*, 3.5 to 8 oz/1000 row ft. (21 days)

*Pennncap-M*, 2 pt. (12 days) (RUP)

*Pounce* 1.5 G, 6.7 to 13.5 lb. (1 day) (RUP)

EUROPEAN CORN BORER: If pheromone trap catch is >5 moths per week. Apply every 5-7 days, beginning at tassel stage.

*Avaunt*, 2.5 to 3.5 oz. (3 days) Prior to silking.

#### Bacillus thuringiensis

- *Agree* WG, 1 to 2 lb. (0 days)
- *DiPel* ES, 1.5 to 2.5 pt. (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

*Baythroid* XL, 1.6 to 2.8 fl oz. (0 days) (RUP)

*Belt* SC, 2 to 3 fl oz. (1 day)

#### Bifenthrin

- *Bifenture* EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Brigade @* 2EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Capture* 1.15 G (3.5 to 8.7 lb.) or *Capture* 2 EC (2.1 to 6.4 fl oz.) (1 day) (RUP)
- *Empower*, 3.5 to 8.7 lb. (1 day) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (1 day) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

#### Carbaryl

- *Carbaryl* 4L, 1.5 to 2 qt. (2 days)
- *Sevin* 4 F (1.5 to 2 qt.) or *Sevin* 80 S (1.88 to 2.5 lb.) or *Sevin* XLR Plus (1.5 to 2 qt.) (2 days)

#### Chlorpyrifos

- *Chlorpyrifos* 4E AG, 1 to 2 pt. (21 days) (RUP)
- *Govern*, 1 to 2 pt. (21 days) (RUP)
- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced (1 to 2 pt.) or *Lorsban* 75 WG (0.67 to 1.33 lb.) (21 days) (RUP)
- *Nufos* 4E, 1 to 2 pt. (21 days) (RUP)
- *Saurus*, 6 to 8 oz/1000 row ft. (21 days)
- *Stallion*, 9.25 to 11.75 oz. (21 days) (RUP)
- *Vulcan*, 1 to 2 pt. (21 days) (RUP)

## Corn

- *Warhawk*, 1 to 2 pt. (21 days) (RUP)
- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

### Chlorpyrifos + Gamma-cyhalothrin

- *Bolton*, 13 to 23 fl oz. (21 days) (RUP)
- *Cobalt*, 19 to 38 fl oz. (21 days) (RUP)

*Coragen*, 3.5 to 5 fl oz. (1 day)

### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (1 day) (RUP)

*Intrepid 2F*, 4 to 16 fl oz. (3 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Larvin 3.2*, 20 to 30 fl oz. (0 days) (RUP)

### Methomyl

- *Lannate LV* (0.75 to 1.5 pt.) or *Lannate SP* (0.25 to 0.5 lb.) (0 days; 3 days for forage; 21 days for fodder) (RUP)
- *Nudrin LV* (0.75 to 1.5 pt.) or *Nudrin SP* (0.25 to 0.5 lb.) (0 days; 3 days for forage; 21 days for fodder) (RUP)

*Mustang Max*, 2.8 to 4 oz. (3 days) (RUP)

*PennCap-M*, 2 to 3 pt. (12 days) Do not apply during pollination. (RUP)

### Permethrin

- *Ambush 25 W*, 6.4 to 12.8 oz. (1 day) (RUP)
- *Perm-UP 25DF* (6.4 to 12.8 oz.) or *Perm-UP 3.2 EC* (4 to 8 oz.) (1 day) (RUP)
- *Pounce 1.5 G* (6.7 to 13.3 lb.) or *Pounce 25 WP* (6.4 to 12.8 oz.) (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Radiant SC*, 3 to 6 fl oz. (1 day; 3 days for forage or fodder)

*Rimon 0.83EC*, 9 to 12 fl oz. (1 day)

*Carbaryl 4L*, 1.5 to 2 qt. (2 days)

*Sevin 4 F* (1.5 to 2 qt.) or *Sevin 80 S* (1.88 to 2.5 lb.) or *Sevin XLR Plus* (1.5 to 2 qt.) (2 days)

### Spinosad

- *Blackhawk* (2.2-3.3 oz/A) or *Entrust* (0.5 to 2 oz.) or *Entrust SC* (1.5 to 6 fl oz.) (28)

*Tundra Supreme*, 5.6 to 16.8 fl oz. (21 days) (RUP)

CORN EARWORM: Apply to silks when moths are active to prevent ear damage. Treat every 5 days if 2-6 moths per week are caught in pheromone traps, every 4 to 5 days if catch is 7 to 90 moths per week, and every 3 to 4 days if catch is >90 moths per week. Use the shorter intervals listed above if temperatures are >85.

\* *Baythroid XL*, 1.6 to 2.8 fl oz. (0 days) (RUP)

### \* Bifenthrin

- *Bifenture EC*, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Brigade @ 2EC*, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (1 day) (RUP)

### \* Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (1 day) (RUP)

\* *Larvin 3.2*, 20 to 30 fl oz. (0 days) (RUP)

\* *Mustang Max*, 2.8 to 4 oz. (3 days) (RUP)

### \* Permethrin

- *Ambush 25 W*, 6.4 to 12.8 oz. (1 day) (RUP)
- *Perm-UP 25DF* (6.4 to 12.8 oz.) or *Perm-UP 3.2 EC* (4 to 8 oz.) (1 day) (RUP)

- *Pounce 25 WP*, 6.4 to 12.8 oz. (1 day) (RUP)

\* *Warrior* with Zeon Technology, 2.6 to 3.8 fl oz. (1 day) (RUP)

*Avaunt*, 2.5 to 3.5 oz. (3 days)

*Belt SC*, 2 to 3 fl oz. (1 day)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (3 days) (RUP)

### Carbaryl

- *Carbaryl 4L*, 1 to 2 qt. (2 days)
- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (2 days)

### Chlorpyrifos

- *Chlorpyrifos 4E AG*, 1.5 to 2 pt. (21 days) (RUP)
- *Govern*, 1.5 to 2 pt. (21 days) (RUP)
- *Hatchet*, 1.5 to 2 pt. (21 days) (RUP)
- *Lorsban 4 E / Lorsban Advanced* (1.5 to 2 pt.) or *Lorsban 75 WG* (1 to 1.33 lb.) (21 days) (RUP)
- *Nufos 4E*, 1.5 to 2 pt. (21 days) (RUP)
- *Stallion*, 9.25 to 11.75 oz. (21 days) (RUP)
- *Vulcan*, 1.5 to 2 pt. (21 days) (RUP)
- *Warhawk*, 1.5 to 2 pt. (21 days) (RUP)
- *Whirlwind*, 1.5 to 2 pt. (21 days) (RUP)

### Chlorpyrifos + Gamma-cyhalothrin

- *Bolton*, 13 to 23 fl oz. (21 days) (RUP)
- *Cobalt*, 19 to 38 fl oz. (21 days) (RUP)

*Coragen*, 3.5 to 5 fl oz. (1 day)

*Diazinon AG 500*, 1 to 1.25 qt. (7 days) (RUP)

*DiPel ES*, 2 to 4 pt. (0 days)

*Endosulfan 3 EC*, 2 qt. (17 days) (RUP)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

### Methomyl

- *Lannate LV* (0.75 to 1.5 pt.) or *Lannate SP* (0.25 to 0.5 lb.) (0 days; 3 days for forage; 21 days for fodder) (RUP)
- *Nudrin LV* (0.75 to 1.5 pt.) or *Nudrin SP* (0.25 to 0.5 lb.) (0 days; 3 days for forage; 21 days for fodder) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Radiant SC*, 3 to 6 fl oz. (3 days)

*Rimon 0.83EC*, 9 to 12 fl oz. (1 day)

*Carbaryl 4L*, 1 to 2 qt. (2 days)

*Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (2 days)

### Spinosad

- *Blackhawk* (2.2-3.3 oz/A) or *Entrust* (1 to 2 oz.) or *Entrust SC* (3 to 6 fl oz.) (1 day)

*Tundra Supreme*, 5.6 to 16.8 fl oz. (21 days) (RUP)

CORN ROOTWORM ADULTS: Apply as needed to protect silks, when beetle are active and feeding on silks.

### Acetamiprid

- *Assail 30 SG*, 4.5 to 5.3 oz/A. (7 days)
- *Assail 70WP*, 1.9 to 2.3 oz/A. (7 days)
- *Baythroid XL*, 1.6 to 2.8 fl oz. (0 days) (RUP)

### Bifenthrin

- *Bifenture EC*, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Brigade @ 2EC*, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (1 day) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (2 days)
- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (2 days)

Chlorpyrifos

- *Chlorpyrifos* 4E AG, 1 to 2 pt. (21 days) (RUP)
- *Govern*, 1 to 2 pt. (21 days) (RUP)
- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced (1 to 2 pt.) or *Lorsban* 75 WG (0.67 to 1.33 lb.) (21 days) (RUP)
- *Nufos* 4E, 1 to 2 pt. (21 days) (RUP)
- *Stallion*, 9.25 to 11.75 oz. (21 days) (RUP)
- *Vulcan*, 1 to 2 pt. (21 days) (RUP)
- *Warhawk*, 1 to 2 pt. (21 days) (RUP)
- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

Chlorpyrifos + Gamma-cyhalothrin

- *Bolton*, 9 to 18 fl oz. (21 days) (RUP)
- *Cobalt*, 13 to 26 fl oz. (21 days) (RUP)

*Diazinon* AG 500, 0.5 to 1 pt. (0 days) (RUP)

Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (1 day) (RUP)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with *Zeon* Technology (1.28 to 1.92 fl oz.) or *Warrior* with *Zeon* Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

Methomyl

- *Lannate* LV (0.75 to 1.5 pt.) or *Lannate* SP (0.25 to 0.5 lb.) (0 days; 3 days for forage; 21 days for fodder) (RUP)
- *Nudrin* LV (0.75 to 1.5 pt.) or *Nudrin* SP (0.25 to 0.5 lb.) (0 days; 3 days for forage; 21 days for fodder) (RUP)

*Mustang* Max, 2.24 to 4 oz. (3 days) (RUP)

*Penncap-M*, 1 to 2 pt. (12 days) (RUP)

Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (1 day) (RUP)
- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (1 day) (RUP)
- *Pounce* 25 WP, 6.4 to 12.8 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Carbaryl* 4L, 1 to 2 qt. (2 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (2 days)

*Tundra* Supreme, 5.6 to 16.8 fl oz. (21 days) (RUP)

CORN LEAF APHIDS: Apply when populations start to build, prevents sooty mold on ears at harvest.

Bifenthrin

- *Bifenture* EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Brigade @* 2EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (1 day) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

Chlorpyrifos

- *Chlorpyrifos* 4E AG, 1 to 2 pt. (21 days) (RUP)
- *Govern*, 1 to 2 pt. (21 days) (RUP)
- *Hatchet*, 1 to 2 pt. (21 days) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced (1 to 2 pt.) or *Lorsban* 75 WG (0.67 to 1.33 lb.) (21 days) (RUP)

- *Nufos* 4E, 1 to 2 pt. (21 days) (RUP)
- *Stallion*, 9.25 to 11.75 oz. (21 days) (RUP)
- *Vulcan*, 1 to 2 pt. (21 days) (RUP)
- *Warhawk*, 1 to 2 pt. (21 days) (RUP)
- *Whirlwind*, 1 to 2 pt. (21 days) (RUP)

Chlorpyrifos + Gamma-cyhalothrin

- *Bolton*, 9 to 18 fl oz. (21 days) (RUP)
- *Cobalt*, 13 to 26 fl oz. (21 days) (RUP)

*Diazinon* AG 500, 1 to 2 pt. (0 days) (RUP)

*Endosulfan* 3 EC, 1.33 qt. (17 days) (RUP)

Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (1 day) (RUP)

*Mustang* Max, 2.8 to 4 oz. (3 days) (RUP)

*Penncap-M*, 2 to 3 pt. (12 days) Do not apply during pollination. (RUP)

*Tundra* Supreme, 5.6 to 16.8 fl oz. (21 days) (RUP)

SAP BEETLE: These usually come in following damage by other insects or birds. Controlling damage will be the most effective solution.

For short-term control, apply as needed.

Bifenthrin

- *Bifenture* EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Brigade @* 2EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (1 day) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (1 day) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (2 days)
- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (2 days)

Chlorpyrifos + Gamma-cyhalothrin

- *Bolton*, 13 to 23 fl oz. (21 days) (RUP)
- *Cobalt*, 19 to 38 fl oz. (21 days) (RUP)

*Diazinon* AG 500, 2 to 2.5 pt. (RUP)

Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (1 day) (RUP)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with *Zeon* Technology (1.28 to 1.92 fl oz.) or *Warrior* with *Zeon* Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Malathion* 57 EC, 1.5 pt. (5 days) Begin treatment when 10% of ears show silk; repeat at 3 to 5 day intervals until 4 to 5 applications are made.

*Mustang* Max, 2.24 to 4 oz. (3 days) (RUP)

*Penncap-M*, 2 to 3 pt. (12 days) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Carbaryl* 4L, 1 to 2 qt. (2 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (2 days)

*Stallion*, 9.25 to 11.75 oz. (21 days) (RUP)

*Tundra* Supreme, 5.6 to 16.8 fl oz. (21 days) (RUP)

ARMYWORM: Apply when they appear. Repeat as needed.

*Avaunt*, 2.5 to 3.5 oz. (3 days)

*Bacillus thuringiensis*

- *Biobit* HP, 0.5 to 2 lb. (0 days)
- *DiPel* ES, 2 to 4 pt. (0 days)

## Corn

- *XenTari*, 0.5 to 2 lb. (0 days)

*Baythroid XL*, 1.6 to 2.8 fl oz. (0 days) (RUP)

### Bifenthrin

- *Capture* 1.15 G, 3.5 to 8.7 lb. (1 day) (RUP)
- *Empower*, 3.5 to 8.7 lb. (1 day) (RUP)

### Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (2 days)
- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (2 days)

### Chlorpyrifos

- *Saurus*, 6 to 8 oz/1000 row ft.. (21 days)
- *Stallion*, 9.25 to 11.75 oz. (21 days) (RUP)

*Coragen*, 3.5 to 5 fl oz. (1 day)

### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (1 day) (RUP)

### Methomyl

- *Lannate* LV (0.75 to 1.5 pt.) or *Lannate* SP (0.25 to 0.5 lb.) (0 days; 3 days for forage; 21 days for fodder) (RUP)
- *Nudrin* LV (0.75 to 1.5 pt.) or *Nudrin* SP (0.25 to 0.5 lb.) (0 days; 3 days for forage; 21 days for fodder) (RUP)

*Mustang Max*, 2.8 to 4 oz. (3 days) (RUP)

*Rimon* 0.83EC, 9 to 12 fl oz. (1 day)

*Carbaryl* 4L, 1 to 2 qt. (2 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (2 days)

### Spinosad

- *Blackhawk* (2.2-3.3 oz/A) or *Entrust* (0.5 to 2 oz.) or *Entrust* SC (1.5 to 6 fl oz.) (7 days)

CUTWORM: Apply when they appear. Repeat as needed.

*Baythroid XL*, 0.8 to 2.8 fl oz. (0 days) (RUP)

*DiPel* ES, 1.5 to 2.5 pt. (0 days)

### Esfenvalerate

- *Adjourn*, 2.9 to 9.6 fl oz. (1 day) (RUP)
- *Asana XL*, 2.9 to 9.6 fl oz. (1 day) (RUP)
- *S-FenvaloStar*, 2.9 to 9.6 fl oz. (1 day) (RUP)

### Methomyl

- *Lannate* LV (1.5 pt.) or *Lannate* SP (0.5 lb.) (0 days; 3 days for forage; 21 days for fodder) (RUP)
- *Nudrin* LV (1.5 pt.) or *Nudrin* SP (0.5 lb.) (0 days; 3 days for forage; 21 days for fodder) (RUP)

*Mustang Max*, 2.24 to 4 oz. (3 days) (RUP)

*Sevin* 4 F, *Sevin* XLR Plus, 2 qt. (2 days; 14 days for forage; 48 days for fodder)

*Sevin* 4 F, *Sevin* XLR Plus, 2 qt. (2 days; 14 days for forage; 48 days for fodder)

### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (1 day)
- *Stallion*, 3.75 to 11.75 oz. (21 days) (RUP)

APHIDS:

### Acetamiprid

- *Assail* 30 SG, 2.1 to 2.9 oz/A. (1 day)
- *Assail* 70WP, 0.9 to 1.2 oz/A. (1 day)
- *Assail* 70WP, 0.9 to 1.2 oz/A. (1 day)

JAPANESE BEETLE:

### Acetamiprid

- *Assail* 30 SG, 5.3 oz. (7 days)
- *Assail* 70WP, 2.3 oz/A. (7 days)

SAP BEETLE:

### Acetamiprid

- *Assail* 30 SG, 4.0 to 5.3 oz/A. (7 days)

- *Assail* 70WP, 1.9 to 2.3 oz/A. (7 days)

STINK BUGS:

### Acetamiprid

- *Assail* 30 SG, 5.3 oz/A. (7 days) Suppression only
- *Assail* 70WP, 2.3 oz/A. (7 days) Suppression only

## MITES

### Bifenthrin

- *Bifenture* EC, 5.12 to 6.4 fl oz. (1 day) (RUP)
- *Brigade* @ 2EC, 5.12 to 6.4 fl oz. (1 day) (RUP)
- *Capture* 2 EC, 5.12 to 6.4 fl oz. (1 day) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (1 day) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (1 day) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero* EW (11.2 oz.) (3 days) (RUP)

### Chlorpyrifos + Bifenthrin

- *Tundra* Supreme, 13.5 to 16.8 fl oz. (21 days) (RUP)

### Phorate

- *Thimet* 20 G, 4.5 to 6.0 oz/1000 row ft. At planting treatment. (RUP)

### Spiromesifen

- *Oberon* 2 SC, 5.7 to 16 fl oz. (5 days)

## DISEASES

### SEED TREATMENT:

DAMPING OFF (*Pythium* spp., *Rhizoctonia solani*): Treatments applied to seed prior to planting. Insecticide and fungicide treatments can be combined according to directions.

### Captan

- *Captan* 4 Flowable, 4 fl oz/100 lb seed.

### Fludioxonil

- *Maxim* 4 FS, 0.08 fl oz/100 lb seed (*Rhizoctonia*). Commercial seed treatment plants only.

### Fludioxonil + mefenoxam

- *Maxim* XL, 0.167 to 0.334 fl oz/100 lb seed (*Pythium* + *Rhizoctonia*).

### Mefenoxam

- *Apron* XL LS, 0.32 to 0.64 oz/100 lb seed (*Pythium*).

### Metalaxyl

- *Allegiance-FL*, 0.75 fl oz/100 lb seed (*Pythium*).

### Thiram

- *42-S* Thiram, 5 oz/100 lb seed.
- *Thiram* 480DP, 5 fl oz/100 lb seed.
- *Thiram* 50 WP Dyed, 3 oz/100 lb seed. Use as a slurry treatment.

### SYSTEMIC DOWNY MILDEW:

### Mefenoxam

- *Apron* XL LS, 1.28 oz/100 lb seed.

### Metalaxyl

- *Allegiance-FL*, 1.5 fl oz/100 lb seed.

### FOLIAR TREATMENT:

CORN RUST (*Puccinia sorghi*): Apply when conditions favor disease.

**Note:** Do not feed treated forage to livestock.

### Azoxystrobin

- *Quadris*, 6.2 to 9.2 fl oz. (7 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

### Azoxystrobin + Propiconazole

- *Quilt* (10.5 - 14 fl oz at 14 day interval) or *Quilt* Xcel (10.5 - 14 fl oz) (14 days)

Chlorothalonil

- *Bravo Ultrex*, 0.7 to 1.8 lb. (14 days) **Note:** Do not apply to sweet corn to be processed.
- *Bravo Weather Stik*, *Equus 720 SST*, 3/4 to 2 pt. (14 days) Sweet corn and seed corn only, not field corn. Do not apply to sweet corn to be processed.
- *Echo 720*, 1.5 to 2 pt. (14 days)

Mancozeb

- *Dithane F-45 Rainshield*, 1 1/5 qt. (7 days)
- *Dithane M-45*, 1 1/2 lb. (7 days)
- *Koverall*, 1.5 lb. (7 days)
- *Manzate Max*, 0.8 to 1.2 qt qt. (7 days)
- *Manzate Pro-Stick*, 1 1/2 lb. (7 days)
- *Penncozeb 75 DF*, *Penncozeb 80WP*, 1 1/2 lb. (7 days)

Propiconazole

- *Tilt*, 4 fl oz. (14 days) Apply at 7 to 14 day intervals. Maximum 16 fl oz per season.

Tebuconazole

- *Orius 3.6F*, *Tebuzol 3.6*, 4-6 fl oz. (7 days) 19 days REI.

## BLIGHTS:

Azoxystrobin

- *Quadris*, 6.0 to 15.5 fl oz. (7 days)

Azoxystrobin + Propiconazole

- *Quilt* (7 to 14 fl oz) or *Quilt Xcel* (10.5 - 14 fl oz) (14 days)

Propiconazole

- *Tilt*, 2 to 4 fl oz. (14 days)

## Cucumber

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

Root-knot and root-lesion nematodes can reduce cucumber yields. Fields with soil or root problems of undetermined cause should be tested for nematodes (see Appendix C). If the plant-parasitic nematodes are present in population densities above the economic threshold for cucumber, crop rotation or application of a nematicide is recommended. The following nematicides are suitable for control of root-knot and root-lesion nematodes in cucumber production. Recent observations indicate that cucumber planted the year following a chemigated (metham) potato crop may provide benefits to the cucumber crop.

#### FALL SOIL FUMIGATION (BROADCAST):

1,3-D

- *Telone II*, 9-18 gal/A (mineral soil).

Fumigate in the fall when soil temperatures at a 6-inch depth are above 50F. Inject the fumigant to a soil depth of 8 inches and lightly seal the soil immediately after application. Use soil fumigants only as directed on the label. In some limited situations soil fumigants can be applied in the spring in Michigan.

Correct soil moisture, temperature and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or by immediate tarping.

#### PREPLANT NEMATICIDE TREATMENT:

Ethoprop

- *Mocap 15 G*, at 13 lb/A (7-foot row spacing) or 2.1 lb/1000 row feet in a band 12 to 15 inches wide on top of the row at or just

before planting. Mix with top 2 to 4 inches of soil immediately after application. Do not use as a seed furrow treatment or allow granules to contact seed. (RUP)

Fluensulfone

- *Nimitz 480EC*, 3.5 - 5.0 pints/A. apply broadcast and incorporate either mechanically or with water to a depth of 6-8 inches at least 7 days prior to transplanting or planting. Do not apply if heavy rainfall is expected within 48 hours of application. This material can be applied in bands or by drip but apparently is most effective if applied broadcast and incorporated. Do not apply to extremely cold soils (<40 F) as nematodes have to be active for the product to be effective. Product has not been evaluated in Michigan.

Oxamyl

- *Vydate L*, apply 2 gal (broadcast) or 1 gal (band) per acre. Apply before planting, incorporate 2-4 in into the soil. (RUP)

#### POST-PLANT TREATMENT:

Oxamyl

- *Vydate L*, . Apply 2-4 pts/A 2-4 weeks after planting. Apply again 2-4 weeks after the first spray. Best used after a preplant treatment. Do not make more than 8 applications per season and do not apply more than 3 gal of Vydate L/A/year. (RUP)

### INSECTS

#### SEED TREATMENT:

## CUCUMBER BEETLE:

- *Cruiser 5 FS*, . See label for rates and application methods.

#### SOIL TREATMENT:

## APHIDS, FLEA BEETLE, LEAFHOPPER, THRIPS:

- *Durivo*, 10 to 13 fl oz. (30 days)

Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum 75 SG* (1.66 to 3.67 oz.) (30 days) See label for application methods.

## SEED CORN MAGGOT:

- *Athena*, 8.5 to 17 fl oz. (RUP)

Bifenthrin

- *Bifenture* 10 DF, 8 to 16 oz/A.
- *Brigade WSB*, 8 to 16 oz. (RUP)
- *Capture LFR*, 3.4 to 6.8 fl oz. (RUP)

Apply infurrow with seed or transplant.

## CUTWORM, FLEA BEETLE LARVAE:

- *Capture LFR*, 3.4 to 6.8 fl oz. See label for application methods. (RUP)

## CUCUMBER BEETLE:

- *Admire Pro*, 7.0 - 10.5 fl oz. (21 days)

- *Belay 50 WDG*, 4.8 to 6.4 oz. (7 days) See label for application methods

- *Nuprid 2 F*, 16 to 24 fl oz. (21 days)

- *Scorpion 35SL*, 9 to 10.5 fl oz.. (21 days)

Imidacloprid

- *Admire Pro*, 7.0 - 10.5 fl oz. (21 days)

- *Belay 50 WDG*, 4.8 to 6.4 oz. (7 days) See label for application methods

- *Nuprid 2 F*, 16 to 24 fl oz. (21 days)

- *Scorpion 35SL*, 9 to 10.5 fl oz.. (21 days)

- *Admire Pro*, 7.0 - 10.5 fl oz. (21 days)

- *Belay 50 WDG*, 4.8 to 6.4 oz. (7 days) See label for application methods

- *Nuprid 2 F*, 16 to 24 fl oz. (21 days)

- *Scorpion 35SL*, 9 to 10.5 fl oz.. (21 days)

## Cucumber

### SQUASH BUG:

*Scorpion* 35SL, 9 to 10.5 fl oz. (21 days) See label for application methods

### APHIDS and THRIPS:

*Verimark*, 10-13.5 oz/A. (1)

### ARMYWORM:

*Verimark*, 6.75-13.5 oz/A. (1)

### CABBAGE LOOPERS:

*Verimark*, 6.75-13.5 oz/A. (1)

### LEAF MINERS:

### LEAFHOPPERS:

*Sivanto*, 21 - 28 fl oz/A.

### APHIDS:

*Sivanto*, 21 - 28 fl oz/A.

### WHITEFLIES:

*Sivanto*, 21 - 28 fl oz/A.

**FOLIAR TREATMENT:** Cucumber plants may be sensitive to certain insecticide formulations. Make certain a problem exists before treatment. Read and observe restrictions on the label. To avoid killing bees, do not treat cucumbers during bloom. If treatment is necessary, see the Insecticide Effectiveness for bee toxicity.

**CUTWORM, ARMYWORM:** Apply if needed to prevent >1-5% stand loss.

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

### *Bacillus thuringiensis*

- *Javelin* WG, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

*Belt* SC, 1.5 fl oz. (1 day)

### Bifenthrin

- *Bifenture* 10 DF, 8 to 16 oz/A. (3 days)
- *Bifenture* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @* 2EC (2.6 to 6.4 fl oz.) or *Brigade* WSB (8 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

*Endigo* ZC, 4 to 4.5 fl oz. (1 day) (RUP)

### Methomyl

- *Lannate* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)
- *Nudrin* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Vetica*, 12 to 17 fl oz. (7 days)

**STRIPED and SPOTTED CUCUMBER BEETLE:** Apply as soon as possible if numbers exceed 0.1 to 1 per plant. Repeat as needed. Use preplant Furadan treatment (above) in fields with severe problems.

### Acetamiprid

- *Assail* 30 SG (2.5 to 5.3 oz.) or *Assail* 70WP (1.1 to 2.3 oz.) (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Baythroid* XL, 2.4 to 2.8 fl oz. (0 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

### Bifenthrin

- *Bifenture* 10 DF, 8 to 16 oz/A. (3 days)

- *Bifenture* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @* 2EC (2.6 to 6.4 fl oz.) or *Brigade* WSB (8 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

### Carbaryl

- *Carbaryl* 4L, 1 qt. (3 days)
- *Sevin* 4 F (1 qt.) or *Sevin* 80 S (1.25 lb.) or *Sevin* XLR Plus (1 qt.) (3 days)

*Danitol* 2.4 EC, 10.66 to 16 fl oz. (7 days) (RUP)

### Dinotefuran

- *Scorpion* 35SL, 2 to 7 fl oz. (1 day)
- *Venom*, 3 to 4 oz. (1 day)

*Endigo* ZC, 4 to 4.5 fl oz. (1 day) (RUP)

*Endosulfan* 3 EC, 0.66 to 1.33 qt. (11 days) (RUP)

### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

*Kryocide*, 8 to 12 lb. (14 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

### Malathion

- *Malathion* 5 (2.75 pt.) or *Malathion* 5 EC (2 pt.) or *Malathion* 8 (1.75 pt.) or *Malathion* 8 Aquamul (1.75 pt.) (1 day)

### Methomyl

- *Lannate* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)
- *Nudrin* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

*Mustang* Max, 2.8 to 4 oz. (1 day) (RUP)

### Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (0 days) (RUP)
- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (0 days) (RUP)
- *Pounce* 25 WP, 6.4 to 12.8 oz. (0 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Rimon* 0.83EC, 9 to 12 fl oz. (1 day)

*Carbaryl* 4L, 1 qt. (3 days)

*Sevin* 4 F (1 qt.) or *Sevin* 80 S (1.25 lb.) or *Sevin* XLR Plus (1 qt.) (3 days)

**FLEA BEETLE:** Apply when damage is present.

*Actara*, 1.5 to 3 oz. (0 days)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

### Carbaryl

- *Carbaryl* 4L, 1 qt. (3 days)
- *Sevin* 4 F (1 qt.) or *Sevin* 80 S (1.25 lb.) or *Sevin* XLR Plus (1 qt.) (3 days)

### Dinotefuran

- *Scorpion* 35SL, 2 to 7 fl oz. (1 day)
- *Venom*, 3 to 4 oz. (1 day)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

*Endosulfan 3 EC*, 0.66 to 1.33 qt. (11 days) (RUP)

*Exirel*, 13.5-20.5 oz. (1)

*Kryocide*, 8 to 12 lb. (14 days)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)

- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

#### Methomyl

- *Lannate LV* (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate SP* (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

- *Nudrin LV* (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin SP* (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

*Pyrenone*, 1 to 12 oz. (0 days)

*Carbaryl 4L*, 1 qt. (3 days)

*Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

*Voliam Flexi*, 4 to 7 oz. (1 day)

APHIDS: Apply if needed.

#### Acetamiprid

- *Assail 30 SG* (2.5 to 4 oz.) or *Assail 70WP* (1.1 to 1.7 oz.) (0 days)

*Actara*, 1.5 to 3 oz. (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

*Beleaf 50 SG*, 2 to 2.8 oz. (0 days)

#### Bifenthrin

- *Bifenture 10 DF*, 8 to 16 oz/A. (3 days)

- *Bifenture EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

- *Brigade @ 2EC* (2.6 to 6.4 fl oz.) or *Brigade WSB* (8 to 16 oz.) (3 days) (RUP)

- *Capture 2 EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

- *Discipline 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

- *Fanfare 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)

- *Tundra EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (3 days) (RUP)

*Endigo ZC*, 4.5 fl oz. (1 day) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

*Fulfill*, 2.75 oz. (7 days) May require 5 to 7 days for aphid mortality.

*Gladiator*, 19 fl oz. (7 days) (RUP)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 3.84 fl oz. (1 day) (RUP)

- *Warrior II* with Zeon Technology (1.92 fl oz.) or *Warrior* with Zeon Technology (3.84 fl oz.) (1 day) (RUP)

#### Malathion

- *Malathion 5* (1.5 pt.) or *Malathion 5 EC* (1.5 to 2 pt.) or *Malathion 57 EC* (1.5 pt.) or *Malathion 8* (1.75 pt.) or *Malathion 8 Aquamul* (1 to 1.75 pt.) (1 day)

#### Methomyl

- *Lannate LV* (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate SP* (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

- *Nudrin LV* (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin SP* (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

#### Permethrin

- *Perm-UP 25DF* (12.8 oz.) or *Perm-UP 3.2 EC* (8 oz.) (0 days) (RUP)

- *Pounce 25 WP*, 12.8 oz. (0 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 21 - 28 fl oz/A.

*Voliam Flexi*, 4 to 7 oz. (1 day)

*Vydate L*, 2 to 4 pt. (1 day) (RUP)

THRIPS: Apply when damage is seen. Repeat as needed.

*Athena*, 13.5 to 17 fl oz. (7 days) (RUP)

#### Dinotefuran

- *Scorpion 35SL*, 2 to 7 fl oz. (1 day)

- *Venom*, 1 to 4 oz. (1 day)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

*Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)

#### Malathion

- *Malathion 8* (1.75 pt.) or *Malathion 8 Aquamul* (1 to 1.75 pt.) (1 day)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant SC*, 6 to 10 fl oz. (1 day)

*Rimon 0.83EC*, 12 fl oz. (1 day)

#### Spinosad

- *Entrust* (2 to 2.5 oz.) or *Entrust SC* (6 to 8 fl oz.) (1 day)

*Vydate L*, 2 to 4 pt. (1 day) (RUP)

#### SQUASH BUG:

#### Acetamiprid

- *Assail 30 SG* (5.3 oz.) or *Assail 70WP* (2.3 oz.) (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

#### Bifenthrin

- *Bifenture 10 DF*, 8 to 16 oz/A. (3 days)

- *Bifenture EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

- *Brigade @ 2EC* (2.6 to 6.4 fl oz.) or *Brigade WSB* (8 to 16 oz.) (3 days) (RUP)

- *Capture 2 EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

- *Discipline 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

- *Fanfare 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)

- *Tundra EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (3 days) (RUP)

- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

#### Carbaryl

- *Carbaryl 4L*, 1 qt. (3 days)

- *Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

#### Dinotefuran

- *Scorpion 35SL*, 2 to 7 fl oz. (1 day)

- *Venom*, 3 to 4 oz. (1 day)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

#### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)

- *Asana XL*, 5.8 to 9.6 fl oz. (3 days) (RUP)

- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)

- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Mustang Max*, 2.8 to 4 oz. (1 day) (RUP)

#### Permethrin

- *Ambush 25 W*, 12.8 oz. (0 days) (RUP)

- *Perm-UP 25DF* (12.8 oz.) or *Perm-UP 3.2 EC* (8 oz.) (0 days) (RUP)

## Cucumber

- *Pounce* 25 WP, 12.8 oz. (0 days) (RUP)
- Pyrenone*, 1 to 12 fl oz. (0 days)
- Rimon* 0.83EC, 12 fl oz. (1 day)
- Carbaryl* 4L, 1 qt. (3 days)
- Sevin* 4 F (1 qt.) or *Sevin* 80 S (1.25 lb.) or *Sevin* XLR Plus (1 qt.) (3 days)

### SEED CORN MAGGOT:

*Empower*, 3.5 to 8.7 lb. (3 days) (RUP)

### LEAFHOPPERS:

#### Acetamiprid

- *Assail* 30 SG (2.5 to 4 oz.) or *Assail* 70WP (1.1 to 1.7 oz.) (0 days)

*Baythroid* XL, 0.8 to 1.6 fl oz. (0 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

#### Bifenthrin

- *Bifenture* 10 DF, 8 to 16 oz/A. (3 days)
- *Bifenture* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.6 to 6.4 fl oz.) or *Brigade* WSB (8 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)

#### Carbaryl

- *Carbaryl* 4L, 1 qt. (3 days)
- *Sevin* 4 F (1 qt.) or *Sevin* 80 S (1.25 lb.) or *Sevin* XLR Plus (1 qt.) (3 days)

*Endigo* ZC, 4 to 4.5 fl oz. (1 day) (RUP)

#### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

*Malathion* 8, 1.75 pt. (1 day)

*Mustang* Max, 2.8 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 1 qt. (3 days)

*Sevin* 4 F (1 qt.) or *Sevin* 80 S (1.25 lb.) or *Sevin* XLR Plus (1 qt.) (3 days)

*Sivanto*, 21 - 28 fl oz/A.

*Vetica*, 14 to 17 fl oz. (7 days)

### ARMYWORM:

*Avaunt*, 3.5 to 6 oz. (3 days)

#### Bacillus thuringiensis

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *Biobit* HP, 0.5 to 2 lb. (0 days)
- *DiPel* DF, 1 to 2 lb. (0 days)

*Baythroid* XL, 1.6 to 2.4 fl oz. (0 days) (RUP)

*Coragen*, 3.5 to 5 fl oz. (1 day)

*Danitol* 2.4 EC, 10.66 to 16 fl oz. (7 days) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

*Gladiator*, 19 fl oz. (7 days) (RUP)

*Intrepid* 2F, 4 to 10 fl oz. (3 days)

*Radiant* SC, 5 to 10 fl oz. (1 day)

*Rimon* 0.83EC, 9 to 12 fl oz. (1 day)

#### Spinosad

- *Entrust* (1.25 to 2.5 oz.) or *Entrust* SC (4 to 8 fl oz.) (1 day)

### CUTWORM:

*Baythroid* XL, 0.8 to 1.6 fl oz. (0 days) (RUP)

*Empower*, 3.5 to 8.7 lb. (3 days) (RUP)

#### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Gladiator*, 6 to 19 fl oz. (7 days) (RUP)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Malathion* 8, 1.75 pt. (1 day)

*Mustang* Max, 1.28 to 4 oz. (1 day) (RUP)

#### Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (0 days) (RUP)
- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (0 days) (RUP)
- *Pounce* 25 WP, 6.4 to 12.8 oz. (0 days) (RUP)

### CABBAGE LOOPERS:

*Exirel*, 10-17 oz/A. (1)

### WHITEFLIES:

*Sivanto*, 21 - 28 fl oz/A.

## MITES

Apply when needed. Usually a problem only in hot, dry weather.

#### Abamectin

- *Agri-Mek* 0.15 EC (8 to 16 fl oz.) or *Agri-Mek* SC (1.75 to 3.5 fl oz.) (7 days) Use with a non-ionic surfactant. (RUP)

#### Bifenazate

- *Acramite* 50WS, 0.75 to 1 lb. (3 days)

#### Bifenthrin

- *Bifenture* EC, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Bifenture* 10 DF, 12.8 to 16 oz/A. (3 days)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (3 days) (RUP)

#### Bifenthrin + Avermectin

- *Athena*, 13.5 to 17 fl oz. (7 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero* EW (11.2 oz.) (3 days) (RUP)

#### Etoazazole

- *Zeal*, 2 to 3 oz. (7 days)

#### Fenpropathrin

- *Danitol* 2.4 EC, 10 2/3 fl oz. (7 days) (RUP)

#### Malathion

- *Malathion* 5 (1.5 pt.) or *Malathion* 5 EC (1.5 to 2 pt.) or *Malathion* 8 (1.75 pt.) or *Malathion* 8 Aquamul (1 to 1.75 pt.) (1 day)

#### Spiromesifen

- *Oberon* 2 SC, 7 to 8.5 fl oz. (7 days)

#### Zeta-Cypermethrin + Avermectin

- *Gladiator*, 19 fl oz. (7 days) (RUP)

## DISEASES

### SEED TREATMENT:

DAMPING OFF (*Pythium* spp., *Rhizoctonia solani*): Use only as directed; over-treatment may cause injury.

#### Captan

- *Captan* 4 Flowable, 3.2 fl oz/100 lb seed.

Fludioxinil

- *Maxim* 4 FS, 0.08 to 0.16 fl oz/100 lb seed (*Rhizoctonia*). Commercial seed treatment plants only.

Mefenoxam

- *Apron* XL, 0.085 - 0.64 fl oz/100 lb seed (*Pythium*). (0 days)

Metalaxyl

- *Allegiance-FL*, 0.75 fl oz/100 lb seed.
- *Allegiance-LS*, 1.2 fl oz/100 lb seed (*Pythium*).

Thiram

- 42-S Thiram, *Thiram* 50 WP Dyed, 4 1/2 oz/100 lb seed.
- *Thiram* 480DP, 4.5 oz/100 lb seed.

**SEEDBED PREPARATION:**

ROOT ROTS (*Fusarium solani*, *Fusarium cucurbitae*, *Pythium* spp., *Rhizoctonia solani*): Grow transplants in disease free soil (sterilized) and fumigate fields before planting. To sterilize soil, use steam or fumigate with Chemicals suggested for seedbed sterilization in Appendix A. Follow manufacturer's recommendations for use with particular crops. Avoid planting until the soil is free of fumigant.

**PREPLANT SOIL FUMIGATION:**

DAMPING OFF, ROOT ROTS (*Phytophthora* spp., *Pythium* spp., *Rhizoctonia solani*): This method protects plants grown from seed or transplanted in the field. See Bulletin E-2099.

Soil sterilization by fumigation is best achieved by proper application of material. Correct soil moisture, temperature, and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or immediate tarping.

1,3 Dichloropropene/chloropicrin

- *Telone* C35, 13-35 gal. (RUP)

Metam Potassium

- *Sectagon-K54*, 30-60 gal. (RUP)

Metam Sodium

- *Sectagon* 42, 37.5-75 gal. (RUP)

**PREPLANT TREATMENT:**

PYTHIUM DAMPING OFF and COTTONY LEAK (*Pythium* spp):

Mefenoxam. Apply as a broadcast preplant incorporation or a surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone after planting with 1/2 to 1 in. of sprinkler irrigation.

- *Ridomil* Gold SL, 1-2 pt.
- *Ultra* Flourish, 2 to 4 pt.

**DRIP APPLICATION:**

PHYTOPHTHORA BLIGHT (*Phytophthora capsici*), DOWNY MILDEW (*Pseudoperonospora cubensis*):

\* Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days)

Ametoctradin + Dimethomorph

- *Zapro*, 14 fl oz (*Phytophthora*). (0 days)

**FOLIAR TREATMENT:**

POWDERY MILDEW (*Sphaerotheca fuliginea* or *Erysiphe cichoracearum*):

\* Azoxystrobin + Difenoconazole

- *Quadris* Top, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

\* Cyflufenamid

- *Torino*, 3.4 oz. (0 day)

\* Kresoxim-methyl

- *Sovran*, 3.2 to 4.8 oz. (0 days)

\* Myclobutanil

- *Rally* 40 WSP, 2.5 to 5 oz. (0 days) Do not apply more than 1.5 lb per acre per crop.

\* Penthiopyrad

- *Fontelis*, 12 - 16 fl oz. (1 day)

\* Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days) Do not apply more than one application before alternating with another chemical.

\* Pyraclostrobin/Boscalid

- *Pristine*, 12.5 to 18.5 oz. (0 days)

\* Thiophanate-Methyl

- *Cercobin* 4.1F, 10.9 fl oz. (1 day)
- *Topsin* 4.5 FL, 10 fl oz. (1 day)
- *Topsin* M 70 WSB, 0.5 lb. (1 day)

\* Trifloxystrobin

- *Flint*, 1 1/2 to 2 oz. (0 days) Maximum 2 consecutive applications, 4 applications/year and 16 oz/season. 12 hr REI.

Azoxystrobin

- *Quadris*, 11.0 to 15.4 fl oz. (1 day)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 3.2 pt every 7 - 14 days. (1 day)

Bacillus amyloliquefaciens

- *Serifel*, 4 - 16 fl oz. (0 day)

Bacillus subtilis

- *Serenade* ASO, 2 - 6 qts. (0 days)
- *Serenade* Max, 1 - 3 lb every 7 to 10 days. (0 days)

Biological control product that needs to be applied before disease development. Control will be limited under heavy disease pressure.

Boscalid

- *Endura*, 6.5 oz. (0 days)

Chlorothalonil

- *Bravo* Ultrex, *Equus* DF, 1.8 to 2.7 lb. (0 days) *Sphaerotheca* only.

- *Bravo* Weather Stik, *Echo* 720, *Equus* 720 SST, 2 to 3 pt. (0 days) *Sphaerotheca* only.

- *Echo* 90 DF, 1.6 to 2.4 lb every 7 days. (0 days)

Copper Ammonium Carbonate

- *Copper* Count N, 1 1/2 to 2 qt. (0 days)

Copper Hydroxide

- *Champ* DP Dry Prill, 1 1/3 lb, 5- to 7-day intervals. (0 days)

- *Champ* Formula 2 F, 1 1/3 pt. (0 days)

- *Champ* WG, 1 1/2 to 2 lb. (0 days)

- *Champion* ION, 0.5 to 1.25 lb. (0 days)

- *Champion* WP, 1.5 to 3 lb. (0 days)

- *Kocide* 2000, 1 1/2 lb. (0 days)

- *Kocide* 3000, 0.5-1.25 lb. (0 day)

- *Nu-Cop* 3 L, 1 1/3 to 2 2/3 pt. (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 2.5 pt. (0 days)

- *Badge* X2, 0.5 to 1.25 lb. (0 days)

Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 1 to 2 lb. (0 days)

Difenoconazole + Cyprodinil

- *Inspire* Super, 16 to 20 fl oz. (7 days) Suppression.

Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 4 - 5.5 fl oz. (0 days)

Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days)

## Cucumber

### Metrafenone

- *Vivando*, 15.4 fl oz. (0 day)

### Neem Oil

- *Trilogy*, 2 pt. (0 days)

### Potassium Bicarbonate

- *Armicarb 100*, 2.5 to 5 lb. (0 days)

### Sulfur

- *Kumulus DF*, 2 to 6 lb. (0 days)
- *Micro Sulf*, 2 to 4 lb. (0 days)
- *Microthiol Disperss*, 2 to 4 lb. (0 days)
- *Thiolux*, 2 to 6 lb. (0 days)

### Tebuconazole

- *Orius 3.6F*, *Tebuzol 3.6*, 4-6 fl oz. (7 days) 12 hr REI.

### Triflumizole

- *Procur* 480 SC, 4 to 8 fl oz every 7-14 days. (0 days)

SCAB (*Cladosporium cucumerinum*): Treat every 7 days after plants are 2 to 3 inches tall.

### \* Chlorothalonil

- *Bravo Ultrex*, *Equus DF*, 1.8 to 2.7 lb. (0 days)
- *Bravo Weather Stik*, *Echo 720*, *Equus 720 SST*, 2 to 3 pt. (0 days)
- *Echo 90 DF*, 1.6 to 2.4 lb every 7 days. (0 days)

### \* Mancozeb

- *Dithane DF Rainshield*, *Dithane M-45*, 2 to 3 lb. (5 days)
- *Dithane F-45 Rainshield*, 1 3/5 to 2 2/5 qt. (5 days)
- *Manzate Max*, 1.6 to 2.4 qt. (5 days)
- *Manzate Pro-Stick*, 2 to 3 lb, 7- to 10-day intervals. (5 days) Maximum 24 In/year.
- *Penncozeb 75 DF*, *Penncozeb 80WP*, 1 1/2 to 3 lb. (5 days)

### Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days)

### Neem Oil

- *Trilogy*, 2 pt. (0 days)

### Potassium phosphite/chlorothalonil

- *Catamaran*, 6 pt. (1 day)

ALTERNARIA LEAF BLIGHT (*Alternaria cucumerin*): Treat plants after vine tip when conditions favor disease and continue at 7 to 10 day intervals.

### \* Azoxystrobin

- *Quadris*, 11.0 to 15.4 fl oz. (1 day)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

### \* Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 3.2 pt every 7 - 14 days. (1 day)

### \* Azoxystrobin + Difenconazole

- *Quadris Top*, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

### \* Chlorothalonil

- *Bravo Ultrex*, *Equus DF*, 1.8 to 2.7 lb every 7 days. (0 days)
- *Bravo Weather Stik*, *Echo 720*, *Equus 720 SST*, 2 to 3 pt. (0 days)
- *Echo 90 DF*, 1.6 to 2.4 lb. (0 days)

### \* Difenoconazole + Cyprodinil

- *Inspire Super*, 16 to 20 fl oz. (7 days)

### \* Fluxapyroxad + Pyraclostrobin

- *Merivon Xemium Brand Fungicide*, 4 - 5.5 fl oz. (0 days)

### \* Mancozeb

- *Koverall*, 2 - 3 lb. (5 days)
- *Manzate Max*, 1.6 to 2.4 qt. (5 days)
- *Penncozeb 75 DF*, *Penncozeb 80WP*, 1 1/2 to 3 lb. (5 days)

### \* Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days) Do not apply more than one application before alternating with another chemical.

### \* Pyraclostrobin/Boscalid

- *Pristine*, 12.5 to 18.5 oz. (0 days)

### Bacillus amyloliquefaciens

- *Serifel*, 4 - 16 fl oz. (0 day)

### Boscalid

- *Endura*, 6.5 oz. (0 days)

### Copper Ammonium Carbonate

- *Copper Count N*, 1 1/2 to 2 qt. (0 days)

### Copper Hydroxide

- *Champ DP Dry Prill*, 1 1/3 lb. (0 days)
- *Champ Formula 2 F*, 1 1/3 pt. (0 days)
- *Champ WG*, 1 1/2 to 2 lb. (0 days)
- *ChampION*, 0.5 to 1.25 lb. (0 days)
- *Champion WP*, 1.5 to 3 lb. (0 days)
- *Kocide 2000*, 1 1/2 lb. (0 days)
- *Kocide 3000*, 0.5-1.25 lb. (0 day)
- *Nu-Cop 3 L*, 1 1/3 to 2 2/3 pt. (0 days)

### Copper Hydroxide + Copper Oxychloride

- *Badge SC* (1 to 2.5 pt) or *Badge X2* (0.5 to 2.5 lb) (0 days)

### Copper Sulfate

- *Cuprofix Ultra 40 Disperss*, 1 to 2 lb. (0 days)

### Famoxadone + Cymoxanil

- *Tanos*, 8 oz. (3 days)

### Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days)

### Mancozeb + Zoxamide

- *Gavel 75 DF*, 1.5 - 2.0 lb. (5 days)

### Neem Oil

- *Trilogy*, 2 pt. (0 days)

### Penthiopyrad

- *Fontelis*, 12 - 16 fl oz. (1 day)

### Potassium Bicarbonate

- *Armicarb 100*, 2.5 to 5 lb. (0 days)

### Potassium phosphite/chlorothalonil

- *Catamaran*, 6 pt. (1 day)

### Zoxamide + chlorothalonil

- *Zing!*, 36 fl oz. (0 days)

ANTHRACNOSE (*Colletotrichum lagenarium*): Treat after flowering when conditions are favorable for disease development.

### \* Azoxystrobin

- *Quadris*, 11.0 to 15.4 fl oz. (1 day)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

### \* Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 3.2 pt every 7 - 14 days. (1 day)

### \* Azoxystrobin + Difenconazole

- *Quadris Top*, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

### \* Chlorothalonil

- *Bravo Ultrex*, *Equus DF*, 1.4 to 1.8 lb. (0 days)
- *Bravo Weather Stik*, *Echo 720*, *Equus 720 SST*, 1.5 to 2 pt. (0 days)

### \* Fluxapyroxad + Pyraclostrobin

- *Merivon Xemium Brand Fungicide*, 5.5 fl oz. (0 days)

### \* Mancozeb

- *Dithane DF Rainshield*, *Dithane M-45*, 2 to 3 lb, 7- to 10-day intervals. (5 days)

- *Dithane F-45 Rainshield*, 1 3/5 to 2 2/5 qt, 7- to 10-day intervals. (5 days)
- *Koverall*, 2 - 3 lb. (5 days)
- *Manzate Max*, 1.6 to 2.4 qt. (5 days)
- *Manzate Pro-Stick*, 2 to 3 lb, 7- to 10-day intervals. (5 days)
- *Penncozeb 75 DF* (1 1/2 to 3 lb, 7- to 10-day intervals) or *Penncozeb 80WP* (1 1/2 to 3 lb) (5 days)

\* Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days) Do not apply more than one application before alternating with another chemical.

\* Pyraclostrobin/Boscalid

- *Pristine*, 18.5 oz. (0 days)

\* Thiophanate-Methyl

- *Cercobin 4.1F*, 10.9 fl oz. (1 day)
- *Topsin 4.5 FL*, 10 fl oz. (1 day)
- *Topsin M 70 WSB*, 0.5 lb. (1 day)

*Bacillus amyloliquefaciens*

- *Serifel*, 4 - 16 fl oz. (0 day)

Copper Ammonium Carbonate

- *Copper Count N*, 1 1/2 to 2 qt. (0 days)

Copper Hydroxide

- *Champ DP Dry Prill*, 1 1/3 lb. (0 days)
- *Champ Formula 2 F*, 1 1/3 pt. (0 days)
- *Champ WG*, 1 1/2 to 2 lb. (0 days)
- *ChampION*, 0.5 to 1.25 lb. (0 days)
- *Champion WP*, 1.5 to 3 lb. (0 days)
- *Kocide 2000*, 1 1/2 lb. (0 days)
- *Kocide 3000*, 0.5-1.25 lb. (0 day)
- *Nu-Cop 3 L*, 1 1/3 to 2 2/3 pt. (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge SC*, 1 to 1.8 pt. (0 days)

Copper Oxychloride + Copper Sulfate

- *C-O-C-S WDG*, 2 to 4 lb every 7 days. (0 days)

Copper Sulfate

- *Basic Copper 53*, *Basicop*, 2 lb. (0 days)
- *Cuprofix Ultra 40 Disperss*, 1 to 2 lb. (0 days)

Difenoconazole + Cyprodinil

- *Inspire Super*, 16 to 20 fl oz. (7 days)

Famoxadone + Cymoxanil

- *Tanos*, 8 oz. (3 days)

Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 4 pt. (1 day)

Zoxamide + chlorothalonil

- *Zing!*, 36 fl oz. (0 days)

ANGULAR LEAF SPOT (*Pseudomonas lachrymans*): Spray every 7 days, starting before the first fruit form. The disease is likely to be more serious in high-population plantings (40,000 plants/A or more). Under these conditions spray every 3 or 4 days to protect fruit at all stages of development.

Copper Ammonium Carbonate

- *Copper Count N*, 1 1/2 to 2 qt. (0 days)

Copper Hydroxide

- *Champ DP Dry Prill*, 1 1/3 lb. (0 days)
- *Champ Formula 2 F*, 1 1/3 pt. (0 days)
- *Champ WG*, 1 1/2 to 2 lb. (0 days)
- *ChampION*, 0.5 to 1.25 lb. (0 days)

- *Champion WP* (1 1/2 to 3 lb) or *Nu-Cop 50 DF* (1 1/2 to 2 lb) (0 days)

- *Kocide 2000*, 1 1/2 lb. (0 days)

- *Kocide 3000*, 0.5-1.25 lb. (0 day)

- *Nu-Cop 3 L*, 1 1/3 to 2 2/3 pt. (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge SC* (1 to 2.5 pt) or *Badge X2* (0.5 to 1.25 lb) (0 days)

Copper Sulfate

- *Basic Copper 53*, *Basicop*, 2 lb. (0 days)

- *Cuprofix Ultra 40 Disperss*, 1 to 2 lb. (0 days)

Mancozeb + Copper Hydroxide

- *ManKocide*, 2 to 2.5 lb. (5 days)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

BELLY ROT (*Rhizoctonia solani*):

\* Thiophanate-Methyl

- *Cercobin 4.1F*, 10.9 fl oz. (1 day)

- *Topsin 4.5 FL*, 10 fl oz. (1 day)

- *Topsin M 70 WSB*, 0.5 lb. (1 day)

Azoxystrobin

- *Quadris*, 11.0 to 15.4 fl oz. (1 day)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 3.2 pt see label for interval. (1 day)

DOWNY MILDEW (*Pseudoperonospora cubensis*): Treat plants at first sign of disease and repeat at 14-day intervals.

\* Ametoctradin + Dimethomorph

- *Zampro*, 14 fl. oz. (0 days)

\* Cyazofamid

- *Ranman 400SC*, 2.1 to 2.75 fl oz every 7 to 10 days. (0 days)

\* Propamocarb

- *Previcur Flex*, 1.2 pt every 7 - 14 days. (2 days)

Azoxystrobin

- *Quadris*, 11.0 to 15.4 fl oz. (1 day)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 3.2 pt every 7 - 14 days. (1 day)

*Bacillus amyloliquefaciens*

- *Serifel*, 4 - 16 fl oz. (0 day)

Chlorothalonil

- *Bravo Ultrex*, *Equus DF*, 1.4 to 1.8 lb. (0 days)

- *Bravo Weather Stik*, *Echo 720*, *Equus 720 SST*, 1.5 to 2 pt. (0 days)

Copper Ammonium Carbonate

- *Copper Count N*, 1 1/2 to 2 qt. (0 days)

Copper Hydroxide

- *Champ DP Dry Prill*, 1 1/3 lb. (0 days)
- *Champ Formula 2 Flowable*, 1 1/3 pt. (0 days)
- *Champ WG*, 1 1/2 to 2 lb. (0 days)
- *ChampION*, 0.5 to 1.25 lb. (0 days)
- *Kocide 3000*, 0.5-1.25 lb. (0 day)
- *Nu-Cop 3 L*, 1 1/3 to 2 2/3 pt. (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge SC* (1 to 2.5 pt) or *Badge X2* (0.5 to 1.25 lb) (0 days)

Copper Sulfate

- *Cuprofix Ultra 40 Disperss*, 1 to 2 lb. (0 days)

## Cucumber

### Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 1 to 2 lb. (0 days)

### Cymoxanil

- *Curzate* 60 DF, 3.2 to 5 oz. (3 days)

### Dimethomorph

- *Forum*, 6 fl oz. (0 days)

### Famoxadone + Cymoxanil

- *Tanos*, 8 oz. (3 days)

### Fenamidon

- *Reason* 500 SC, 5.5 fl oz every 5 to 10 days. (14 days)

### Fuopicolide

- *Presidio*, 3-4 fl oz. (2 days)

### Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 5.5 fl oz. (0 days) Suppression only

### Fosetyl-Aluminum

- *Aliette* WDG, 2 to 5 lb, 7 to 14 day intervals. (0 days) Do not tank mix with copper fungicides.

### Mancozeb

- *Dithane* DF Rainshield, *Dithane* M-45, 2 to 3 lb, 7- to 10-day intervals. (5 days)
- *Dithane* F-45 Rainshield, 1 3/5 to 2 2/5 qt, 7- to 10-day intervals. (5 days)
- *Koverall*, 2 - 3 lb. (5 days)
- *Manzate* Max, 1.6 to 2.4 qt. (5 days)
- *Manzate* Pro-Stick, 2 to 3 lb, 7- to 10-day intervals. (5 days) Maximum 24 lb/season.
- *Penncozeb* 75 DF, *Penncozeb* 80WP, 1 1/2 to 3 lb. (5 days)

### Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days)

### Mancozeb + Zoxamide

- *Gavel* 75 DF, 2.0 lb. (5 days)

### Mandipropamid

- *Revus*, 8 fl oz. (0 day)

### Mefenoxam + Chlorothalonil

- *Ridomil* Gold Bravo, 2 lb. (7 days) Maximum 4 applications. Do not apply to mature or senescent plants.

### Mefenoxam + Copper Hydroxide

- *Ridomil* Gold Copper, 2 lb. (5 days) Maximum 4 applications.

### Mefenoxam + Mancozeb

- *Ridomil* Gold MZ, 2 1/2 lb. (5 days) Maximum 4 applications.

### Mono- dibasic sodium salts of phosphorous acid

- *Fosphite*, 1 to 3 qt per 100 gal (ground) or 10 gal (aerial) of water. (0 days)

### Mono- dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 2.5 to 5 pt every 7 - 14 days. (0 days)
- *Prophyt*, 2 to 4 pt. (0 days)

### Neem Oil

- *Trilogy*, 2 pt. (0 days)

### Potassium Bicarbonate

- *Armcarb* 100, 2.5 to 5 lb. (0 days)

### Potassium phosphite/chlorothalonil

- *Catamaran*, 4 pt. (1 day)

### Pyraclostrobin

- *Cabrio*, 8-12 oz. (0 days) Do not apply more than one application before alternating with another chemical.

### Pyraclostrobin/Boscalid

- *Pristine*, 12.5 to 18.5 oz. (0 days)

### Trifloxystrobin

- *Flint*, 4 oz. (0 days) Maximum 2 consecutive applications, 4 applications/year and 16 oz/season. Alternate with Ridomil Gold Bravo. 12 hr REI.

### Zoxamide + chlorothalonil

- *Zing!*, 36 fl oz. (0 days)

**Note:** Most fungicides that protect against *Alternaria* and gummy stem blight may also provide limited downy mildew protection.

GUMMY STEM BLIGHT or BLACK ROT (*Didymella bryoniae* also called *Mycosphaerella melonis*): Begin treatment at the 2-leaf stage.

### \* Azoxystrobin

- *Quadris*, 11.0 to 15.4 fl oz. (1 day)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

### \* Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 3.2 pt every 7 - 14 days. (1 day)

### \* Azoxystrobin + Difenconazole

- *Quadris* Top, 12 to 14 fl oz. (1 day)

### \* Chlorothalonil

- *Bravo* Ultrex, *Equus* DF, 1.8 to 2.7 lb. (0 days)
- *Bravo* Weather Stik, or *Echo* 720 (2 to 3 pt, 7-day intervals) or *Equus* 720 SST (2 to 3 pt every 7 days) (0 days)
- *Echo* 90 DF, 1.6 to 2.4 lb every 7 days. (0 days)

### \* Mancozeb

- *Dithane* DF Rainshield, *Dithane* M-45, 2 to 3 lb, 7- to 10-day intervals. (5 days)
- *Dithane* F-45 Rainshield, 1 3/5 to 2 2/5 qt, 7- to 10-day intervals. (5 days)
- *Koverall*, 2 - 3 lb. (5 days)
- *Manzate* Max, 1.6 to 2.4 qt. (5 days)
- *Manzate* Pro-Stick, 2 to 3 lb, 7- to 10-day intervals. (5 days) Maximum 24 lb/season.
- *Penncozeb* 75 DF, *Penncozeb* 80WP, 1 1/2 to 3 lb. (5 days)

### \* Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days) Do not apply more than one application before alternating with another chemical.

### \* Pyraclostrobin/Boscalid

- *Pristine*, 12.5 to 18.5 oz. (0 days)

### \* Thiophanate-Methyl

- *Cercobin* 4.1F, 10.9 fl oz. (1 day)
- *Topsin* 4.5 FL, 10 fl oz. (1 day)
- *Topsin* M 70 WSB, 0.5 lb. (1 day)

### Bacillus amyloliquefaciens

- *Serifel*, 4 - 16 fl oz. (0 day)

### Bacillus subtilis

- *Serenade* ASO, 2 - 6 qts. (0 days)

### Boscalid

- *Endura*, 6.5 oz. (0 days)

### Copper Ammonium Carbonate

- *Copper* Count N, 1 1/2 to 2 qt. (0 days)

### Copper Hydroxide

- *Champ* DP Dry Prill, 1 1/3 lb. (0 days)
- *Champ* Formula 2 F, 1 1/3 pt. (0 days)
- *Champ* WG, 1 1/2 to 2 lb. (0 days)
- *Champ* ION, 0.5 to 1.25 lb. (0 days)
- *Champion* WP, 1.5 to 3 lb. (0 days)
- *Kocide* 2000, 1 1/2 lb. (0 days)
- *Kocide* 3000, 0.5-1.25 lb. (0 day)
- *Nu-Cop* 3 L, 1 1/3 to 2 2/3 pt. (0 days)

### Copper Hydroxide + Copper Oxychloride

- *Badge* SC (1 to 2.5 pt) or *Badge* X2 (0.5 to 1.25 lb) (0 days)

### Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 1 to 2 lb. (0 days)

Difenoconazole + Cyprodinil

- *Inspire Super*, 16 to 20 fl oz. (7 days)

Kresoxim-methyl

- *Sovran*, 4.8 oz. (0 days)

Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days)

Penthiopyrad

- *Fontelis*, 12 - 16 fl oz. (1 day)

Potassium phosphite/chlorothalonil

- *Catamaran*, 6 pt. (1 day)

Tebuconazole

- *Orius* 3.6F, *Tebuzol* 3.6, 8 fl oz. (7 days) Approved for gummy stem blight. Suppression only.

FRUIT ROT (*Phytophthora* spp., *Pythium* spp.): Initiate treatment at flowering. If possible, tank-mix products with a labeled copper product.

\* Dimethomorph

- *Forum*, 6 fl oz. (0 days)

\* Mancozeb + Zoxamide

- *Gavel* 75 DF, 1.5 - 2.0 lb. (5 days)

\* Mandipropamid

- *Revus*, 8 fl oz. (0 day)

Ametoctradin + Dimethomorph

- *Zapro*, 14 fl. oz. (0 days)

Cyazofamid

- *Ranman* 400SC, 2.75 fl oz every 7 to 10 days. (0 days)

Famoxadone + Cymoxanil

- *Tanos*, 8 - 10 oz every 5 - 7 days. (3 days)

Fosetyl-Aluminum

- *Aliette* WDG, 2 to 5 lb, 7- to 14-day intervals (*Phytophthora*). (0 days) Do not tank mix with copper fungicides.

Mancozeb

- *Manzate* Max, 1.2 to 2.4 qt. (5 days)
- *Penncozeb* 75 DF (1 1/2 to 3 lb, 7- to 10-intervals (*Pythium*)) or *Penncozeb* 80WP (1 1/2 to 3 lb, 7- to 10-day intervals (*Pythium*)) (5 days)

Mono-, dibasic sodium salts of phosphorous acid

- *Fosphite*, 1 to 3 qt per 100 gal (ground) or 10 gal (aerial) of water. (0 days)

Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 2.5 to 5 pt every 7 - 14 days. (0 days)
- *Prophyt*, 6 pt. (0 days)

**Note:** Fungicides applied to control downy mildew may have limited efficacy against *Phytophthora* crown and fruit rot.

PHYTOPHTHORA CROWN and FRUIT ROT (*Phytophthora* spp.):

\* Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days)

## Eggplant

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

#### PREPLANT NEMATOCIDE TREATMENT:

Fluensulfone

- *Nimitz* 480EC, 3.5 - 5.0 pints/A. apply broadcast and incorporate either mechanically or with water to a depth of 6-8 inches at least 7 days prior to transplanting or planting. Do not apply if heavy rainfall is expected within 48 hours of application. This material can be applied in bands or by drip but apparently is most effective

if applied broadcast and incorporated. Do not apply to extremely cold soils (<40 F) as nematodes have to be active for the product to be effective. Product has not been evaluated in Michigan.

#### SOIL TREATMENT AT PLANTING:

OxamyI

- *Vydate* L, . Apply 1 gal/A as a band treatment prior to transplanting and incorporate. Apply 4 pts/A as a foliar spray 2-3 weeks after transplanting and again 4 weeks after the first foliar treatment. Do not apply more than 3 gal (24 pts) of *Vydate* L/A/year. (RUP)

### INSECTS

#### SOIL TREATMENT:

COLORADO POTATO BEETLE, APHIDS, FLEA BEETLE: Apply where high potato beetle, aphid, or flea beetle numbers are expected. Apply in a band prior to transplanting or in a drench at transplanting.

\* Imidacloprid. Additional generic brands available.

- *Admire* Pro, 7 to 10.5 fl oz. (21 days) Consult label for rotation restrictions and application methods.
- *Nuprid* 2 F, 16 to 24 fl oz.

\* Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum* 75 SG (1.66 to 3.67 oz.) (30 days) See label for application methods.
- *Belay* 50 WDG, 4.8 to 6.4 oz. See label for application methods.
- *Durivo*, 10 to 13 fl oz. (30 days)

COLORADO POTATO BEETLE, FLEA BEETLE:

Dinotefuran

- *Scorpion* 35SL, 9 to 10.5 fl oz. (21 days)
- *Venom*, 5 to 6 oz. (21 days)

## CUTWORM:

*Capture* LFR, 3.4 to 6.8 fl oz. See label for application methods. (RUP)

## ARMYWORM:

*Verimark*, 5-10 oz/A. (1)

FLEA BEETLE, LEAFMINERS, LOOPERS, APHIDS, WHITEFLY, THRIPS:

*Verimark*, 6.75-13.5 oz/A. (1)

TOMATO FRUITWORM, TOMATO PINWORM:

*Verimark*, 5-10 oz/A. (1)

LEAFHOPPERS, APHIDS, PSYLID, WHITEFLIES:

*Sivanto*, 21 - 28 fl oz/A.

#### FOLIAR TREATMENT:

CUTWORM: Apply when damage is first seen, usually soon after transplanting.

\* *Baythroid* XL, 2.1 to 2.8 fl oz. (7 days) (RUP)

\* *Perm-UP* 3.2 EC, 4 to 8 oz. (3 days) (RUP)

\* *Warrior* with Zeon Technology, 2.6 to 3.8 fl oz. (5 days) (RUP)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

Bacillus thuringiensis

- *Biobit* HP, 0.5 to 1 lb. (0 days)
- *DiPel* DF (0.5 to 1 lb.) or *DiPel* ES (1 to 2 pt.) (0 days)
- *Javelin* WG, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Belt* SC, 1.5 fl oz. (1 day)

Bifenthrin

- *Bifenture* 10 DF, 5.3. (7 days)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @* 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 12.8 oz.) (7 days) (RUP)
- *Empower*, 3.5 to 8.7 lb. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

## Eggplant

### Bifenthrin + Imidacloprid

- *Brigadier*, 5.1 to 9.85 fl oz. (7 days) (RUP)
- *Swagger*, 10.2 to 19.7 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

### Carbaryl

- *Carbaryl* 4L, 2 qt. (3 days)
- *Sevin* 4 F (2 qt.) or *Sevin* 80 S (2.5 lb.) or *Sevin* 80 WSP (2.5 lb.) or *Sevin* XLR Plus (2 qt.) (3 days)

*Confirm* 2F, 6 to 8 fl oz. (early-season); 8 to 16 fl oz. (mid- to late-season). (7 days)

*Endigo ZC*, 4 to 4.5 fl oz. (5 days) (RUP)

*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)

*Intrepid* 2F, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

### Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (5 days) (RUP)
- *Warrior* II with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (5 days) (RUP)

*Leverage* 360, 3.8 to 4.1 fl oz. (7 days) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (5 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 2 qt. (3 days)

*Sevin* 4 F (2 qt.) or *Sevin* 80 S (2.5 lb.) or *Sevin* 80 WSP (2.5 lb.) or *Sevin* XLR Plus (2 qt.) (3 days)

*Vetica*, 12 to 17 fl oz. (1 day)

### COLORADO POTATO BEETLE:

#### Abamectin

- *Agri-Mek* 0.15 EC (8 to 16 fl oz.) or *Agri-Mek* SC (1.75 to 3.5 fl oz.) (7 days) Use with a non-ionic surfactant. (RUP)

#### Acetamiprid

- *Assail* 30 SG (1.5 to 2.5 oz.) or *Assail* 70WP (0.6 to 1.1 oz.) (7 days) Do not use if neonicotinoids were used at planting.

*Actara*, 2 to 3 oz. (0 days) Do not apply if a neonicotinoid was used at planting.

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Baythroid* XL, 1.6 to 2.8 fl oz. (7 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

#### Bifenthrin

- *Bifenture* 10 DF, 5.3. (7 days)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @* 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 12.8 oz.) (7 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

#### Bifenthrin + Imidacloprid

- *Brigadier*, 5.1 to 9.85 fl oz. (7 days) (RUP)
- *Swagger*, 10.2 to 19.7 fl oz. (7 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

#### Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (3 days)
- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (3 days)

*Coragen*, 3.5 to 5 fl oz. (1 day) Minimum of 5 days between applications; do not apply more than 15.4 fl oz. per season.

#### Dinotefuran

- *Scorpion* 35SL, 2 to 7 fl oz. (1 day)
- *Venom*, 1 to 4 oz. (1 day)

Do not use if neonicotinoids were used at planting.

*Endigo ZC*, 4 to 4.5 fl oz. (5 days) (RUP)

#### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (7 days) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

*Gladiator*, 19 fl oz. (7 days) (RUP)

Imidacloprid. Additional generic brands available.

- *Admire* Pro, 1.3 to 2.2 fl oz. (0 days)
- *Nuprid* 1.6 F, 3.8 to 6.2 fl oz. (0 days)

Do not use if neonicotinoids were used at planting. Do not apply more than 19.2 oz/acre per season.

*Kryocide*, 8 to 16 lb. (14 days)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (5 days) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (5 days) (RUP)

*Leverage* 360, 3.8 to 4.1 fl oz. (7 days) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

#### Permethrin

- *Ambush* 25 W, 12.8 oz. (3 days) (RUP)
- *Perm-UP* 25DF (9.6 oz.) or *Perm-UP* 3.2 EC (8 oz.) (3 days) (RUP)
- *Pounce* 25 WP, 9.6 oz. (3 days) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (5 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 5 to 10 fl oz. (1 day)

*Rimon* 0.83EC, 9 to 12 fl oz. (1 day)

*Carbaryl* 4L, 1 to 2 qt. (3 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (3 days)

*Sivanto*, 10.5 - 14 fl oz/A.

#### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (1 day)
- *Voliam* Flexi, 4 to 7 oz. (1 day)
- *Vydate* L, 2 to 4 pt. (1 day) (RUP)

FLEA BEETLE: Apply when damage is first seen.

*Actara*, 2 to 3 oz. (0 days) Do not apply if a neonicotinoid was used at planting.

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Baythroid* XL, 2.8 fl oz. (7 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

#### Bifenthrin

- *Bifenture* 10 DF, 5.3. (7 days)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @* 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 12.8 oz.) (7 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

#### Bifenthrin + Imidacloprid

- *Brigadier*, 5.1 to 9.85 fl oz. (7 days) (RUP)
- *Swagger*, 10.2 to 19.7 fl oz. (7 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (7 days) (RUP)

- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

Carbaryl

- *Carbaryl* 4L, 0.5 to 1 qt. (3 days)
- *Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* 80 WSP (0.67 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (3 days)

*Dibrom* 8 Emulsive, 1 pt. (1 day) (RUP)

Dinotefuran

- *Scorpion* 35SL, 2 to 7 fl oz. (1 day)
- *Venom*, 1 to 4 oz. (1 day)

Do not use if neonicotinoids were used at planting.

*Endigo* ZC, 4 to 4.5 fl oz. (5 days) (RUP)

Esfenvalerate

- *Adjour*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (1 day) (RUP)

*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)

*Kryocide*, 8 to 16 lb. (14 days)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (5 days) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (5 days) (RUP)

*Leverage* 360, 4.1 fl oz. (7 days) (RUP)

*Mustang* Max, 2.24 to 4 oz. (1 day) (RUP)

Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (3 days) (RUP)
- *Perm-UP* 25DF (9.6 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (3 days) (RUP)
- *Pounce* 25 WP, 6.4 to 9.6 oz. (3 days) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (5 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 0.5 to 1 qt. (3 days)

*Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* 80 WSP (0.67 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (3 days)

*Voliam* Flexi, 4 to 7 oz. (1 day)

APHIDS: Apply when needed.

\* Acetamiprid

- *Assail* 30 SG (2 to 4 oz.) or *Assail* 70WP (0.8 to 1.7 oz.) (7 days)

\* *Actara*, 2 to 3 oz. (0 days) Do not apply if a neonicotinoid was used at planting.

\* Imidacloprid. Additional generic brands available.

- *Admire* Pro, 1.3 to 2.2 fl oz. (0 days)
- *Nuprid* 1.6 F, 3.8 to 6.2 fl oz. (0 days)

Do not use if neonicotinoids were used at planting. Do not apply more than 19.2 oz/acre per season.

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Baythroid* XL, 1.6 to 2.8 fl oz. (7 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

*Beleaf* 50 SG, 2 to 2.8 oz. (0 days)

Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 9.85 fl oz. (7 days) (RUP)
- *Swagger*, 7.6 to 19.7 fl oz. (7 days) (RUP)

*Dibrom* 8 Emulsive, 1 pt. (1 day) (RUP)

*Endigo* ZC, 4 to 4.5 fl oz. (5 days) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

*Fulfill*, 2.75 oz. (0 days) May require 5 to 7 days for aphid mortality

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

*Leverage* 360, 3.8 to 4.1 fl oz. (7 days) (RUP)

Malathion

- *Malathion* 5, or *Malathion* 5 EC (1 pt.) or *Malathion* 57 EC (1 to 1.5 pt.) or *Malathion* 8 (0.75 to 3.5 pt.) or *Malathion* 8 Aquamul (0.75 to 1.56 pt.) (3 days)

Methomyl

- *Lannate* LV (0.75 to 3 pt.) or *Lannate* SP (0.25 to 1 lb.) (5 days) (RUP)

- *Nudrin* LV (0.75 to 3 pt.) or *Nudrin* SP (0.25 to 1 lb.) (5 days) (RUP)

*Movento*, 4 to 5 fl oz. (1 day) Must be tank mixed with adjuvant having spreading and penetrating properties.

*Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 7 - 12 fl oz/A.

*Voliam* Flexi, 4 to 7 oz. (1 day)

*Vydate* L, 2 to 4 pt. (1 day) (RUP)

ARMYWORM:

*Exirel*, 7-13.5 oz/A. (1)

TOMATO FRUITWORM:

*Exirel*, 7-13.5 oz/A. (1)

THRIPS:

*Exirel*, 13.5-20.5 oz/A. (1)

LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

PSYLLID:

*Sivanto*, 10.5 - 14 fl oz/A.

WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

**MITES**

Apply if needed to avoid foliar injury.

Abamectin

- *Agri-Mek* 0.15 EC (8 to 16 fl oz.) or *Agri-Mek* SC (1.75 to 3.5 fl oz.) (7 days) Use with a non-ionic surfactant. (RUP)

Bifenazate

- *Acramite* 50WS, 0.75 to 1 lb. (3 days)

Bifenthrin

- *Bifenture* EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Bifenture* 10 DF, 12.8 to 16 oz/A. (7 days)
- *Brigade* @ 2EC (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (7 days) (RUP)
- *Capture* 2 EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (7 days) (RUP)

Bifenthrin + Avermectin

- *Athena*, 13.5 to 17 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero* EW (11.2 oz.) (7 days) (RUP)

Etoazazole

- *Zeal*, 2 to 3 oz. (7 days)

Fenpyroximate

- *Portal*, 2 pt. (1 day)

Malathion

- *Malathion* 5, or *Malathion* 5 EC (1 pt.) or *Malathion* 8 (0.75 to 3.5 pt.) or *Malathion* 8 Aquamul (0.75 to 1.56 pt.) (3 days)

Naled

- *Dibrom* 8 Emulsive, 1 to 2 pt. (1 day) (RUP)

Oxamyl

- *Vydate* L, 2 to 4 pt. (1 day) (RUP)

Spiromesifen

- *Oberon* 2 SC, 7 to 8.5 fl oz. (7 days)

Zeta-Cypermethrin + Avermectin

- *Gladiator*, 19 fl oz. (7 days) (RUP)

# Eggplant

## DISEASES

### SEED TREATMENT:

DAMPING OFF (*Pythium* spp., *Phytophthora* spp., *Rhizoctonia solani*): Apply to seed as slurry or dust. Use only as directed; overtreatment may cause injury.

#### Fludioxonil + mefenoxam

- *Maxim* XL, 0.08 to 0.16 fl oz/100 lb seed (*Rhizoctonia*, *Fusarium*).

#### Mefenoxam

- *Apron* XL, 0.085 - 0.64 fl oz/100 lb seed (*Pythium*).

#### Thiram

- 42-S Thiram, *Thiram* 480DP, 6 1/2 fl oz/100 lb seed.
- *Thiram* 50 WP Dyed, 6 oz/100 lb seed.

### SEEDBED TREATMENT:

DAMPING OFF (*Pythium* spp.), CROWN ROT (*Phytophthora capsici*): Ridomil must be applied to the soil before the plants are infected with *Phytophthora* to obtain satisfactory disease control.

#### Mefenoxam

- *Ridomil* Gold SL, 1 pt. (7 days)
- *Ridomil* Gold WSP, 1 lb. (7 days)
- *Ultra* Flourish, 2 pt. (7 days)

Incorporate mechanically before planting or move into root zone after planting with 1/2 to 1 inch sprinkler water. For banded applications, use 12 to 16 inch band.

After initial application, 2 supplemental post-directed applications at 1 lb (*Ridomil* Gold WSP) or 1 pt (*Ridomil* Gold EC) should be made at 30-day intervals. Spray should be directed at the base of the plants and cover 6 to 8 inches of soil on either side of the plants. *Ridomil* Gold must be moved into the root zone mechanically or by sprinkler irrigation. Spray may be applied with liquid fertilizer shanked in as a band treatment to either side of the plant. The foliar blight phase of *Phytophthora* cannot be controlled with foliar applications of *Ridomil* Gold. **Note:** Observe limit of active ingredient/crop on label.

### PREPLANT SOIL FUMIGATION:

FUSARIUM, VERTICILLIUM WILT, *PHYTOPHTHORA* spp: Preplant treatment (production fields). Most fumigants applied to the soil to control disease organisms will also control soil insects, nematodes and weed seeds.

Soil sterilization by fumigation is best achieved by proper application of material. Correct soil moisture, temperature, and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or immediate tarping.

#### 1,3 Dichloropropene/chloropicrin

- *Telone* C35, 13-35 gal. (RUP)

#### Metam Potassium

- *Sectagon-K54*, 30-60 gal. (RUP)

#### Metam Sodium

- *Sectagon* 42, 37.5-75 gal. (RUP)

### DRIP APPLICATION:

PHYTOPHTHORA CROWN ROT (*Phytophthora* spp.):

#### \* Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days)

#### Ametoctradin + Dimethomorph

- *Zapro*, 14 fl oz. (4 days)

#### Mefenoxam

- *Ridomil* Gold SL, 1 pt. (7 days)

### FOLIAR TREATMENT:

ALTERNARIA BLIGHT (*Alternaria melongena*), ANTHRACNOSE (*Colletotrichum melongena*): Treat every 7 to 10 days after disease first appears.

#### \* Azoxystrobin. Anthracnose only.

- *Quadris*, 6.2 to 15.4 fl oz. (0 days)

Do not apply more than one foliar application of *Amistar* and *Quadris* or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

#### \* Boscalid

- *Endura*, 2.5 to 3.5 oz (alternaria blight only). (0 days)

#### \* Fluxapyroxad + Pyraclostrobin

- *Priaxor* Xemium Brand Fungicide, 4 - 8 fl oz. (0 days)

#### \* Trifloxystrobin

- *Flint*, 2 to 3 oz (*Alternaria*) 3 to 5 oz (*Anthracnose*). (3 days) Do not apply more than three sequential foliar applications of strobilurin fungicides before alternating with a fungicide that has a different mode of action.

#### Bacillus amyloliquefaciens

- *Serifel*, 4 - 16 fl oz. (0 day)

#### Copper Ammonium Carbonate

- *Copper* Count N, 2 qt. (0 days)

#### Copper Hydroxide

- *Champ* DP Dry Prill, 1 1/3 lb. (0 days)
- *Champ* Formula 2 F (1 1/3 pt) or *Nu-Cop* 3 L (1 1/3 to 2 pt) (0 days)
- *Champ* WG, 1.58 lb. (0 days)
- *Champ*ION, 0.75 to 1.5 lb. (0 days)
- *Kocide* 2000, 1 1/2 lb. (0 days)
- *Kocide* 3000, 0.75-1.5 lb. (0 day)
- *Nu-Cop* 50 DF, 1 1/2 lb. (0 days)

#### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1.5 pt. (0 days)
- *Badge* X2, 0.75 lb. (0 days)

#### Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 1.25 lb. (0 days)

#### Penthiopyrad

- *Fontelis*, 16 - 24 fl oz. (0 days)

#### Pyraclostrobin

- *Cabrio*, 8 to 12 oz. (0 days) Do not apply more than one application before alternating with another chemical.

PHOMOPSIS BLIGHT (*Phomopsis vexans*): Treat every 7 to 10 days after disease first appears.

#### Copper Ammonium Carbonate

- *Copper* Count N, 2 qt. (0 days)

#### Copper Hydroxide

- *Champ* DP Dry Prill, 1 1/3 lb. (0 days)
- *Champ* Formula 2 F (1 1/3 pt) or *Nu-Cop* 3 L (1 1/3 to 2 pt) (0 days)
- *Champ* WG, 1.58 lb. (0 days)
- *Champ*ION, 0.75 to 1.5 lb. (0 days)
- *Kocide* 2000, 1 1/2 lb. (0 days)
- *Kocide* 3000, 0.75-1.5 lb. (0 day)
- *Nu-Cop* 50 DF, 1 1/2 lb. (0 days)

#### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1.5 pt. (0 days)
- *Badge* X2, 0.75 lb. (0 days)

#### Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 1.25 lb. (0 days)

PHYTOPHTHORA CROWN ROT:

#### \* Dimethomorph

- *Forum*, 6 fl oz. (0 days)

Ametoctradin + Dimethomorph

- *Zapro*, 14 fl. oz. (4 days)

Copper Hydroxide + Copper Oxychloride

- *Badge SC*, 1.5 pt. (0 days)
- *Badge X2*, 0.75 lb. (0 days)

## Garden Greens

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### INSECTS

#### PLANTING TREATMENT:

##### APHIDS:

Imidacloprid. See label for application methods.

- *Admire Pro*, 4.4 to 10.5 fl oz. (21 days)
- *Nuprid 2 F*, 10 to 24 oz. (21 days)

##### CABBAGE MAGGOT:

##### Chlorpyrifos

- *Lorsban 15 G* (4.6 to 9.2 oz /1,000 row ft.) or *Lorsban 4 E / Lorsban Advanced* (1.6 to 2.75 fl oz / 1,000 row ft.) Apply in a 4-inch band over row at time of seeding. Use only as directed. Brassica greens only. (RUP)

##### APHIDS, CABBAGE "WORM", FLEA BEETLE, LOOPERS:

*Durivo*, 10 to 13 fl oz. (30 days)

##### APHIDS and FLEA BEETLE:

*Belay 50 WDG*, 4.8 to 6.4 oz.

##### Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum 75 SG* (1.66 to 3.67 oz.) (30 days) See label for application methods.

#### FOLIAR TREATMENT:

FLEA BEETLE: Apply when damage is first seen on young plants.

Repeat as needed.

*Actara*, 1.5 to 3 oz. (7 days)

*Asana XL*, 5.8 to 9.6 oz. (7 days) Collards only. (RUP)

*Baythroid XL*, 2.4 to 3.2 fl oz. (0 days) (RUP)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

##### Bifenthrin

- *Bifenture EC*, 2.1 to 6.4 oz. (7 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)

Brassica greens only.

##### Carbaryl

- *Carbaryl 4L*, 0.5 to 1 qt. (14 days)
- *Sevin 80 S* (1 1/4 lb) or *Sevin XLR Plus* (1 qt) (14 days)

##### Cypermethrin

- *Ammo 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)

Brassica greens only.

*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)

##### Imidacloprid

- *Admire Pro*, 1.3 fl oz. (7 days)
- *Nuprid 1.6 F*, 3.8 fl oz. (7 days) Do not use if Imidacloprid was used at planting. Do not exceed 19.2 oz/Acre per season.

*Leverage 360*, 3 fl oz. (7 days) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

CUTWORM, LOOPERS: Apply as needed.

\* *Ambush 25 W*, 6.4 to 12.8 oz. (1 day) Non-Brassica greens only. (RUP)

\* *Asana XL*, 9.6 oz. (7 days) Collards and mustard greens only. (RUP)

*Avaunt*, 2.5 to 3.5 oz. (3 days)

##### Bacillus thuringiensis

- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF*, 0.5 to 1 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Brigadier*, 4.2 to 6.1 fl oz. (7 days) Brassica greens only. (RUP)

*Endosulfan 3 EC*, 1 qt. (21 days) Collards, kale and mustard greens only. (RUP)

*Larvin 3.2*, 16 to 30 oz. (14 days) Cress, dandelion, endive, parsley and Swiss chard (consult label for a complete list). (RUP)

CABBAGE "WORM": Apply when feeding damage is seen. Repeat as needed.

*Asana XL*, 9.6 oz. (7 days) Collards and mustard greens only. (RUP)

*Avaunt*, 2.5 to 3.5 oz. (3 days)

##### Bacillus thuringiensis

- *Agree WG*, 0.5 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF*, 0.25 to 1 lb. (0 days)
- *Javelin WG*, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid XL*, 1.6 to 2.4 fl oz. (0 days) (RUP)

*Belt SC*, 1.5 fl oz. (1 day)

##### Bifenthrin

- *Bifenture 10 DF*, 2.1 to 6.4 oz/A. (7 days)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)

Brassica greens only.

*Brigadier*, 4.2 to 6.1 fl oz. (7 days) Brassica greens only. (RUP)

##### Carbaryl

- *Carbaryl 4L*, 1 to 2 qt. (14 days)
- *Sevin 80 S* (1 1/4 lb) or *Sevin XLR Plus* (1 to 2 qt) (14 days)

*Confirm 2F*, 6 to 8 fl oz. (7 days)

##### Cypermethrin

- *Ammo 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde 2.5 EC*, 2.5 to 5 fl oz. (1 day) (RUP)

Brassica greens only.

*Dibrom 8 Emulsive*, 1 pt. (1 day) Collards and kale only. (RUP)

*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)

*Intrepid 2F*, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

*Larvin 3.2*, 16 to 30 oz. (14 days) Cress, dandelion, endive, parsley and swiss chard (consult label for a complete list). (RUP)

*Leverage 360*, 3 fl oz. (7 days) (RUP)

##### Methomyl

- *Lannate LV* (1.5 to 3 pt.) or *Lannate SP* (0.5 to 1 lb.) (10 days) (RUP)
- *Nudrin LV* (1.5 to 3 pt.) or *Nudrin SP* (0.5 to 1 lb.) (10 days) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant SC*, 5 to 10 fl oz. (1 day)

##### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust SC* (3 to 6 fl oz.) (1 day)

*Vetiva*, 12 to 17 fl oz. (7 days)

APHIDS: Apply as needed to avoid infestations on leaves at harvest.

##### \* Acetamiprid

\* *Assail 30 SG* (2 to 4 oz.) or *Assail 70WP* (0.8 to 1.7 oz.) (7 days)

\* *Fulfill*, 2.75 oz. (0 days) May require 5 to 7 days for aphid mortality.

##### \* Imidacloprid

- *Admire Pro*, 1.3 fl oz. (7 days)

## Garden Greens

- *Nuprid* 1.6 F, 3.8 fl oz. (7 days) Do not use if Imidacloprid was used at planting. Do not exceed 19.2 oz/Acre per season.

*Actara*, 1.5 to 3 oz. (7 days)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

*Beleaf* 50 SG, 2 to 2.8 oz. (0 days)

### Bifenthrin

- *Bifenture* 10 DF, 2.1 to 6.4 oz/A.
- *Bifenture* 10 DF, 2.1 to 6.4 oz/A. (7 days)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)

Brassica greens only.

*Brigadier*, 4.2 to 6.1 fl oz. (7 days) Brassica greens only. (RUP)

*Dibrom* 8 Emulsive, 1 pt. (1 day) Collards and kale only. (RUP)

*Endosulfan* 3 EC, 1 qt. (21 days) Collards, kale and mustard greens only. (RUP)

*Gladiator*, 19 fl oz. (7 days) (RUP)

*Malathion* 8, 1 to 2 pt. (7 days)

*Movento*, 4 to 5 fl oz. (3 days) Must be tank mixed with adjuvant having spreading and penetrating properties.

*Pyrenone*, 1 to 12 fl oz. (0 days)

### CUTWORM, EUROPEAN CORN BORER:

*Belt* SC, 1.5 fl oz. (1 day)

*Bifenture* EC, 2.1 to 6.4 oz. (7 days) Brassica greens only. (RUP)

*Javelin* WG, 0.12 to 1.5 lb. (0 days)

*Vetica*, 12 to 17 fl oz. (7 days)

### CATERPILLARS:

*Avaunt*, 3.5 to 6 oz. (3 days)

#### Bacillus thuringiensis

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *Javelin* WG, 0.12 to 1.5 lb. (0 days)

*Baythroid* XL, 1.6 to 2.4 fl oz. (0 days) (RUP)

*Belt* SC, 1.5 fl oz. (1 day)

### Bifenthrin

- *Bifenture* 10 DF, 2.1 to 6.4 oz/A. (7 days)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)

Brassica greens only.

*Bifenture* 10 DF, 2.1 to 6.4 oz/A. (7 days)

*Confirm* 2F, 6 to 8 fl oz. (7 days)

### Cypermethrin

- *Ammo* 2.5 EC, 3.75 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde* 2.5 EC, 3.75 to 5 fl oz. (1 day) (RUP)

Brassica greens only.

*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)

*Larvin* 3.2, 16 to 30 fl oz. (14 days) (RUP)

*Leverage* 360, 3 fl oz. (7 days) (RUP)

### Methomyl

- *Lannate* LV (1.5 to 3 pt.) or *Lannate* SP (0.5 to 1 lb.) (10 days) (RUP)
- *Nudrin* LV (1.5 to 3 pt.) or *Nudrin* SP (0.5 to 1 lb.) (10 days) (RUP)

*Proclaim*, 3.2 to 4.8 oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 5 to 10 fl oz. (1 day)

*Vetica*, 12 to 17 fl oz. (7 days)

### CUTWORM:

*Baythroid* XL, 0.8 to 1.6 fl oz. (0 days) (RUP)

*Belt* SC, 1.5 fl oz. (1 day)

### Cypermethrin

- *Ammo* 2.5 EC, 2.5 to 5 fl oz. (1 day) (RUP)
- *UP-Cyde* 2.5 EC, 2.5 to 5 fl oz. (1 day) (RUP)

Brassica greens only.

*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)

*Mustang* Max, 2.24 to 4 oz. (1 day) (RUP)

### Permethrin

- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 fl oz.) (1 day) (RUP)
- *Pounce* 25 WP, 6.4 to 12.8 oz. (1 day) (RUP)

### LOOPERS:

*Avaunt*, 2.5 to 3.5 oz. (3 days)

*Belt* SC, 1.5 fl oz. (1 day)

*Biobit* HP, 0.5 to 1 lb. (0 days)

*Dibrom* 8 Emulsive, 2 pt. (1 day) Collards and kale only. (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

*Intrepid* 2F, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

*Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

### Permethrin

- *Perm-UP* 25DF (3.2 to 12.8 oz.) or *Perm-UP* 3.2 EC (2 to 8 fl oz.) (1 day) (RUP)
- *Pounce* 25 WP, 3.2 to 12.8 oz. (1 day) (RUP)

### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (1 day)

## MITES

May be a problem in hot, dry weather.

### Abamectin

- *Agri-Mek* 0.15 EC (8 to 16 fl oz.) or *Agri-Mek* SC (1.75 to 3.5 fl oz.) (7 days) Use with a non-ionic surfactant. (RUP)

### Bifenthrin

- *Bifenture* EC, 5.1 to 6.4 oz. (7 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (7 days) (RUP)

Brassica greens only.

### Naled

- *Dibrom* 8 Emulsive, 1 pt. (1 day) Collards and kale. (RUP)

### Zeta-Cypermethrin + Avermectin

- *Gladiator*, 19 fl oz. (7 days) (RUP)

## SLUGS

*Deadline* M-Ps 4% (20 to 40 lb) or *Metaldehyde* 3.5 G (30 to 40 lb) Apply between rows. Avoid contact to edible product.

## DISEASES

### SEED TREATMENT:

DAMPING OFF (*Rhizoctonia* spp., *Pythium* spp.):

#### Captan

- *Captan* 4 Flowable, 12 fl oz/100 lb seed. Swiss chard

#### Fludioxinil

- *Maxim* 4 FS, 0.08 to 0.16 fl oz/100 lb seed (*Rhizoctonia*). Commercial seed treatment plants only. Collards, endive, kale, swiss chard.

#### Mefenoxam

- *Apron* XL, 0.085 - 0.64 fl oz/100 lb seed (Pythium).

#### Thiram

- 42-S Thiram, *Thiram* 50 WP Dyed, 8 oz/100 lb seed.

### SEEDBED TREATMENT:

CLUBROOT (*Plasmiodiophora brassicae*):

#### Fluazinam

- *Omega* 500 F, 2.6 pt. (50 days)

### PREPLANT INCORPORATED:

DAMPING OFF (*Pythium* spp.):

Mefenoxam. Apply as a broadcast preplant incorporation or a surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate

mechanically before planting or water into seed zone after planting with 1/2 to 1 in. of sprinkler irrigation. Endive and Swiss chard only).

- *Ridomil* Gold GR, 20 to 40 lb.
- *Ridomil* Gold WSP, 1 to 2 lb.

#### TRANSPLANT DRENCH:

CLUBROOT (*Plasmiodiophora brassicae*):

##### Fluazinam

- *Omega* 500 F, 6.45 fl oz. (50 days)

#### FOLIAR TREATMENT:

BOTRYTIS GRAY MOLD (*Botrytis* spp.): Apply 7 days following transplanting. Repeat applications when plants are half, mature. Do not apply to wilted plants or seedlings.

##### Penthiopyrad

- *Fontelis*, 14 - 30 fl oz. (3 days)

DOWNY MILDEW (*Peronospora parasitica*): Apply as needed to maintain control.

##### \* Fosetyl-Aluminum

- *Aliette* WDG, 2 to 5 lb at 7- to 21-day intervals. (3 days) Collards, kale, mustard greens, endive, escarole, Swiss chard. **Note:** Do not tank mix with copper fungicides.

##### Acibenzolar-S-methyl

- *Actigard*, 1 oz per 20 gal (ground) or 10 gal (aerial) of water. (7 days) Do not apply more than 4 applications per crop per year.

##### Ametoctradin + Dimethomorph

- *Zapro*, 14 fl oz. (0 days)

##### Dimethomorph

- *Forum*, 6 fl oz. (7 days)

##### Mandipropamid

- *Revus*, 8 fl oz. (1 day)

##### Mono-, dibasic sodium salts of phosphorous acid

- *Fosphite*, 1 to 3 qt per 100 gal (ground) or 10 gal (aerial) of water. (0 days)

##### Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 2.5 to 5 pt every 7 - 21 days. (0 days)

**Note:** Fungicides that protect against *Alternaria* also provide limited downy mildew protection.

CERCOSPORA LEAF SPOT (*Cercospora beticola*):

##### \* Azoxystrobin

- *Quadris*, 6.2 to 15.4 fl oz. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

##### \* Difenoconazole + Cyprodinil

- *Inspire* Super, 16 to 20 fl oz. (7 days)

##### \* Trifloxystrobin

- *Flint*, 2 to 3 oz. (7 days) Swiss chard only.

Do not apply more than three sequential foliar applications of strobilurin fungicides before alternating with a fungicide that has a different mode of action.

##### Azoxystrobin + Difenoconazole

- *Quadris* Top, 12 to 14 fl oz. (1 day)

##### Penthiopyrad

- *Fontelis*, 14 - 30 fl oz. (3 days)

##### Pyraclostrobin

- *Cabrio*, 12-16 oz. (3 days) Do not apply more than one application before alternating with another chemical.

##### Tebuconazole

- *Orius* 3.6F, *Tebuzol* 3.6, 3-4 fl oz. (7 days) Maximum 16 fl oz/acre/season. 12 hr REI.

ALTERNARIA LEAF SPOT (*Alternaria cucumerina*):

##### \* Azoxystrobin

- *Quadris*, 6.2 to 15.4 fl oz. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

##### \* Azoxystrobin + Difenoconazole

- *Quadris* Top, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

##### \* Difenoconazole + Cyprodinil

- *Inspire* Super, 16 to 20 fl oz. (7 days)

##### Copper Hydroxide

- *Kocide* 2000, 3/4 to 1 1/2 lb. (0 days) Mustard greens and Collards only.

- *Kocide* 3000, 0.5-0.75 lb. (0 day)

##### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 1.8 pt. (0 days)

- *Badge* X2, 0.5 to 0.75 lb. (0 days)

##### Copper Sulfate

- *Cuprofix* Ultra 40, 0.75 to 1.25 lb. (0 days)

##### Cyprodinil + Fludioxonil

- *Switch* 62.5 WG, 11 to 14 oz. (7 days)

##### Penthiopyrad

- *Fontelis*, 14 - 30 fl oz. (3 days)

##### Pyraclostrobin

- *Cabrio*, 12-16 oz. (3 days) Do not apply more than one application before alternating with another chemical.

##### Tebuconazole

- *Orius* 3.6F, *Tebuzol* 3.6, 3-4 fl oz. (7 days) Maximum 16 fl oz/acre/season. 12 hr REI.

## Garlic

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

#### SOIL TREATMENT:

BULB and STEM NEMATODE: Garlic is an excellent host for the bulb and stem nematode but there are no labeled chemical options for its control on this crop. If garlic plantings exhibit symptoms, submit leaves and bulbs for nematode analyses. If bulb and stem nematodes are detected, a management plan will be provided. These nematodes can be difficult to detect in the soil, so it is always best plant tissue samples are submitted for proper diagnoses.

### INSECTS

#### SOIL TREATMENT:

THRIPS:

*Admire* Pro, 14 fl oz. (21 days) See label for application methods.

#### FOLIAR TREATMENT:

LOOPERS, ARMYWORM: Apply as needed.

##### \* Permethrin

- *Ambush* 25 W, 9.6 to 19.2 oz. (1 day) (RUP)

- *Perm-UP* 3.2 EC (6 to 12 oz) or *Pounce* 25 WP (9.6 to 19.2 oz) (1 day) (RUP)

##### Bacillus thuringiensis

- *Agree* WG, 1 to 2 lb. (0 days)

- *Javelin* WG, 0.12 to 1.5 lb. (0 days)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 5 to 10 fl oz. (1 day)

## Lettuce

### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust SC* (3 to 6 fl oz.) (1 day)

APHIDS: Apply as needed.

### Cypermethrin

- *Ammo 2.5 EC*, 2.5 to 5 fl oz. (7 days) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (7 days) (RUP)
- *Holster*, 2 to 5 fl oz. (7 days) (RUP)
- *UP-Cyde 2.5 EC*, 2.5 to 5 fl oz. (7 days) (RUP)

### Malathion

- *Malathion 5*, *Malathion 5 EC*, or *Malathion 57 EC* (1.5 to 2 pt.) or *Malathion 8* (1 to 2 pt.) or *Malathion 8 Aquamul* (1 to 1.5 pt.) (3 days)

*Mustang Max*, 2.24 to 4 oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

THRIPS: Apply as needed.

### Acetamiprid

- *Assail 30 SG* (5 to 8 oz.) or *Assail 70WP* (2.1 to 3.4 oz.) (7 days)

### Cypermethrin

- *Ammo 2.5 EC*, 4 to 5 fl oz. (7 days) (RUP)
- *Cypermethrin*, 4 to 5 fl oz. (7 days) (RUP)
- *Holster*, 4 to 5 fl oz. (7 days) (RUP)
- *UP-Cyde 2.5 EC*, 4 to 5 fl oz. (7 days) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (14 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (14 days) (RUP)

### Malathion

- *Malathion 5*, *Malathion 5 EC*, or *Malathion 57 EC* (1.5 to 2 pt.) or *Malathion 8* (1 to 2 pt.) or *Malathion 8 Aquamul* (1 to 1.5 pt.) (3 days)

*Mustang Max*, 2.88 to 4 oz. (7 days) (RUP)

### Permethrin

- *Ambush 25 W*, 9.6 to 19.2 oz. (1 day) (RUP)
- *Perm-UP 3.2 EC* (6 to 12 oz) or *Pounce 25 WP* (9.6 to 19.2 oz) (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (14 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant SC*, 6 to 10 fl oz. (1 day)

ARMYWORM:

### Bacillus thuringiensis

- *Biobit HP*, 0.5 to 2 lb. (0 days)
- *DiPel DF*, 1 to 2 lb. (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

*Coragen*, 3.5 to 5 fl oz. (1 day)

### Cypermethrin

- *Ammo 2.5 EC*, 2.5 to 5 fl oz. (7 days) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (7 days) (RUP)
- *Holster*, 2 to 5 fl oz. (7 days) (RUP)
- *UP-Cyde 2.5 EC*, 2.5 to 5 fl oz. (7 days) (RUP)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (14 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (14 days) (RUP)

### Methomyl

- *Lannate LV* (1.5 pt.) or *Lannate SP* (0.5 lb.) (7 days) (RUP)
- *Nudrin LV* (1.5 pt.) or *Nudrin SP* (0.5 lb.) (7 days) (RUP)

*Mustang Max*, 2.24 to 4 oz. (7 days) (RUP)

LOOPERS:

### Bacillus thuringiensis

- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF*, 0.5 to 1 lb. (0 days)

- *XenTari*, 0.5 to 1.5 lb. (0 days)

LEAFMINERS:

*Exirel*, 13.5-20.5 oz/A. (1)

## DISEASES

### PLANTING TREATMENT:

DAMPING OFF (*Pythium* spp.):

Mefenoxam. Apply as a broadcast preplant incorporation or a surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone after planting with 1/2 to 1 in. or sprinkler irrigation.

- *Ridomil Gold SL*, 0.5-1 pt.

- *Ultra Flourish*, 1 to 2 pt.

WHITE ROT (*Sclerotium cepivorum*): Apply as an in-furrow spray at planting.

### Boscalid

- *Endura*, 6.8 oz. (7 days)

### Iprodione

- *Iprodione 4L AG*, *Rovral 4 Flowable*, 4 pt. **Note:** See label for permissible crop rotation.

- *Meteor*, 4 pt. (0 days)

### Thiophanate-Methyl

- *Topsin 4.5 FL*, 40 fl oz.

PENICILLIUM CLOVE ROT:

### Thiophanate-Methyl

- *Cercobin 4.1F*, 21.8 fl oz/100 gal. Completely immerse garlic cloves in suspension for minimum 5 minutes prior to planting.

### FOLIAR TREATMENT:

BOTRYTIS LEAF BLIGHT (*Botrytis* spp.):

#### \* Azoxystrobin

- *Quadris*, 9.0 to 15.5 fl oz. (0 days)

Do not apply more than one foliar application of *Quadris* or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

#### \* Boscalid

- *Endura*, 6.8 oz. (7 days)

#### \* Chlorothalonil

- *Bravo Ultrex*, 0.9 to 2.7 lb. (7 days)
- *Bravo Weather Stik*, *Echo 720*, *Equus 720 SST*, 1 to 3 pt. (7 days)
- *Bravo ZN*, 1 1/2 to 4 1/4 pt. (7 days)
- *Echo 90 DF*, 7/8 to 1 5/8 lb. (7 days)
- *Equus DF*, 0.9 to 2.7 lb. (7 days)

#### \* Mancozeb

- *Dithane DF Rainshield*, *Dithane M-45*, 3 lb. (7 days)
- *Dithane F-45 Rainshield*, 2.4 qt. (7 days)
- *Koverall*, 3 lb. (7 days)
- *Manzate Max*, 1.6 to 2.4 qt. (7 days)
- *Manzate Pro-Stick*, 3 lb. (7 days) Do not apply to exposed bulbs.
- *Penncozeb 75 DF*, *Penncozeb 80WP*, 2 to 3 lb. (7 days)

#### \* Pyraclostrobin/Boscalid

- *Pristine*, 14.5 to 18.5 oz. (7 days)

#### Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 1.6 to 3.2 pt. (7 days)

#### Azoxystrobin + Difenoconazole

- *Quadris Top*, 12 to 14 fl oz. (7 days)

#### Azoxystrobin + Propiconazole

- *Quilt*, 14 to 27.5 fl oz (suppression). (14 days)
- *Quilt Xcel*, 17.5 to 26 fl oz. (14 days)

Difenoconazole + Cyprodinil

- *Inspire Super*, 16 to 20 fl oz. (7 days)

Fluxapyroxad + Pyraclostrobin

- *Merivon Xemium Brand Fungicide*, 8 to 11 fl oz. (7 days)

Mancozeb + Zoxamide

- *Gavel 75 DF*, 1.5 - 2.0 lb. (7 days)

Mefenoxam + Chlorothalonil

- *Ridomil Gold Bravo*, 2.5 pt. (7 days (14 days for green))

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Penthiopyrad

- *Fontelis*, 16 - 24 fl oz. (3 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 4-7 pt. (7 days)

Propiconazole

- *Propimax EC*, 4 to 8 fl oz. (14 days)
- *Tilt*, 4-8 fl oz. (14 days)

Pyraclostrobin

- *Cabrio*, 12 oz (suppression). (7 days) Do not apply more than one application before alternating with another chemical.

Pyrimethanil

- *Scala*, 18 fl oz. (7 days) 12 hr REI.

Zoxamide + chlorothalonil

- *Zing!*, 30 fl oz. (7 days)

BACTERIAL BLIGHT (*Erwinia carotovora* subsp. *carotovora*, *Pseudomonas* spp.): Apply at 7 to 10 day intervals when plants are 4-6 in. tall. Can cause foliar phytotoxicity.

Copper Hydroxide

- *Champ DP Dry Prill*, 2/3 to 1 lb. (0 days)
- *Champ Formula 2 F*, 2/3 to 1 pt. (0 days)
- *Kocide 3000*, 0.75-1.5 lb. (0 day)

Copper Hydroxide + Copper Oxychloride

- *Badge SC*, 1.5 pt. (0 days)

Copper Sulfate

- *Cuprofix Ultra 40 Disperss*, 1.25 to 2.5 lb. (0 days)

Famoxadone + Cymoxanil

- *Tanos*, 8 to 10 oz. (1 day) Apply as preventative and tank mix.

DOWNY MILDEW (*Peronospora destructor*): Apply after the 4-leaf stage.

\* Dimethomorph

- *Forum*, 6 fl oz. (0 days)

\* Mancozeb

- *Dithane DF Rainshield*, *Dithane M-45*, 3 lb. (7 days)
- *Dithane F-45 Rainshield*, 2.4 qt. (7 days)
- *Koverall*, 3 lb. (7 days)
- *Manzate Max*, 1.6 to 2.4 qt. (7 days)
- *Manzate Pro-Stick*, 3 lb. (7 days) Do not apply to exposed bulbs.
- *Penncozeb 75 DF*, *Penncozeb 80WP*, 2 to 3 lb. (7 days)

\* Mefenoxam + Chlorothalonil

- *Ridomil Gold Bravo*, 2.5 pt. (7 days) Maximum 4 applications.

\* Mefenoxam + Copper Hydroxide

- *Ridomil Gold Copper*, 2 lb. (10 days) Maximum 4 applications.

\* Mefenoxam + Mancozeb

- *Ridomil Gold MZ*, 2 1/2 lb. (7 days) Maximum 4 applications.

Ametoctradin + Dimethomorph

- *Zapro*, 14 fl. oz. (0 days)

Azoxystrobin

- *Quadris*, 9.0 to 15.5 fl oz. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 2.4 to 3.6 pt. (7 days)

Chlorothalonil. Downy mildew suppression.

- *Bravo Ultrex*, 0.9 - 2.7 lb every 7 to 10 days. (7 days)
- *Bravo Weather Stik*, *Echo 720*, *Equus 720 SST*, 1 to 3 pt. (7 days) Downy mildew suppression.
- *Bravo ZN*, 1 1/2 to 4 1/4 pt. (7 days)

Copper Hydroxide + Copper Oxychloride

- *Badge SC*, 1.5 pt. (0 days)

Famoxadone + Cymoxanil

- *Tanos*, 8 to 10 oz. (1 day) Apply as preventative and tank mix.

Fenamidone

- *Reason 500 SC*, 5.5 fl oz every 5 to 10 days. (14 days)

Fluxapyroxad + Pyraclostrobin

- *Merivon Xemium Brand Fungicide*, 8 to 11 fl oz. (7 days) Suppression only

Mancozeb + Zoxamide

- *Gavel 75 DF*, 1.5 - 2.0 lb. (7 days)

Mandipropamid

- *Revus*, 8 fl oz. (7 day)

Mono-, dibasic sodium, potassium and ammonium phosphites

- *Prophyt*, 4 pt. (0 days)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 4-7 pt. (7 days)

Pyraclostrobin

- *Cabrio*, 12 oz. (7 days) Do not apply more than one application before alternating with another chemical.

Pyraclostrobin/Boscalid

- *Pristine*, 18.5 oz (suppression). (7 days)

Zoxamide + chlorothalonil

- *Zing!*, 30 fl oz. (7 days)

**Note:** Most fungicides that protect against purple blotch or Botrytis leaf blight may also provide limited downy mildew protection.

WHITE ROT (*Sclerotium cepivorum*):

\* Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 1.6 to 3.2 pt. (7 days)

Penthiopyrad

- *Fontelis*, 16 - 24 fl oz. (3 days)

Tebuconazole

- *Orius 3.6F*, *Tebuzol 3.6*, 20.5 fl oz in 4-6 inch band. 12 hr REI.

PURPLE BLOTCH (*Alternaria porri*):

\* Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 1.6 to 3.2 pt. (7 days)

\* Azoxystrobin + Propiconazole

- *Quilt* (14 to 27.5 fl oz) or *Quilt Xcel* (14 to 21 fl oz) (14 days)

Azoxystrobin

- *Quadris*, 6 to 12 fl oz. (0 days)

Azoxystrobin + Difenoconazole

- *Quadris Top*, 12 to 14 fl oz. (7 days)

Boscalid

- *Endura*, 6.8 oz. (7 days)

Chlorothalonil

- *Bravo Weather Stik*, 1 to 3 pt. (7 days)
- *Bravo ZN*, 1 1/2 to 4 1/4 pt. (7 days)
- *Echo 90 DF*, 7/8 to 1 5/8 lb. (7 days)
- *Equus DF*, 0.9 to 2.7 lb. (7 days)

Copper Hydroxide + Copper Oxychloride

- *Badge SC*, 1.5 pt. (0 days)

## Lettuce

### Famoxadone + Cymoxanil

- *Tanos*, 8 oz. (1 day) Apply as preventative and tank mix.

### Fenamidone

- *Reason 500 SC*, 5.5 fl oz. (7 days)

### Fluxapyroxad + Pyraclostrobin

- *Merivon Xemium Brand Fungicide*, 4 - 11 fl oz. (7 days)

### Mancozeb

- *Dithane F-45 Rainshield*, 2.4 qt. (7 days)
- *Koverall*, 3 lb. (7 days)
- *Manzate Max*, 1.6 to 2.4 qt. (7 days)
- *Penncozeb 75 DF*, *Penncozeb 80WP*, 2 to 3 lb. (7 days)

### Mancozeb + Zoxamide

- *Gavel 75 DF*, 1.5 - 2.0 lb. (7 days)

### Mefenoxam + Chlorothalonil

- *Ridomil Gold Bravo*, 2.5 pt. (7 days)

### Penthiopyrad

- *Fontelis*, 16 - 24 fl oz. (3 days)

### Potassium phosphite/chlorothalonil

- *Catamaran*, 4-7 pt. (7 days)

### Potassium phosphite/chlorothalonil

- *Catamaran*, 4-7 pt. (7 days)

### Propiconazole

- *Propimax EC* (4 to 8 fl oz) or *Tilt* (4-8 fl oz) (14 days)

### Pyraclostrobin

- *Cabrio*, 8 to 12 oz. (7 days)

### Pyraclostrobin/Boscalid

- *Pristine*, 10.5 to 18.5 oz. (7 days)

### Pyrimethanil

- *Scala*, 18 fl oz. (7 days)

### Tebuconazole

- *Orius 3.6F*, *Tebuzol 3.6*, 4-6 fl oz. (7 days) Maximum 12 fl oz/acre/season. 12 hr REI.

### Zoxamide + chlorothalonil

- *Zing!*, 30 fl oz. (7 days)

- *UP-Cyde 2.5 EC*, 2.5 to 5 fl oz. (7 days) (RUP)

*Javelin WG*, 0.12 to 1.5 lb. (0 days)

*Mustang Max*, 2.24 to 4 oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

### THRIPS:

#### Acetamiprid

- *Assail 30 SG* (5 to 8 oz.) or *Assail 70WP* (2.1 to 3.4 oz.) (7 days)

#### Cypermethrin

- *Ammo 2.5 EC*, 4 to 5 fl oz. (7 days) (RUP)
- *Cypermethrin*, 4 to 5 fl oz. (7 days) (RUP)
- *Holster*, 4 to 5 fl oz. (7 days) (RUP)
- *UP-Cyde 2.5 EC*, 4 to 5 fl oz. (7 days) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

#### Malathion

- *Malathion 5* (2.5 pt.) or *Malathion 5 EC* (3 pt.) or *Malathion 57 EC* (1.5 to 2 pt.) or *Malathion 8* (1 to 2 pt.) or *Malathion 8 Aquamul* (1 to 1.56 pt.) (3 days)

*Movento*, 5 fl oz/A. (3 days)

*Mustang Max*, 2.88 to 4 oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant SC*, 6 to 10 fl oz. (1 day)

### ARMYWORM:

#### Bacillus thuringiensis

- *DiPel DF*, 1 to 2 lb. (0 days)

- *XenTari*, 0.5 to 2 lb. (0 days)

*Radiant SC*, 5 to 10 fl oz. (1 day)

#### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust SC* (3 to 6 fl oz.) (1 day)

### CUTWORM:

*DiPel DF*, 0.5 to 1 lb. (0 days)

### LEAFMINERS:

*Exirel*, 13.5-20.5 oz/A. (1)

## DISEASES

### SOIL TREATMENT:

DAMPING OFF (*Pythium* spp.):

Mefenoxam. Apply as a broadcast preplant incorporation or a surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone after planting with 1/2 to 1 in. of sprinkler irrigation.

- *Ridomil Gold SL*, 0.5-1 pt.

- *Ultra Flourish*, 1 to 2 pt.

### GREENHOUSE PREPLANT INCORPORATION:

DAMPING OFF (*Pythium* spp.), ROOT ROT (*Rhizoctonia* spp.):

#### Gliocladium virens GL-21

- *SoilGard 12 G*, 1 to 1.5 lb per cubic yard.

Biological control product that needs to be applied before disease development. Control may be limited under heavy disease pressure.

### FOLIAR TREATMENT:

BACTERIAL BLIGHT (*Erwinia carotovora* subsp. *carotovora*,

*Pseudomonas* spp.): Apply at 7 to 10 day intervals when plants are 4-6 in. tall. Can cause foliar phytotoxicity.

#### Copper Hydroxide

- *Champ DP Dry Prill*, 2/3 to 1 lb. (0 days)

- *Champ Formula 2 F*, 2/3 to 1 pt. (0 days)

#### Famoxadone + Cymoxanil

- *Tanos*, 8 to 10 oz. (1 day) Apply as preventative and tank mix.

BOTRYTIS LEAF BLIGHT (*Botrytis squamosa*): Apply every 7 to 10 days after the 4 leaf stage.

#### \* Azoxystrobin

- *Quadris*, 9.0 to 15.5 fl oz. (0 days)

## Leeks

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

Leeks are hosts for root-knot nematodes. Fields with soil or root problems of undetermined cause should be tested for nematodes (see Appendix C). Management of root-knot nematodes can be accomplished by using crop rotation. The benefits of utilizing nematicides for leeks grown in Michigan are undetermined at this time.

### INSECTS

**SEED TREATMENT:** None presently registered.

### SOIL TREATMENT:

#### ONION MAGGOT:

*Diazinon 50 W*, 4 to 8 lb. (RUP)

#### THRIPS:

*Admire Pro*, 14 fl oz. (21 days)

### FOLIAR TREATMENT:

CUTWORM, ARMYWORM: Apply banded over the row.

#### Cypermethrin

- *Ammo 2.5 EC*, 2.5 to 5 fl oz. (7 days) (RUP)

- *Cypermethrin*, 2.5 to 5 fl oz. (7 days) (RUP)

- *Holster*, 2 to 5 fl oz. (7 days) (RUP)

\*Materials marked with an asterisk are particularly recommended for problem infestations.

Do not apply more than one foliar application of Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

\* Azoxystrobin + Difenconazole

- *Quadris* Top, 12 to 14 fl oz. (7 days)

\* Chlorothalonil

- *Bravo* Ultrex, 1.4 to 2.7 lb every 7 - 10 days. (14 days)
- *Bravo* Weather Stik, *Echo* 720, *Equus* 720 SST, 1.5 to 3 pt every 7 to 10 days. (14 days)
- *Bravo* ZN, 2 1/4 to 4 1/4. (14 days)
- *Echo* 90 DF, 1 1/4 to 2 1/2 lb. (14 days)
- *Equus* DF, 1.4 to 2.7 lb. (14 days)

\* Difenconazole + Cyprodinil

- *Inspire* Super, 16 to 20 fl oz. (7 days)

\* Pyraclostrobin/Boscalid

- *Pristine*, 14.5 to 18.5 oz. (7 days)

Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 1.6 to 3.2 pt. (7 days)

Azoxystrobin + Propiconazole

- *Quilt* (14 to 27.5 fl oz (suppression)) or *Quilt* Xcel (17.5 to 26 fl oz) (14 days)

Boscalid

- *Endura*, 6.8 oz. (7 days)

Mefenoxam + Chlorothalonil

- *Ridomil* Gold Bravo, 2.5 pt. (14 days)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Penthiopyrad

- *Fontelis*, 16 - 24 fl oz. (3 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 4-7 pt. (14 days)

Propiconazole

- *Propimax* EC, 4 to 8 fl oz. (14 days)
- *Tilt*, 4-8 fl oz. (14 days)

Pyraclostrobin

- *Cabrio*, 12 oz (suppression). (7 days) Do not apply more than one application before alternating with another chemical.

Pyrimethanil

- *Scala*, 9 to 18 fl oz. (7 days)

DOWNY MILDEW (*Peronospora destructor*): Apply every 7 to 10 days after the 4 leaf stage.

\* Dimethomorph

- *Forum*, 6 fl oz. (0 days)

\* Mefenoxam + Chlorothalonil

- *Ridomil* Gold Bravo, 2.5 pt. (14 days) Maximum 3 applications.

\* Mefenoxam + Copper Hydroxide

- *Ridomil* Gold Copper, 2 lb. (7 days) Maximum 3 applications.

Ametoctradin + Dimethomorph

- *Zapro*, 14 fl. oz. (0 days)

Azoxystrobin

- *Quadris*, 9.0 to 15.5 fl oz. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 2.4 - 3.7 pt. (14 days)

Chlorothalonil. Downy mildew suppression.

- *Bravo* Ultrex, 1.4 to 2.7 lb every 7 - 10 days. (14 days)
- *Bravo* Weather Stik, *Echo* 720, *Equus* 720 SST, 1.5 to 3 pt every 7 days. (14 days)
- *Bravo* Weather Stik Zn, 1.5 to 3 pt every 7 to 10 days. (14 days)
- *Echo* 90 DF, 1.2 to 2.4 lb every 7 days. (14 days)

Famoxadone + Cymoxanil

- *Tanos*, 8 to 10 oz. (1 day) Apply as preventative and tank mix.

Fenamidone

- *Reason* 500 SC, 5.5 fl oz every 5 to 10 days. (7 days)

Mandipropamid

- *Revus*, 8 fl oz. (7 day)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 4-7 pt. (14 days)

Pyraclostrobin

- *Cabrio*, 12 oz. (7 days) Do not apply more than application before alternating with another chemical.

**Note:** Most fungicides that protect against purple blotch or Botrytis leaf blight may also provide limited downy mildew protection.

PURPLE BLOTCH (*Alternaria porri*):

\* Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 1.6 to 3.2 pt. (7 days)

\* Azoxystrobin + Difenconazole

- *Quadris* Top, 12 to 14 fl oz. (7 days)

\* Azoxystrobin + Propiconazole

- *Quilt*, 14 to 27.5 fl oz. (14 days)
- *Quilt* Xcel, 14 to 21 fl oz. (14 days)

\* Pyraclostrobin

- *Cabrio*, 8 to 12 oz. (7 days)

Azoxystrobin

- *Quadris*, 6 to 12 fl oz. (0 days)

Boscalid

- *Endura*, 6.8 oz. (7 days)

Chlorothalonil

- *Echo* 90 DF, 1 1/4 to 2 1/2 lb. (14 days)
- *Equus* DF, 1.4 to 2.7 lb. (14 days)

Famoxadone + Cymoxanil

- *Tanos*, 8 oz. (1 day) Apply as preventative and tank mix.

Fenamidone

- *Reason* 500 SC, 5.5 fl oz. (7 days)

Mefenoxam + Chlorothalonil

- *Ridomil* Gold Bravo, 2.5 pt. (14 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 4-7 pt. (14 days)

Propiconazole

- *Propimax* EC (4 to 8 fl oz) or *Tilt* (4-8 fl oz) (14 days)

Pyraclostrobin/Boscalid

- *Pristine*, 10.5 to 18.5 oz. (7 days)

Pyrimethanil

- *Scala*, 18 fl oz. (7 days)

## Lettuce

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

Root-knot and root-lesion can reduce lettuce yields. Fields with soil or root problems of undetermined cause should be tested for nematodes (see Appendix C). If the plant-parasitic nematodes are present in population densities above the economic threshold for lettuce, crop rotation or application of a nematicide is recommended. The following nematicides are suitable for control of root-knot and root-lesion nematodes in lettuce production.

## Lettuce

### FALL SOIL FUMIGATION (BROADCAST):

Fumigate in the fall when soil temperatures at a 6 inch depth are above 50F. Inject the fumigant to a soil depth of 8 inches and lightly seal the soil immediately after application. Use soil fumigants only as directed on the label. In some limited situations, soil fumigants can be applied in the spring in Michigan.

Correct soil moisture, temperature and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or by immediate tarping.

#### 1,3-D

- *Telone II*, 25 gal/A (muck soil), 9-18 gal/A (mineral soil).

## INSECTS

### SOIL TREATMENT:

#### CUTWORM:

##### Diazinon

- *Diazinon* 50 W (4 lb.) or *Diazinon* AG 500 (2 to 4 qt.) or *Diazinon* AG600 (51 fl oz.) Use only as directed. (RUP)

#### FLEA BEETLE:

*Scorpion* 35SL, 9 to 10.5 fl oz. (21 days) See label for application methods.

#### APHIDS:

##### Imidacloprid

- *Admire Pro*, 4.4 to 10.5 fl oz. (21 days)
- *Nuprid* 2 F, 10 to 24 fl oz. (21 days)
- Verimark*, 6.75-13.5 oz/A. (0 days)

#### LEAFHOPPERS:

##### Dinotefuran

- *Scorpion* 35SL (9 to 10.5 fl oz) or *Venom* (5 to 6 oz) (21 days)

##### Imidacloprid

- *Admire Pro*, 4.4 to 10.5 fl oz. (21 days)
- *Nuprid* 2 F, 10 to 24 fl oz. (21 days)

#### LEAFMINERS:

##### Dinotefuran

• *Scorpion* 35SL (9 to 10.5 fl oz) or *Venom* (5 to 6 oz) (21 days)  
*Verimark*, 6.75-13.5 oz/A. (0 days)

#### ARMYWORM:

*Verimark*, 5-10 oz/A. (0 days)

#### DIAMONDBACK MOTH:

*Verimark*, 5-10 oz/A. (0 days)

### PLANTING TREATMENT:

#### APHIDS, LEAFHOPPER, FLEA BEETLE:

*Belay* 50 WDG, 4.8 to 6.4 oz. See label for application methods.

##### Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum* 75 SG (1.66 to 3.67 oz.) (30 days) See label for application methods.

#### APHIDS, ARMYWORM, CABBAGE LOOPERS, FLEA BEETLE,

#### LEAFHOPPERS:

*Durivo*, 10 to 13 fl oz. (30 days)

#### ARMYWORM, CABBAGE LOOPERS:

*Coragen*, 3.5 to 5 fl oz. (1 day) See label for application methods.

#### ARMYWORM, CUTWORM:

*Capture* LFR, 3.4 to 6.8 fl oz. Head lettuce only. See label for application methods. (RUP)

#### ARMYWORM, CORN EARWORM, DIAMONDBACK MOTH, :

*Verimark*, 5-10 oz/A. (0 days)

#### LOOPERS, APHIDS, LEAFMINERS:

*Verimark*, 6.75-13.5 oz/A. (0 days)

### FOLIAR TREATMENT:

CUTWORM, ARMYWORM: Apply when damage is first seen and repeat as needed.

#### \* Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (1 day) (RUP)
- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 fl oz.) (1 day) (RUP)

- *Pounce* 25 WP, 6.4 to 12.8 oz. (1 day) (RUP)

*Athena*, 7 to 17 fl oz. (7 days) Head lettuce only. (RUP)

*Belt* SC, 1.5 fl oz. (1 day)

Bifenthrin. Head lettuce only.

- *Bifenture* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Brigade @* 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (7 days) (RUP)

- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

Bifenthrin + Imidacloprid. Head lettuce only.

- *Brigadier*, 5.1 to 6.1 fl oz. (7 days) (RUP)

- *Swagger*, 10.2 to 12.2 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (7 days) Head lettuce only. (RUP)

*Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)

*Javelin* WG, 0.12 to 1.5 lb. (0 days)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Vetiva*, 12 to 17 fl oz. (7 days)

#### ASTER LEAFHOPPERS:

Acephate. Crisphead type only.

- *Acephate* 90 WDG (0.55 to 1.11 lb.) or *Acephate* 90 WSP (0.5 to 1.1 lb.) or *Acephate* 97 (0.5 to 1 lb.) or *Acephate* 97 UP (0.5 to 1 lb.) (21 days)

- *Bracket* 97, 8 to 16 oz. (21 days)

- *Orthene* 97, 8 to 16 oz. (21 days)

Do not apply more than 2.13 lb per season.

*Actara*, 1.5 to 3 oz. (7 days)

*Athena*, 7 to 17 fl oz. (7 days) Head lettuce only. (RUP)

*Baythroid* XL, 2.4 to 3.2 fl oz. (0 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

Bifenthrin. Head lettuce only.

- *Bifenture* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Brigade @* 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (7 days) (RUP)

- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

Bifenthrin + Imidacloprid. Head lettuce only.

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)

- *Swagger*, 7.6 to 12.2 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (7 days) (RUP)

- *Steed*, 3.5 to 4.7 fl oz. (7 days) Head lettuce only. (RUP)

*Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)

Carbaryl

- *Carbaryl* 4L, 0.5 to 2 qt. (14 days)

- *Sevin* 4 F (0.5 to 2 qt.) or *Sevin* 80 S (0.63 to 2.5 lb.) or *Sevin* 80 WSP (0.67 to 2.5 lb.) or *Sevin* XLR Plus (0.5 to 2 qt.) (14 days)

Cypermethrin. Head lettuce only.

- *Ammo* 2.5 EC, 2.5 to 5 fl oz. (5 days) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (5 days) (RUP)
- *Holster*, 2.5 to 5 fl oz. (5 days) (RUP)
- *UP-Cyde* 2.5 EC, 2.5 to 5 fl oz. (5 days) (RUP)

Dimethoate

- *Dimethoate* 4 EC, *Dimethoate* 400, *Dimethoate* 4E, 0.5 pt.. (14 days) Leaf lettuce only.

Dinotefuran

- *Scorpion* 35SL, 2 to 5.25 fl oz. (7 days)
- *Venom*, 1 to 3 oz. (7 days)

Endigo ZC, 4 to 4.5 fl oz. (7 days) (RUP)Imidacloprid

- *Admire* Pro, 1.3 fl oz. (7 days)
- *Nuprid* 1.6 F, 3.8 fl oz. (7 days)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

Leverage 360, 3 fl oz. (7 days) (RUP)Malathion

- *Malathion* 5, *Malathion* 5 EC, *Malathion* 57 EC, or *Malathion* 8 (2 pt.) or *Malathion* 8 Aquamul (1.25 to 1.88 pt.) (7 days for head lettuce & 14 days for leaf lettuce for Malathion 5 EC & 8; 14 days for all others)

Methomyl

- *Lannate* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)
- *Nudrin* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

Mustang Max, 2.24 to 4 oz. (1 day) Head lettuce only. (RUP)Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (1 day) (RUP)
- *Perm-UP* 25DF (3.2 to 12.8 oz.) or *Perm-UP* 3.2 EC (2 to 8 oz.) (1 day) (RUP)
- *Pounce* 25 WP, 3.2 to 12.8 oz. (1 day) (RUP)

Proaxis, 2.56 to 3.84 fl oz. (1 day) (RUP)Pyrenone, 1 to 12 fl oz. (0 days)Carbaryl 4L, 0.5 to 2 qt. (14 days)Sevin 4 F (0.5 to 2 qt.) or Sevin 80 S (0.63 to 2.5 lb.) or Sevin 80WSP (0.67 to 2.5 lb.) or Sevin XLR Plus (0.5 to 2 qt.) (14 days)Torac, 14.0-21.0 oz/A. (1) Do not make more than 2 applications per crop cycle and no more than 4 applications per year. Allow at least 14 days between applications.Vetica, 14 to 17 fl oz. (7 days)Voliam Flexi, 4 to 7 oz. (7 days)

## APHIDS:

\* Acetamiprid

- *Assail* 30 SG (2 to 4 oz.) or *Assail* 70WP (0.8 to 1.7 oz.) (7 days)

\* Fulfill, 2.75 oz. (0 days)Acephate. Chishead only.

- *Acephate* 90 WDG (0.55 to 1.11 lb.) or *Acephate* 90 WSP (0.5 to 1.1 lb.) or *Acephate* 97 (0.5 to 1 lb.) or *Acephate* 97 UP (0.5 to 1 lb.) (21 days)
- *Bracket* 97, 8 to 16 oz. (21 days)
- *Orthene* 97, 8 to 16 oz. (21 days)

Do not apply more than 2.13 lb per season.

Actara, 1.5 to 3 oz. (7 days)Athena, 7 to 17 fl oz. (7 days) Head lettuce only. (RUP)Belay 50 WDG, 1.6 to 2.1 oz. (7 days)Beleaf 50 SG, 2 to 2.8 oz. (0 days)Bifenthrin. Head lettuce only.

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @* 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (7 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

Bifenthrin + Imidacloprid. Head lettuce only.

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 7.6 to 12.2 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (7 days) (RUP)

Diazinon

- *Diazinon* AG 500 (0.5 to 1 pt) or *Diazinon* AG600 (6.5 to 12.75 fl oz.) (14 days) (RUP)

Dimethoate

- *Dimethoate* 4 EC, *Dimethoate* 400, *Dimethoate* 4E, 0.5 pt.. (14 days) Leaf lettuce only.

Endigo ZC, 4 to 4.5 fl oz. (7 days) (RUP)Exirel, 13.5-20.5 oz/A. (1)Imidacloprid. Additional generic brands available.

- *Admire* Pro, 1.3 fl oz. (7 days)
- *Nuprid* 1.6 F, 3.8 fl oz. (7 days)

Do not use if Imidacloprid was used at planting. Do not exceed 19.2 oz/Acre per season.

Leverage 360, 3 fl oz. (7 days) (RUP)Malathion

- *Malathion* 5, *Malathion* 5 EC, *Malathion* 57 EC, or *Malathion* 8 (2 pt.) or *Malathion* 8 Aquamul (1.25 to 1.88 pt.) (7 days for head lettuce & 14 days for leaf lettuce for Malathion 5 EC & 8; 14 days for all others)

Methomyl

- *Lannate* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)
- *Nudrin* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

Movento, 4 to 5 fl oz. (3 days) Must be tank mixed with adjuvant having spreading and penetrating properties.Mustang Max, 2.24 to 4 oz. (1 day) (RUP)Pyrenone, 1 to 12 fl oz. (0 days)Voliam Flexi, 4 to 7 oz. (7 days)

## TARNISHED PLANT BUG: Head lettuce only.

Athena, 13.5 to 17 fl oz. (7 days) Head lettuce only. (RUP)Baythroid XL, 2.4 to 3.2 fl oz. (0 days) (RUP)Beleaf 50 SG, 2 to 2.8 oz. (0 days)Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)
- *Bifenture* EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @* 2EC (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (7 days) (RUP)
- *Capture* 2 EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (7 days) (RUP)

## Lettuce

### Bifenthrin + Imidacloprid. Head lettuce only.

- *Brigadier*, 3.8 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 7.6 to 12.2 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero EW* (11.2 oz.) (7 days) Head lettuce only. (RUP)

### Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (14 days)
- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (14 days)

### Cypermethrin. Head lettuce only.

- *Ammo* 2.5 EC, 2.5 to 5 fl oz. (5 days) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (5 days) (RUP)
- *Holster*, 2.5 to 5 fl oz. (5 days) (RUP)
- *UP-Cyde* 2.5 EC, 2.5 to 5 fl oz. (5 days) (RUP)

### Endigo ZC, 4 to 4.5 fl oz. (7 days) (RUP)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

### *Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

### *Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

### *Pyrenone*, 1 to 12 fl oz. (0 days)

### *Carbaryl* 4L, 1 to 2 qt. (14 days)

### *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (14 days)

CATERPILLARS: Caterpillars (mainly cabbage loopers), are usually controlled with aster leafhopper program, but damage potential may require additional treatments.

### Acephate. Crisphead type only.

- *Acephate* 90 WDG (1.11 lb.) or *Acephate* 90 WSP (1.1 lb.) or *Acephate* 97 (1 lb.) or *Acephate* 97 UP (1 lb.) (21 days)
- *Bracket* 97, 16 oz. (21 days)
- *Orthene* 97, 16 oz. (21 days)

### *Athena*, 7 to 17 fl oz. (7 days) Head lettuce only. (RUP)

### *Avaunt*, 2.5 to 3.5 oz. (3 days)

### Bacillus thuringiensis

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *Biobit* HP, 0.5 to 1 lb. (0 days)
- *DiPel* DF (0.5 to 1 lb.) or *DiPel* ES (1 to 2 pt.) (0 days)
- *Javelin* WG, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

### *Baythroid* XL, 1.6 to 2.4 fl oz. (0 days) (RUP)

### *Belt* SC, 1.5 fl oz. (1 day)

### Bifenthrin. Head lettuce only.

- *Bifenture* 10 DF, 2.1 to 6.4 oz/A. (7 days)
- *Bifenture* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (7 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

### Bifenthrin + Imidacloprid. Head lettuce only.

- *Brigadier*, 5.1 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 10.2 to 12.2 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (7 days) Head lettuce only. (RUP)

### Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (14 days)

- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (14 days)

### *Confirm* 2F, 6 to 8 fl oz. (7 days)

*Coragen*, 3.5 to 5 fl oz. (1 day) Minimum of 3 days between applications; do not apply more than 15.4 fl oz. per season.

### Cypermethrin. Head lettuce only.

- *Ammo* 2.5 EC, 3.75 to 5 fl oz. (5 days) (RUP)
- *Cypermethrin*, 3.75 to 5 fl oz. (5 days) (RUP)
- *Holster*, 3.75 to 5 fl oz. (5 days) (RUP)
- *UP-Cyde* 2.5 EC, 3.75 to 5 fl oz. (5 days) (RUP)

### Esfenvalerate

- *Adjourn*, 4.8 to 9.6 fl oz. (7 days) (RUP)
- *Asana* XL, 4.8 to 9.6 fl oz. (7 days) (RUP)
- *S-FenvaloStar*, 4.8 to 9.6 fl oz. (7 days) (RUP)

*Intrepid* 2F, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

### *Kryocide*, 8 to 20 lb. (14 days)

### *Larvin* 3.2, 16 to 30 oz. (14 days) (RUP)

### *Leverage* 360, 3 fl oz. (7 days) (RUP)

### Malathion

- *Malathion* 5, or *Malathion* 5 EC (3 pt.) or *Malathion* 57 EC (2.5 to 3 pt.) or *Malathion* 8 (2 pt.) or *Malathion* 8 Aquamul (1.88 pt.) (7 days for head lettuce & 14 days for leaf lettuce for *Malathion* 5 EC & 8; 14 days for all others)

### Methomyl

- *Lannate* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)
- *Nudrin* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

### *Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

### Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (1 day) (RUP)
- *Perm-UP* 25DF (3.2 to 12.8 oz.) or *Perm-UP* 3.2 EC (2 to 8 fl oz.) (1 day) (RUP)
- *Pounce* 25 WP, 3.2 to 12.8 oz. (1 day) (RUP)

### *Proclaim*, 3.2 to 4.8 oz. (7 days) Head Lettuce only. (RUP)

### *Pyrenone*, 1 to 12 fl oz. (0 days)

### *Radiant* SC, 5 to 10 fl oz. (1 day)

### *Carbaryl* 4L, 1 to 2 qt. (14 days)

### *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (14 days)

### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (1 day)
- Vetica*, 12 to 17 fl oz. (7 days)
- Voliam* Flexi, 4 to 7 oz. (7 days)

VEGETABLE LEAFMINER: Apply as soon as visible mines appear and repeat every 7 days as needed.

### Abamectin

- *Agri-Mek* 0.15 EC (8 to 16 fl oz.) or *Agri-Mek* SC (1.75 to 3.5 fl oz.) (7 days) Use with a non-ionic surfactant. (RUP)

### *Athena*, 13.5 to 17 fl oz. (7 days) Head lettuce only. (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) Head lettuce only. (RUP)

### *Coragen*, 5 to 7.5 fl oz. (1 day)

### Dimethoate

- *Dimethoate* 4 EC, *Dimethoate* 400, *Dimethoate* 4E, 0.5 pt.. (14 days) Leaf lettuce only.

### Dinotefuran

- *Scorpion* 35SL, 2 to 5.25 fl oz. (7 days)

- *Venom*, 1 to 3 oz. (7 days)

*Exirel*, 13.5-20.5 oz/A. (1)

Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (1 day) (RUP)
- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (1 day) (RUP)
- *Pounce* 25 WP, 6.4 to 12.8 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 6 to 10 fl oz. (1 day)

Spinosad

- *Entrust* (2 to 3 oz.) or *Entrust* SC (6 to 10 fl oz.) (1 day)
- Swagger*, 10.2 to 12.2 fl oz. (7 days) Head lettuce only. (RUP)
- Trigard*, 2.66 oz. (7 days)

CUTWORM:

*Bacillus thuringiensis*

- *Biobit* HP, 0.5 to 1 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid* XL, 0.8 to 1.6 fl oz. (0 days) (RUP)

Cypermethrin

- *Ammo* 2.5 EC, 2.5 to 5 fl oz. (5 days) (RUP)
  - *Cypermethrin*, 2.5 to 5 fl oz. (5 days) (RUP)
  - *Holster*, 2.5 to 5 fl oz. (5 days) (RUP)
  - *UP-Cyde* 2.5 EC, 2.5 to 5 fl oz. (5 days) (RUP)
- Empower*, 3.5 to 8.7 lb. (7 days) Head lettuce only. (RUP)

Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (1 day) (RUP)

Methomyl

- *Lannate* LV (1.5 pt.) or *Lannate* SP (0.5 lb.) (7 days) (RUP)
- *Nudrin* LV (1.5 pt.) or *Nudrin* SP (0.5 lb.) (7 days) (RUP)

*Mustang* Max, 2.24 to 4 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (1 day) (RUP)

*Steed*, 3.5 to 4.7 fl oz. (7 days) Head lettuce only. (RUP)

SUPPRESSION ONLY

*Torac*, 21 oz/A. (1) Do not make more than 2 applications per crop cycle and no more than 4 applications per year. Allow at least 14 days between applications.

FLEA BEETLE:

*Actara*, 1.5 to 3 oz. (7 days)

*Athena*, 7 to 17 fl oz. (7 days) Head lettuce only. (RUP)

*Baythroid* XL, 2.4 to 3.2 fl oz. (0 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

*Bifenthrin*. Head lettuce only.

- *Bifenture* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade* @ 2EC (2.1 to 6.4 fl oz) or *Brigade* WSB (5.3 to 16 oz.) (7 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

*Bifenthrin* + *Imidacloprid*. Head lettuce only.

- *Brigadier*, 5.1 to 6.1 fl oz. (7 days) (RUP)
- *Swagger*, 10.2 to 12.2 fl oz. (7 days) (RUP)

*Bifenthrin* + *Zeta-Cypermethrin*

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) Head lettuce only. (RUP)

*Bifenture* 10 DF, 2.1 to 6.4 oz/A. (7 days)

*Carbaryl*

- *Carbaryl* 4L, 0.5 to 1 qt. (14 days)

- *Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* 80 WSP (0.67 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (14 days)

Cypermethrin

- *Ammo* 2.5 EC, 2.5 to 5 fl oz. (5 days) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (5 days) (RUP)
- *Holster*, 2.5 to 5 fl oz. (5 days) (RUP)
- *UP-Cyde* 2.5 EC, 2.5 to 5 fl oz. (5 days) (RUP)

*Endigo* ZC, 4 to 4.5 fl oz. (7 days) (RUP)

Imidacloprid

- *Admire* Pro, 1.3 fl oz. (7 days)
- *Nuprid* 1.6 F, 3.8 fl oz. (7 days)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Leverage* 360, 3 fl oz. (7 days) (RUP)

*Mustang* Max, 2.24 to 4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Scorpion* 35SL, 2 to 5.25 fl oz. (7 days)

*Carbaryl* 4L, 0.5 to 1 qt. (14 days)

*Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* 80 WSP (0.67 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (14 days)

*Torac*, 17-21 oz/A. (1) Do not make more than 2 applications per crop cycle and no more than 4 applications per year. Allow 14 days between applications.

*Voliam* Flexi, 4 to 7 oz. (7 days)

ARMYWORM:

*Acephate*

- *Acephate* 90 WDG (1.11 lb.) or *Acephate* 90 WSP (1.1 lb.) or *Acephate* 97 (1 lb.) or *Acephate* 97 UP (1 lb.) (21 days)
- *Bracket* 97, 16 oz. (21 days)
- *Orthene* 97, 16 oz. (21 days)

*Avaunt*, 3.5 to 6 oz. (3 days)

*Bacillus thuringiensis*

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *Biobit* HP, 0.5 to 2 lb. (0 days)
- *DiPel* DF (1 to 2 lb.) or *DiPel* ES (2 to 4 pt.) (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

*Baythroid* XL, 2.4 to 3.2 fl oz. (0 days) (RUP)

*Confirm* 2F, 6 to 8 fl oz. (7 days)

Cypermethrin

- *Ammo* 2.5 EC, 3.75 to 5 fl oz. (5 days) (RUP)
- *Cypermethrin*, 3.75 to 5 fl oz. (5 days) (RUP)
- *Holster*, 3.75 to 5 fl oz. (5 days) (RUP)
- *UP-Cyde* 2.5 EC, 3.75 to 5 fl oz. (5 days) (RUP)

*Endigo* ZC, 4 to 4.5 fl oz. (7 days) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

*Intrepid* 2F, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

*Kryocide*, 8 to 20 lb. (14 days)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

Methomyl

- *Lannate* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

## Lettuce

- *Nudrin* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

*Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)

*Radiant* SC, 5 to 10 fl oz. (1 day) Minimum of 4 days between applications; do not apply more than 34 fl oz. per season.

### Spinosa

- *Entrust* (1.25 to 2.5 oz.) or *Entrust* SC (4 to 8 fl oz.) (1 day)

*Torac*, 21 oz/A. (1) Do not make more than 2 applications per crop cycle and no more than 4 applications per year. Allow at least 14 days between applications.

*Voliam* Flexi, 4 to 7 oz. (7 days)

### DIAMONDBACK MOTH:

*Exirel*, 7-13.5 oz/A. (1)

### CABBAGE LOOPERS:

*Exirel*, 10-17 oz/A. (1)

### THRIPS:

*Exirel*, 13.5-20.5 oz/A. (1)

*Torac*, 21 oz/A. (1) Do not make more than 2 applications per crop cycle and no more than 4 applications per year. Allow 14 days between applications.

## MITES

### Abamectin

- *Agri-Mek* 0.15 EC (8 to 16 fl oz.) or *Agri-Mek* SC (1.75 to 3.5 fl oz.) (7 days) Use with a non-ionic surfactant. (RUP)

### Bifenthrin

- *Bifenxure* EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Bifenxure* 10 DF, 12.8 to 16 oz/A. (7 days)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (7 days) (RUP)
- *Capture* 2 EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (7 days) (RUP)

### Bifenthrin + Avermectin

- *Athena*, 13.5 to 17 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero* EW (11.2 oz.) (7 days) (RUP)

### Malathion

- *Malathion* 5 EC (2 pt.) or *Malathion* 57 EC (1.5 to 2 pt.) or *Malathion* 8 (2 pt.) or *Malathion* 8 Aquamul (1.88 pt.) (7 days for head lettuce & 14 days for leaf lettuce for Malathion 5 EC & 8; 14 days for all others)

## SLUGS

*Deadline* M-Ps 4% (20 to 40 lb) or *Metaldehyde* 3.5 G (30 to 40 lb) Apply between rows. Avoid contact to edible product.

## DISEASES

### SEED TREATMENT:

DAMPING OFF (*Rhizoctonia* spp., *Pythium* spp. *Botrytis* spp.):

#### Fludioxinil

- *Maxim* 4 FS, 0.08 to 0.16 fl oz/100 lb seed (*Rhizoctonia*). Commercial seed treatment plants only.

#### Mefenoxam

- *Apron* XL, 0.085 - 0.64 fl oz/100 lb seed.

#### Thiram

- 42-S Thiram, *Thiram* 480DP, *Thiram* 50 WP Dyed, 8 oz/100 lb seed.

### SEEDBED TREATMENT:

DAMPING OFF SEED and CROWN ROTs (*Rhizoctonia* spp., *Pythium* spp., *Botrytis* spp., *Sclerotinia sclerotiorum*):

**Note:** For seedbed protection programs, sterilize seedbed with steam or Chemicals (see Appendix A). Follow recommended procedures carefully.

### PLANTING TREATMENT:

PYTHIUM DAMPING OFF:

Mefenoxam. Apply as a broadcast preplant incorporation or a surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting with 1/2 to 1 in. of sprinkler irrigation.

- *Ridomil* Gold GR, 20 to 40 lb.
- *Ridomil* Gold WSP, 1 to 2 lb.
- *Ultra* Flourish, 2-4 pt.

### DRIP APPLICATION:

DOWNY MILDEW (*Peronospora effusa*):

#### \* Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days)

### FOLIAR TREATMENT:

DROP (*Sclerotinia sclerotiorum* or *Sclerotinia minor*):

#### Boscalid

- *Endura*, 8 to 11 oz. (14 days)

#### Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 8 to 11 fl oz. (1 day)

#### Iprodione

- *Meteor*, 1.5 - 2.0 pt. (14 days)
- *Rovral* 4 Flowable, 1 1/2 to 2 pt. (14 days) Apply at 3-leaf stage to just after thinning and again in 10 days. Make a third application 10 days later if conditions for disease remain favorable.

**Note:** See label for permissible crop rotations.

#### Penthiopyrad

- *Fontelis*, 16 - 24 fl oz. (3 days)

BOTTOM ROT (*Rhizoctonia solani*):

#### Boscalid

- *Endura*, 8 to 11 oz (bottom rot suppression). (14 days)

#### Iprodione

- *Meteor*, 1.5 - 2.0 pt. (14 days)
- *Rovral* 4 Flowable, 1 1/2 to 2 pt. (14 days) Apply at 3-leaf stage to just after thinning and again in 10 days. Make a third application 10 days later if conditions for disease remain favorable.

**Note:** See label for permissible crop rotations.

DOWNY MILDEW (*Bremia lactucae*):

#### \* Dimethomorph

- *Forum*, 6 fl oz. (0 days)

#### \* Famoxadone + Cymoxanil

- *Tanos*, 8 to 10 oz. (3 days)

#### \* Fosetyl-Aluminum

- *Aliette* WDG, 2 to 5 lb at 7- to 21-day intervals. (3 days) Do not make more than 7 applications per season. Do not tank mix with copper fungicides.

#### Ametoctradin + Dimethomorph

- *Zapro*, 14 fl. oz. (0 days)

#### Azoxystrobin

- *Quadris*, 12.0 to 15.5 fl oz every 7 - 14 days. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

Copper Hydroxide

- *Champ* Formula 2 F, 2/3 to 1 1/3 pt. (0 days)
- *Champion* WP, *Nu-Cop* 50 DF, 1 to 2 lb. (0 days)
- *Nu-Cop* 3 L, 2/3 to 2 2/3 pt. (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1.7 pt. (0 days)

Cymoxanil

- *Curzate* 60 DF, 3.2 to 5 oz. (30 days) Do not apply more than 30 oz/acre/season.

Fenamidone

- *Reason* 500 SC, 5.5 to 8.2 fl oz every 5 to 10 days. (2 days)

Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days)

Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 8 to 11 fl oz. (1 day)

Mancozeb

- *Koverall*, 2 lb. (10 days)
- *Manzate* Max, 1.2 - 1.6 qt. (14 days)
- *Manzate* Pro-Stick, 1.6 to 2.1 lb. (7 days)

Mandipropamid

- *Revus*, 8 fl oz. (1 day)

Mefenoxam

- *Ridomil* Gold SL, 0.125-0.25 pt. (7 days)

Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 2.5 to 5 pt every 7 - 21 days. (0 days)
- *Prophyt*, 2 to 4 pt. (0 days)

Propamocarb

- *Previcur* Flex, 2 pt. (2 days)

Pyraclostrobin

- *Cabrio*, 16 oz. (0 days)

## SEEDLING DISEASES:

Propamocarb

- *Previcur* Flex, 2 pt. (2 days) Pythium only: Directed spray at lower portion of plant and surrounding soil, or via drip irrigation, transplant water or sprinklers.

## Melons

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

Muskmelons and watermelons are hosts for root-knot and lesion nematodes. These nematodes can reduce melon yields but yield losses in Michigan have not been documented. If you suspect nematodes are reducing melon yields collect root and soil samples for analyses as described in Appendix C. If the numbers of nematodes recovered from those samples exceed damage thresholds; control options will be suggested. Vydate 2L is labeled for use in melons.

### PREPLANT NEMATOCIDE TREATMENT:

Fluensulfone

- *Nimitz* 480EC, 3.5 - 5.0 pints/A. apply broadcast and incorporate either mechanically or with water to a depth of 6-8 inches at least 7 days prior to transplanting or planting. Do not apply if heavy rainfall is expected within 48 hours of application. This material can be applied in bands or by drip but apparently is most effective if applied broadcast and incorporated. Do not apply to extremely cold soils (<40 F) as nematodes have to be active for the product to be effective. Product has not been evaluated in Michigan.

## INSECTS

### SEED TREATMENT:

## CUCUMBER BEETLE:

*Cruiser* 5 FS, . See label for rates and application methods.

### SOIL TREATMENT:

## APHIDS, FLEA BEETLE, LEAFHOPPER, THRIPS:

*Durivo*, 10 to 13 fl oz. (30 days)

Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum* 75 SG (1.66 to 3.67 oz) (30 days) See label for application methods.

## THRIPS, LEAFHOPPERS, SQUASH BUG:

*Venom*, 5 to 6 oz. (21 days) See label for application methods.

## CUTWORM:

*Capture* LFR, 3.4 to 6.8 fl oz. (RUP)

Diazinon

- *Diazinon* 50 W (4 lb.) or *Diazinon* AG 500 (2 to 4 qt.) or *Diazinon* AG600 (51 to 102 fl oz.) Use only as directed. (RUP)

## SEED CORN MAGGOT:

*Athena*, 8.5 to 17 fl oz. (RUP)

*Bifenthrin*. See label for application methods.

- *Bifenture* 10 DF, 8 to 16 oz/A. (3 days)
- *Brigade* WSB, 8 to 16 oz. (RUP)
- *Capture* LFR, 3.4 to 6.8 fl oz. (RUP)

## FLEA BEETLE LARVAE:

*Capture* LFR, 3.4 to 6.8 fl oz. See label for application methods. (RUP)

## APHIDS, CUCUMBER BEETLES, LEAFHOPPERS, THRIPS:

*Belay* 50 WDG, 4.8 to 6.4 oz. See label for application methods

Imidacloprid

- *Admire* Pro, 7 to 10.5 fl oz. (21 days)
- *Nuprid* 2 F, 16 to 24 fl oz. (21 days)
- *Scorpion* 35SL, 9 to 10.5 fl oz. (21 days)

## ARMYWORM:

*Verimark*, 6.75-13.5 oz/A. (1)

## APHIDS and THRIPS:

*Verimark*, 13.5-20.5. (1)

## LEAFHOPPERS:

*Sivanto*, 21 - 28 fl oz/A.

## APHIDS:

*Sivanto*, 21 - 28 fl oz/A.

## WHITEFLIES:

*Sivanto*, 21 - 28 fl oz/A.

**FOLIAR TREATMENT:** Melon plants may be sensitive to certain insecticide formulations. Make certain a problem exists before treatment. Read and observe restrictions on the label. To avoid killing bees, do not treat melons during bloom.

CUTWORM, ARMYWORM: Apply if >1% of plants are injured.

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

Bacillus thuringiensis

- *Javelin* WG, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

*Belt* SC, 1.5 fl oz. (1 day)

Bifenthrin

- *Bifenture* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.6 to 6.4 fl oz.) or *Brigade* WSB (8 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)

## Melons

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

*Bifenture* 10 DF, 8 to 16 oz/A. (3 days)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

### Methomyl

- *Lannate LV* (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate SP* (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

- *Nudrin LV* (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin SP* (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Vetica*, 12 to 17 fl oz. (7 days)

STRIPED and SPOTTED CUCUMBER BEETLE: Apply if numbers exceed 0.1 to 1/plant. Repeat as needed. Use preplant Furadan treatment in fields with severe problems.

### Acetamiprid

- *Assail 30 SG* (2.5 to 5.3 oz.) or *Assail 70WP* (1.1 to 2.3 oz.) (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Baythroid XL*, 2.4 to 2.8 fl oz. (0 days) (RUP)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

### Bifenthrin

- *Bifenture EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.6 to 6.4 fl oz.) or *Brigade WSB* (8 to 16 oz.) (3 days) (RUP)
- *Capture 2 EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

### Carbaryl

- *Carbaryl 4L*, 1 qt. (3 days)
- *Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

*Danitol 2.4 EC*, 10.66 to 16 fl oz. (7 days) (RUP)

### Diazinon

- *Diazinon 50 W* (0.5 to 1.5 lb.) or *Diazinon AG 500* (0.5 to 1.5 pt.) (3 days) *Diazinon 50 W* for honeydew melons only. (RUP)

### Dinotefuran

- *Scorpion 35SL*, 2 to 7 fl oz. (1 day)
- *Venom*, 3 to 4 oz. (1 day)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

### Esfenvalerate

- *Adjour*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

*Kryocide*, 8 to 16 lb. (14 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

### Malathion

- *Malathion 5*, or *Malathion 57 EC* (2 pt for watermelons; 1.6 pt for all others) or *Malathion 8 Aquamul* (1.5 pt for watermelons; 1 pt for all others) (1 day)

### Methomyl

- *Lannate LV* (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate SP* (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

- *Nudrin LV* (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin SP* (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

*Mustang Max*, 2.8 to 4 oz. (1 day) (RUP)

### Permethrin

- *Ambush 25 W*, 6.4 to 12.8 oz. (0 days) (RUP)
- *Perm-UP 25DF* (6.4 to 12.8 oz.) or *Perm-UP 3.2 EC* (4 to 8 oz.) (0 days) (RUP)
- *Pounce 25 WP*, 6.4 to 12.8 oz. (0 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Rimon 0.83EC*, 9 to 12 fl oz. (1 day)

*Carbaryl 4L*, 1 qt. (3 days)

*Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

FLEA BEETLE: Apply if needed.

*Actara*, 1.5 to 3 oz. (0 days)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

### Carbaryl

- *Carbaryl 4L*, 1 qt. (3 days)
- *Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

*Kryocide*, 8 to 16 lb. (14 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

### Methomyl

- *Lannate LV* (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate SP* (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

- *Nudrin LV* (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin SP* (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl 4L*, 1 qt. (3 days)

*Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

*Venom*, 3 to 4 oz. (1 day)

*Voliam Flexi*, 4 to 7 oz. (1 day)

LEAFHOPPERS: Apply if insects and damage are present.

### \* Esfenvalerate

- *Adjour*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

### Acetamiprid

- *Assail 30 SG* (2.5 to 4 oz.) or *Assail 70WP* (1.1 to 1.7 oz.) (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Baythroid XL*, 0.8 to 1.6 fl oz. (0 days) (RUP)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

### Bifenthrin

- *Bifenture EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.6 to 6.4 fl oz.) or *Brigade WSB* (8 to 16 oz.) (3 days) (RUP)
- *Capture 2 EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

- *Fanfare* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

*Bifenture* 10 DF, 8 to 16 oz/A. (3 days)

Carbaryl

- *Carbaryl* 4L, 1 qt. (3 days)
- *Sevin* 4 F (1 qt.) or *Sevin* 80 S (1.25 lb.) or *Sevin* XLR Plus (1 qt.) (3 days)

Diazinon

- *Diazinon* 50 W (0.5 to 1.5 lb.) or *Diazinon* AG 500 (0.5 to 1.5 pt.) (3 days) *Diazinon* 50 W for honeydew melons only. (RUP)

*Dibrom* 8 Emulsive, 1 pt. (1 day) (RUP)

Dimethoate

- *Dimethoate* 4 EC (1 pt.) or *Dimethoate* 400 (0.5 to 1 pt.) or *Dimethoate* 4E (0.5 to 1 pt.) (3 days) *Dimethoate* 4EC not for use on watermelons.

Dinotefuran

- *Scorpion* 35SL, 2 to 7 fl oz. (1 day)
- *Venom*, 1 to 4 oz. (1 day)

*Endigo* ZC, 4 to 4.5 fl oz. (1 day) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

Malathion

- *Malathion* 5 (2.25 pt for watermelons; 1.6 pt for all others) or *Malathion* 57 EC (2 pt for watermelons; 1.6 pt for all others) or *Malathion* 8 Aquamul (1.5 pt for watermelons only) (1 day)

*Mustang* Max, 2.8 to 4 oz. (1 day) (RUP)

Permethrin

- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (0 days) (RUP)
- *Pounce* 25 WP, 6.4 to 12.8 oz. (0 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 1 qt. (3 days)

*Sevin* 4 F (1 qt.) or *Sevin* 80 S (1.25 lb.) or *Sevin* XLR Plus (1 qt.) (3 days)

*Sivanto*, 21 - 28 fl oz/A.

*Vetica*, 14 to 17 fl oz. (7 days)

APHIDS:

Acetamiprid

- *Assail* 30 SG (2.5 to 4 oz.) or *Assail* 70WP (1.1 to 1.7 oz.) (0 days)

*Actara*, 1.5 to 3 oz. (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

*Beleaf* 50 SG, 2 to 2.8 oz. (0 days)

Bifenthrin

- *Bifenture* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @* 2EC (2.6 to 6.4 fl oz.) or *Brigade* WSB (8 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)

*Bifenture* 10 DF, 8 to 16 oz/A. (3 days)

Diazinon

- *Diazinon* 50 W (0.5 to 1.5 lb.) or *Diazinon* AG 500 (0.5 to 1.5 pt.) (3 days) *Diazinon* 50 W for honeydew melons only. (RUP)

*Dibrom* 8 Emulsive, 1 pt. (1 day) (RUP)

Dimethoate

- *Dimethoate* 4 EC (1 pt.) or *Dimethoate* 400 (0.5 to 1 pt.) or *Dimethoate* 4E (0.5 to 1 pt.) (3 days) *Dimethoate* 4EC not for use on watermelons.

*Endigo* ZC, 4.5 fl oz. (1 day) (RUP)

*Exirel*, 13.5-20.5 oz. (1)

*Fulfill*, 2.75 to 5.5 oz. (7 days) May require 5 to 7 days for aphid mortality.

*Gladiator*, 19 fl oz. (7 days) (RUP)

Lambda-cyhalothrin

- *Lambda-Cy*, 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.92 fl oz.) or *Warrior* with Zeon Technology (3.84 fl oz.) (1 day) (RUP)

Malathion

- *Malathion* 5 (1.5 to 2.0 pt for watermelons; 1.6 pt for all others) or *Malathion* 57 EC (1.5 pt.) or *Malathion* 8 Aquamul (1.5 pt for watermelons; 1 pt for all others) (1 day)

Methomyl

- *Lannate* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

- *Nudrin* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 21 - 28 fl oz/A.

*Voliam* Flexi, 4 to 7 oz. (1 day)

*Vydate* L, 2 to 4 pt. (1 day) (RUP)

THRIPS: Apply when damage is seen. Repeat as needed.

*Athena*, 13.5 to 17 fl oz. (7 days) (RUP)

Diazinon

- *Diazinon* 50 W (0.5 to 1.5 lb.) or *Diazinon* AG 500 (0.5 to 1.5 pt.) (3 days) *Diazinon* 50 W for honeydew melons only. (RUP)

Dimethoate

- *Dimethoate* 4 EC (1 pt.) or *Dimethoate* 400 (0.5 to 1 pt.) or *Dimethoate* 4E (0.5 to 1 pt.) (3 days) *Dimethoate* 4EC not for use on watermelons.

Dinotefuran

- *Scorpion* 35SL, 2 to 7 fl oz. (1 day)
- *Venom*, 1 to 4 oz. (1 day)

*Endigo* ZC, 4 to 4.5 fl oz. (1 day) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

*Exirel*, 13.5-20.5 oz. (1)

*Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Malathion* 8 Aquamul, 1 pt - not for watermelons. (1 day)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 6 to 10 fl oz. (3 days)

*Rimon* 0.83EC, 12 fl oz. (1 day)

Spinosad

- *Entrust* (2 to 2.5 oz.) or *Entrust* SC (6 to 8 fl oz.) (3 days)

*Vydate* L, 2 to 4 pt. (1 day) (RUP)

SQUASH BUG:

Acetamiprid

- *Assail* 30 SG (5.3 oz.) or *Assail* 70WP (2.3 oz.) (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

\*Materials marked with an asterisk are particularly recommended for problem infestations.

## Melons

### Bifenthrin

- *Bifenture* 10 DF, 8 to 16 oz/A. (3 days)
- *Bifenture* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.6 to 6.4 fl oz.) or *Brigade* WSB (8 to 16 oz.) (3 days) (RUP)
- *Capture 2* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

### Carbaryl

- *Carbaryl* 4L, 1 qt. (3 days)
- *Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

### Dinotefuran

- *Scorpion 35SL*, 2 to 7 fl oz. (1 day)
- *Venom*, 3 to 4 oz. (1 day)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Mustang Max*, 2.8 to 4 oz. (1 day) (RUP)

### Permethrin

- *Ambush 25 W*, 12.8 oz. (0 days) (RUP)
- *Perm-UP 25DF* (12.8 oz.) or *Perm-UP 3.2 EC* (8 oz.) (0 days) (RUP)
- *Pounce 25 WP*, 12.8 oz. (0 days) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Rimon 0.83EC*, 12 fl oz. (1 day)

*Carbaryl* 4L, 1 qt. (3 days)

*Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

### SQUASH VINE BORER:

#### Acetamiprid

- *Assail 30 SG* (5.3 oz.) or *Assail 70WP* (2.3 oz.) (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Belt SC*, 1.5 fl oz. (1 day)

#### Bifenthrin

- *Bifenture* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.6 to 6.4 fl oz.) or *Brigade* WSB (8 to 16 oz.) (3 days) (RUP)
- *Capture 2* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

*Bifenture* 10 DF, 8 to 16 oz/A. (3 days)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Mustang Max*, 2.8 to 4 oz. (1 day) (RUP)

### Permethrin

- *Ambush 25 W*, 6.4 to 12.8 oz. (0 days) (RUP)
- *Perm-UP 25DF* (6.4 to 12.8 oz.) or *Perm-UP 3.2 EC* (4 to 8 oz.) (0 days) (RUP)
- *Pounce 25 WP*, 6.4 to 12.8 oz. (0 days) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Vetiva*, 12 to 17 fl oz. (7 days)

### SEED CORN MAGGOT:

*Empower*, 3.5 to 8.7 lb. (3 days) (RUP)

### ARMYWORM:

*Avaunt*, 3.5 to 6 oz. (3 days)

#### Bacillus thuringiensis

- *Agree* WG, 0.5 to 2 lb. (0 days)
  - *Biobit* HP, 0.5 to 2 lb. (0 days)
  - *DiPel* DF, 1 to 2 lb. (0 days)
- Baythroid XL*, 1.6 to 2.4 fl oz. (0 days) (RUP)
- Coragen*, 3.5 to 5 fl oz. (1 day)
- Exirel*, 7-13.5 oz/A. (1)
- Gladiator*, 19 fl oz. (7 days) (RUP)
- Intrepid 2F*, 4 to 10 fl oz. (3 days)
- Radiant SC*, 5 to 10 fl oz. (3 days)
- Rimon 0.83EC*, 9 to 12 fl oz. (1 day)

#### Spinosaad

- *Entrust* (1.25 to 2.5 oz.) or *Entrust SC* (4 to 8 fl oz.) (3 days)

### CUTWORM:

*Baythroid XL*, 0.8 to 1.6 fl oz. (0 days) (RUP)

*Empower*, 3.5 to 8.7 lb. (3 days) (RUP)

#### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
  - *Asana XL*, 5.8 to 9.6 fl oz. (3 days) (RUP)
  - *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- Gladiator*, 6 to 19 fl oz. (7 days) (RUP)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
  - *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)
- Mustang Max*, 1.28 to 4 oz. (1 day) (RUP)

#### Permethrin

- *Ambush 25 W*, 6.4 to 12.8 oz. (0 days) (RUP)
- *Perm-UP 25DF* (6.4 to 12.8 oz.) or *Perm-UP 3.2 EC* (4 to 8 oz.) (0 days) (RUP)
- *Pounce 25 WP*, 6.4 to 12.8 oz. (0 days) (RUP)

### WHITEFLIES:

#### Acetamiprid

- *Assail 30 SG*, 2.5 to 5.3 oz. (0 days)
- *Assail 70WP*, 1.1 to 2.3 oz/A. (0 days)

*Exirel*, 13.5-20.5 oz. (1)

*Portal*, 2 pt. (3 day) Do not apply more than 4 pt per acre per crop per cycle

*Sivanto*, 21 - 28 fl oz/A.

## SWEET POTATO WHITEFLY, SILVER LEAF WHITEFLY:

Acetamiprid

- *Assail* 30 SG, 2.5 to 5.3 oz. (0 days)
- *Assail* 70WP, 1.1 to 2.3 oz. (0 days)

**MITES**

Apply when needed. Watermelons are particularly susceptible. Usually a problem only in hot, dry weather.

Abamectin

- *Agri-Mek* 0.15 EC (8 to 16 fl oz.) or *Agri-Mek* SC (1.75 to 3.5 fl oz.) (7 days) Use with a non-ionic surfactant. (RUP)

Bifenazate

- *Acramite* 50WS, 0.75 to 1 lb. (3 days)

Bifenthrin

- *Bifenture* EC, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Bifenture* 10 DF, 12.8 to 16 oz/A. (3 days)
- *Brigade* @ 2EC (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (3 days) (RUP)

Bifenthrin + Avermectin

- *Athena*, 13.5 to 17 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero* EW (11.2 oz.) (3 days) (RUP)

Diazinon

- *Diazinon* 50 W (1 lb) or *Diazinon* AG 500 (1 pt) (3 days) (RUP)

Etoxazole

- *Zeal*, 2 to 3 oz. (7 days)

Fenpropathrin

- *Danitol* 2.4 EC, 10 2/3 fl oz. (7 days) (RUP)

Fenpyroximate

- *Portal*, 2 pt. (3 day) Do not apply more than 4 pt per acre per crop per cycle

Malathion

- *Malathion* 5 (1.5 to 2.0 pt for watermelons; 1.6 pt for all others) or *Malathion* 57 EC (1.5 pt.) or *Malathion* 8 Aquamul (1.5 pt for watermelons; 1 pt for all others) (1 day)

Naled

- *Dibrom* 8 Emulsive, 1 pt. (1 day) (RUP)

Spiromesifen

- *Oberon* 2 SC, 7 to 8.5 fl oz. (7 days)

Zeta-Cypermethrin + Avermectin

- *Gladiator*, 19 fl oz. (7 days) (RUP)

**SLUGS**

*Deadline* M-PS 4% (20 to 40 lb) or *Metaldehyde* 3.5 G (30 to 40 lb) Apply between rows. Avoid contact with edible product.

**DISEASES****SEED TREATMENT:**

DAMPING OFF (*Pythium* spp., *Rhizoctonia solani*): If possible, buy treated seed. Use only as directed; over-treatment may cause injury.

Captan

- *Captan* 4 Flowable, 2 fl oz/100 lb seed.

Fludioxinil

- *Maxim* 4 FS, 0.08 to 0.16 fl oz/100 lb seed (*Rhizoctonia*).

Thiram

- 42-S Thiram, *Thiram* 480DP, *Thiram* 50 WP Dyed, 4 1/2 oz/100 lb seed.

**SEEDBED PREPARATION:**

DAMPING OFF, ROOT ROT (*Pythium* spp., *Rhizoctonia solani*): Grow transplants in disease-free soil (sterilized) and fumigate fields before planting. To sterilize soil use steam or fumigate with Chemicals suggested for seedbed sterilization in Appendix A. Follow manufacturer's recommendations for use with particular crops. Avoid planting until soil is free of fumigant.

**SOIL INJECTION:**

## VINE DECLINE:

Fludioxinil

- *Cannonball*, 0.25 to 0.5 lb. (14 days) Shanked in prior to planting or transplanting. Follow up with drip applications.
- *Cannonball* WG, *Cannonball* WP, 4 to 8 oz. (14 days) Shanked in prior to planting or transplanting. Follow up with drip applications.

**PREPLANT SOIL FUMIGATION:**

DAMPING OFF, ROOT ROT (*Phytophthora* spp., *Pythium* spp., *Rhizoctonia solani*), FUSARIUM WILT or ROOT ROT (*Fusarium oxysporum*): See bulletin E-2099. This protects plants grown from seed or transplanted in the field.

Soil sterilization by fumigation is best achieved by proper application of material. Correct soil moisture, temperature, and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or immediate tarping.

1,3 Dichloropropene/chloropicrin

- *Telone* C35, 13-136 gal. (RUP)

Metam Potassium

- *Sectagon-K54*, 30-60 gal. (RUP)

Metam Sodium

- *Sectagon* 42, 37.5-75 gal. (RUP)

**GREENHOUSE PREPLANT INCORPORATION:**

DAMPING OFF (*Pythium* spp.), ROOT ROT (*Rhizoctonia* spp.):

*Gliocladium virens* GL-21

- *SoilGard* 12 G, 1 to 1.5 lb per cubic yard. Biological control product that needs to be applied before disease development. Control may be limited under heavy disease pressure.

**PREPLANT TREATMENT:**

DAMPING OFF and COTTONY LEAK (*Pythium* spp.):

Mefenoxam. Apply as a broadcast preplant incorporation or a surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone after planting with 1/2 to 1 in. of sprinkler irrigation.

- *Ridomil* Gold SL, 1-2 pt.
- *Ultra* Flourish, 2 to 4 pt.

**DRIP APPLICATION:**

DAMPING OFF (*Pseudoperonospora cubensis*), PHYTOPHTHORA BLIGHT (*Phytophthora capsici*):

\* Ametoctradin + Dimethomorph

- *Presidio*, 3-4 fl oz. (2 days)
- *Zampro*, 14 fl oz. (0 days)

\* Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days)
- *Zampro*, 14 fl oz. (0 days)

## VINE DECLINE:

Fludioxinil

- *Cannonball*, 0.25 to 0.5 lb. (14 days)
- *Cannonball* WG, *Cannonball* WP, 4 to 8 oz. (14 days)

## Melons

### PYTHIUM ROOT ROT:

#### Mefenoxam

- *Ridomil* Gold SL, 0.25-0.4 pt. (5 days)

### FOLIAR TREATMENT:

#### POWDERY MILDEW (*Sphaerotheca fuliginea*, *Erysiphe cichoracearum*):

#### \* Azoxystrobin + Difenconazole

- *Quadris* Top, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

#### \* Cyflufenamid

- *Torino*, 3.4 oz. (0 day)

#### \* Fluopyram + Trifloxystrobin

- *Luna* Sensation, 4 - 7.6 fl oz. (0 days) Watermelon only.

#### \* Kresoxim-methyl

- *Sovran*, 3.2 to 4.8 oz. (0 days)

#### \* Myclobutanil

- *Rally* 40 WSP, 2.5 to 5 oz. (0 days)

#### \* Penthiopyrad

- *Fontelis*, 12 - 16 fl oz. (1 day)

#### \* Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days) Do not apply more than one application before alternating with another chemical.

#### \* Pyraclostrobin/Boscalid

- *Pristine*, 12.5 to 18.5 oz. (0 days) To avoid crop injury, do not add adjuvants.

#### \* Quinoxifen

- *Quintec*, 4 to 6 fl oz. (3 days)

#### \* Thiophanate-Methyl

- *Cercobin* 4.1F, 10.9 fl oz. (1 day)
- *Topsin* 4.5 FL, 10 fl oz. (1 day)
- *Topsin* M 70 WP, *Topsin* M WSB, 0.5 lb. (1 day)

#### \* Trifloxystrobin

- *Flint*, 1 1/2 to 2 oz, 7- to 14-day intervals. (0 days) Maximum 2 consecutive applications, 4 applications/year and 16 oz/season.

#### Azoxystrobin

- *Quadris*, 11.0 to 15.5 fl oz. (1 day)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

#### Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 3.2 pt. (1 day)

#### Bacillus subtilis

- *Serenade* ASO, 2 - 6 qt. (0 days) Biological control product that needs to be applied before disease development. Control will be limited under heavy disease pressure.
- *Serenade* Max, 1 - 3 lb. (0 days) Biological control product that needs to be applied before disease development. Control will be limited under heavy disease pressure.

#### Boscalid

- *Endura*, 6.5 oz. (0 days) Suppression.

#### Chlorothalonil

- *Bravo* Ultrex, *Equus* DF, 1.8 to 2.7 lb. (0 days)
- *Bravo* Weather Stik, or *Echo* 720 (2 to 3 pt, 7-day intervals) or *Equus* 720 SST (2 to 3 pt every 7 days) (0 days)
- *Echo* 90 DF, 1 5/8 to 2 1/2 lb. (0 days)

#### Copper Ammonium Carbonate

- *Copper* Count N, 1 1/2 to 2 qt. (0 days)

#### Copper Hydroxide

- *Champ* DP Dry Prill, 1 1/3 lb. (0 days)
- *Champ* Formula 2 F, 1 1/3 pt. (0 days)
- *Champion* WP, 1.5 to 3 lb. (0 days)
- *Kocide* 2000, 1 1/2 lb. (0 days)

- *Kocide* 3000, 0.5-1.25 lb. (0 day)
- *Nu-Cop* 3 L, 1 1/3 to 2 2/3 pt. (0 days)

#### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 2.5 pt. (0 days)

#### Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 1 to 2 lb. (0 days)

#### Difenconazole + Cyprodinil

- *Inspire* Super, 16 to 20 fl oz. (7 days)

#### Neem Oil

- *Trilogy*, 2 pt. (0 days)

#### Potassium Bicarbonate

- *Armicarb* 100, 2.5 to 5 lb. (0 days)

#### Sulfur

- *Kumulus* DF, 20 to 25 lb. Do not use on sulfur-sensitive varieties. (0 days)
- *Microthiol* Disperss, 5 to 10 lb. (0 days)
- *Thiolux*, 20 to 25 lb. (0 days)

#### Tebuconazole

- *Orius* 3.6F, *Tebuzol* 3.6, 4-6 fl oz. (7 days)

#### Triflumizole

- *Procure* 480 SC, 4 to 8 fl oz. (0 days)

### ALTERNARIA LEAF BLIGHT (*Alternaria cucumerin*):

#### \* Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 3.2 pt. (1 day)

#### \* Azoxystrobin + Difenconazole

- *Quadris* Top, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

#### \* Chlorothalonil

- *Bravo* Ultrex, *Equus* DF, 1.8 to 2.7 lb. (0 days)
- *Bravo* Weather Stik, *Echo* 720, *Equus* 720 SST, 2 to 3 pt. (0 days)
- *Echo* 90 DF, 1 5/8 to 2 1/2 lb. (0 days)

#### \* Difenconazole + Cyprodinil

- *Inspire* Super, 16 to 20 fl oz. (7 days)

#### \* Mancozeb

- *Dithane* DF Rainshield, *Dithane* M-45, *Dithane* WSP, 2 to 3 lb. (5 days)
- *Dithane* F-45 Rainshield, 1 3/5 to 2 2/5 qt. (5 days)
- *Koverall* (2 - 3 lb) or *Penncozeb* 75 DF (2 to 3 lb) (5 days)
- *Manzate* Max, 1.6 to 2.4 qt. (5 days)
- *Manzate* Pro-Stick, 2 to 3 lb. (5 days)

#### \* Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days) Do not apply more than one application before alternating with another chemical.

#### \* Pyraclostrobin/Boscalid

- *Pristine*, 12.5 to 18.5 oz. (0 days) See label for use of adjuvants.

#### Azoxystrobin

- *Quadris*, 11.0 to 15.5 fl oz. (1 day) Do not apply more than one foliar application of Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

#### Boscalid

- *Endura*, 6.5 oz. (0 days)

#### Copper Ammonium Carbonate

- *Copper* Count N, 1 1/2 to 2 qt. (0 days)

#### Copper Hydroxide

- *Champ* DP Dry Prill, 1 1/3 lb. (0 days)
- *Champ* Formula 2 F, 1 1/3 pt. (0 days)
- *Champion* WP, 1.5 to 3 lb. (0 days)
- *Kocide* 2000, 1 1/2 lb. (0 days)
- *Kocide* 3000, 0.5-1.25 lb. (0 day)
- *Nu-Cop* 3 L, 1 1/3 to 2 2/3 pt. (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 2.5 pt. (0 days)

Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 1 to 2 lb. (0 days)

Famoxadone + Cymoxanil

- *Tanos*, 8 oz. (3 days)

Fenamidon

- *Reason* 500 SC, 5.5 fl oz. (14 days)

Fluopyram + Trifloxystrobin

- *Luna* Sensation, 7.6 fl oz. (0 days) Watermelon only.

Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days) Some cantaloupe varieties are sensitive to ManKocide.

Mancozeb + Zoxamide

- *Gavel* 75 DF, 1.5 - 2.0 lb. (5 days) Some cantaloupe varieties are sensitive to Gavel.

Mefenoxam + Chlorothalonil

- *Ridomil* Gold Bravo, 2.5 to 3.25 pt. (0 days)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Penthiopyrad

- *Fontelis*, 12 - 16 fl oz. (1 day)

Potassium Bicarbonate

- *Armcarb* 100, 2.5 to 5 lb. (0 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 6 pt. (1 day)

SCAB (*Cladosporium cucumerinum*): Treat every 7 days beginning after the plants have flowered.

\* Chlorothalonil

- *Bravo* Ultrex, *Equus* DF, 1.8 to 2.7 lb. (0 days)
- *Bravo* Weather Stik, *Echo* 720, *Equus* 720 SST, 2 to 3 pt. (0 days)
- *Echo* 90 DF, 1 5/8 to 2 1/2 lb. (0 days)

\* Mancozeb

- *Dithane* DF Rainshield (2 to 3 lb (watermelon)) or *Dithane* M-45 (2 to 3 lb (watermelon)) or *Dithane* WSP (2 to 3 lb (watermelon)) (5 days)
- *Dithane* F-45 Rainshield, 1.6 to 2.4 qt (watermelon). (5 days)

Copper Ammonium Carbonate

- *Copper* Count N, 1 1/2 to 2 qt. (0 days)

Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days) Some cantaloupe varieties are sensitive to ManKocide.

Mefenoxam + Chlorothalonil

- *Ridomil* Gold Bravo, 2.5 to 3.25 pt. (0 days)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 6 pt. (1 day) May result in sunburn of watermelon fruit surfaces. See label.

ANTHRACNOSE (*Colletotrichum lagenarium*): Treat every 7 to 14 days after flowering.

\* Azoxystrobin

- *Quadris*, 11.0 to 15.5 fl oz. (1 day)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

\* Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 3.2 pt. (1 day)

\* Azoxystrobin + Difenoconazole

- *Quadris* Top, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

\* Chlorothalonil

- *Bravo* Ultrex, *Equus* DF, 1.4 to 1.8 lb. (0 days)
- *Bravo* Weather Stik, *Echo* 720, *Equus* 720 SST, 1.5 to 2 pt. (0 days)
- *Echo* 90 DF, 1 1/4 to 1 5/8 lb. (0 days)

\* Mancozeb

- *Dithane* DF Rainshield, *Dithane* M-45, *Dithane* WSP, 2 to 3 lb. (5 days)
- *Dithane* F-45 Rainshield, 1 3/5 to 2 2/5 qt. (5 days)
- *Koverall* (2 - 3 lb) or *Penncozeb* 75 DF (2 to 3 lb) (5 days)
- *Manzate* Max, 1.6 to 2.4 qt. (5 days)
- *Manzate* Pro-Stick, 2 to 3 lb. (5 days)

\* Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days) Do not apply more than one application before alternating with another chemical.

\* Pyraclostrobin/Boscalid

- *Pristine*, 18.5 oz. (0 days) See label for use of adjuvants.

\* Thiophanate-Methyl

- *Cercobin* 4.1F, 10.9 fl oz. (1 day)
- *Topsin* 4.5 FL, 10 fl oz. (1 day)
- *Topsin* M 70 WP, *Topsin* M WSB, 0.5 lb. (1 day)

Copper Ammonium Carbonate

- *Copper* Count N, 1 1/2 to 2 qt. (0 days)

Copper Hydroxide

- *Champ* DP Dry Prill, 1 1/3 lb. (0 days)
- *Champ* Formula 2 F, 1 1/3 pt. (0 days)
- *Champion* WP, 1.5 to 3 lb. (0 days) Watermelon.
- *Kocide* 2000, 1 1/2 lb. (0 days)
- *Kocide* 3000, 0.5-1.25 lb. (0 day)
- *Nu-Cop* 3 L, 1 1/3 to 2 2/3 pt. (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 2.5 pt. (0 days)

Copper Oxychloride + Copper Sulfate

- C-O-C-S WDG, 1 to 2 lb. (0 days)

Copper Sulfate

- *Basic* Copper 53, 2 lb. (0 days)
- *Cuprofix* Ultra 40 Disperss, 1 to 2 lb. (0 days)

Difenoconazole + Cyprodinil

- *Inspire* Super, 16 to 20 fl oz. (7 days)

Famoxadone + Cymoxanil

- *Tanos*, 8 oz. (3 days)

Fluopyram + Trifloxystrobin

- *Luna* Sensation, 7.6 fl oz. (0 days) Watermelon only.

Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days)

Mefenoxam + Chlorothalonil

- *Ridomil* Gold Bravo, 2.5 to 3.25 pt. (0 days)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Potassium Bicarbonate

- *Armcarb* 100, 2.5 to 5 lb. (0 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 4 pt. (1 day) May result in sunburn of watermelon fruit surfaces. See label.

ANGULAR LEAF SPOT (*Pseudomonas lachrymans*): Copper may be used for control of this bacterial disease. Spray every 7 days, starting before the first fruit form and continue to protect fruit at all stages of development.

Copper Ammonium Carbonate

- *Copper* Count N, 1 1/2 to 2 qt. (0 days)

## Melons

### Copper Hydroxide

- *Champ* DP Dry Prill, 1 1/3 lb. (0 days)
- *Champ* Formula 2 F, 1 1/3 pt. (0 days)
- *Champion* WP, 1.5 to 3 lb. (0 days)
- *Kocide* 2000, 1 1/2 lb. (0 days)
- *Kocide* 3000, 0.5-1.25 lb. (0 day)
- *Nu-Cop* 3 L, 1 1/3 to 2 2/3 pt. (0 days)

### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 2.5 pt. (0 days)

### Copper Sulfate

- *Basic* Copper 53, *Basicop*, 2 lb. (0 days)
- *Cuprofix* Ultra 40 Dispers, 1 to 2 lb. (0 days)

### Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days)

### Neem Oil

- *Trilogy*, 2 pt. (0 days)

DOWNY MILDEW (*Pseudoperonospora cubensis*): Treat plants when in the 2-leaf stage and continue at 7-14 day intervals.

### \* Ametoctradin + Dimethomorph

- *Zapro*, 14 fl. oz. (0 days)

### \* Chlorothalonil

- *Bravo* Ultrex, *Equus* DF, 1.4 to 1.8 lb. (0 days)
- *Bravo* Weather Stik, *Echo* 720, *Equus* 720 SST, 1.5 to 2 pt. (0 days)
- *Echo* 90 DF, 1 1/4 to 1 5/8 lb. (0 days)

### \* Cyazofamid

- *Ranman* 400SC, 2.1 to 2.75 fl oz every 7 to 10 days. (0 days)

### \* Cymoxanil

- *Curzate* 60 DF, 3.2 to 5 oz. (3 days)

### \* Famoxadone + Cymoxanil

- *Tanos*, 8 oz. (3 days)

### \* Mancozeb

- *Dithane* DF Rainshield, *Dithane* M-45, *Dithane* WSP, 2 to 3 lb. (5 days)
- *Dithane* F-45 Rainshield, 1 3/5 to 2 2/5 qt. (5 days)
- *Koverall* (2 - 3 lb) or *Penncozeb* 75 DF (2 to 3 lb) (5 days)
- *Manzate* Max, 1.6 to 2.4 qt. (5 days)
- *Manzate* Pro-Stick, 2 to 3 lb. (5 days)

### \* Mancozeb + Zoxamide

- *Gavel* 75 DF, 1.5-2.0 lb. (5 days) Some cantaloupe varieties are sensitive to *Gavel*.

### \* Propamocarb

- *Previcur* Flex, 1.2 pt every 7 - 14 days. (2 days)

### \* Propamocarb

- *Previcur* Flex, 1.2 pt every 7 - 14 days. (2 days)

### Azoxystrobin

- *Quadris*, 11.0 to 15.5 fl oz. (1 day)

Do not apply more than one foliar application of *Amistar* and *Quadris* or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

### Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 3.2 pt. (1 day)

### Azoxystrobin + Difenconazole

- *Quadris* Top, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 2.5 pt. (0 days)

### Dimethomorph

- *Forum*, 6 fl oz. (0 days)

### Fenamidone

- *Reason* 500 SC, 5.5 fl oz. (14 days)

### Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days)

### Fosetyl-Aluminum

- *Aliette* WDG, 2 to 5 lb, 7- to 14-day intervals. (0 days) Do not tank mix with copper fungicides.

### Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days) Some cantaloupe varieties are sensitive to *ManKocide*.

### Mandipropamid

- *Revus*, 8 fl oz. (0 day)

### Mefenoxam + Chlorothalonil

- *Ridomil* Gold Bravo, 2.5 pt. (0 days) Maximum 4 applications.

### Mefenoxam + Copper Hydroxide

- *Ridomil* Gold Copper, 2 lb. (5 days) Maximum 4 applications.

### Mefenoxam + Mancozeb

- *Ridomil* Gold MZ, 2 1/2 lb. (5 days) Maximum 4 applications.

### Mono-, dibasic sodium salts of phosphorous acid

- *Fosphite*, 1 to 3 qt. (0 days)

### Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 2.5 to 5 pt every 7 - 14 days. (0 days)

- *Prophyt*, 2 to 4 pt. (0 days)

### Neem Oil

- *Trilogy*, 2 pt. (0 days)

### Potassium Bicarbonate

- *Armcarb* 100, 2.5 to 5 lb. (0 days)

### Potassium phosphite/chlorothalonil

- *Catamaran*, 4 pt. (1 day) May result in sunburn of watermelon fruit surfaces. See label.

### Pyraclostrobin

- *Cabrio*, 8 to 12 oz. (0 days) Do not apply more than one application before alternating with another chemical

### Pyraclostrobin/Boscalid

- *Pristine*, 12.5 to 18.5 oz. (0 days) See label for use of adjuvants.

### Trifloxystrobin

- *Flint*, 4 oz, 7- to 14-day intervals. (0 days) Maximum 1 consecutive application, 4 applications/year and 16 oz/season. Alternate with *Ridomil* Gold Bravo.

**Note:** Most fungicides that protect against *Alternaria* may also provide limited downy mildew protection.

GUMMY STEM BLIGHT or BLACK ROT (*Didymella bryoniae* also called *Mycosphaerella melonis*): Begin at the 2-leaf stage and apply every 7 days.

### \* Azoxystrobin

- *Quadris*, 11.0 to 15.5 fl oz. (1 day)

Do not apply more than one foliar application of *Amistar* and *Quadris* or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

### \* Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 3.2 pt. (0 days)

### \* Azoxystrobin + Difenconazole

- *Quadris* Top, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

### \* Chlorothalonil

- *Bravo* Ultrex, *Equus* DF, 1.8 to 2.7 lb. (0 days)
- *Bravo* Weather Stik, *Echo* 720, *Equus* 720 SST, 2 to 3 pt. (0 days)
- *Echo* 90 DF, 1 5/8 to 2 1/2 lb. (0 days)

### \* Mancozeb

- *Dithane* DF Rainshield, *Dithane* M-45, *Dithane* WSP, 2 to 3 lb. (5 days)
- *Dithane* F-45 Rainshield, 1 3/5 to 2 2/5 qt. (5 days)

- *Koverall* (2 - 3 lb) or *Penncozeb* 75 DF (2 to 3 lb) (5 days)
- *Manzate* Max, 1.6 to 2.4 qt. (5 days)
- *Manzate* Pro-Stick, 2 to 3 lb. (5 days)

\* Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days) Do not apply more than one application before alternating with another chemical.

\* Thiophanate-Methyl

- *Cercobin* 4.1F, 10.9 fl oz. (1 day)
- *Topsin* 4.5 FL, 10 fl oz. (1 day)
- *Topsin* M 70 WP, *Topsin* M WSB, 0.5 lb. (1 day)

Boscalid

- *Endura*, 6.5 oz. (0 days)

Copper Ammonium Carbonate

- *Copper* Count N, 1 1/2 to 2 qt. (0 days)

Copper Hydroxide

- *Champ* DP Dry Prill, 1 1/3 lb. (0 days)
- *Champ* Formula 2 F, 1 1/3 pt. (0 days)
- *Champion* WP, 1.5 to 3 lb. (0 days)
- *Kocide* 2000, 1 1/2 lb. (0 days)
- *Kocide* 3000, 0.5-1.25 lb. (0 day)
- *Nu-Cop* 3 L, 1 1/3 to 2 2/3 pt. (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 2.5 pt. (0 days)

Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 1 to 2 lb. (0 days)

Difenoconazole + Cyprodinil

- *Inspire* Super, 16 to 20 fl oz. (7 days)

Kresoxim-methyl

- *Sovran*, 4.8 oz. (0 days)

Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days) Some cantaloupe varieties are sensitive to ManKocide.

Mefenoxam + Chlorothalonil

- *Ridomil* Gold Bravo, 2.5 to 3.25 pt. (0 days)

Penthiopyrad

- *Fontelis*, 12 - 16 fl oz. (1 day)

Potassium phosphite/chlorothalonil

- *Catamaran*, 6 pt. (1 day) May result in sunburn of watermelon fruit surfaces. See label.

Pyraclostrobin/Boscalid

- *Pristine*, 12.5 to 18.5 oz. (0 days) See label for use of adjuvants.

Tebuconazole

- *Orius* 3.6F, *Tebuzol* 3.6, 8 fl oz. (7 days) Suppression only.

PHYTOPHTHORA CROWN and FRUIT ROT (*Phytophthora* spp.):

\* Dimethomorph

- *Forum*, 6 fl oz. (0 days)

\* Famoxadone + Cymoxanil

- *Tanos*, 8 - 10 oz every 5 - 7 days. (3 days)

\* Mancozeb + Zoxamide

- *Gavel* 75 DF, 1.5-2.0 lb. (5 days) Some cantaloupe varieties are sensitive to Gavel.

Ametoctradin + Dimethomorph

- *Zapro*, 14 fl. oz. (0 days)

Cyazofamid

- *Ranman* 400SC, 2.75 fl oz every 7 to 10 days. (0 days)

Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days)

Fosetyl-Aluminum

- *Aliette* WDG, 2 to 5 lb, 7- to 14-day intervals. (0 days) Do not tank mix with copper fungicides.

Mandipropamid

- *Revus*, 8 fl oz. (0 day) Suppression.

Mono-, dibasic sodium salts of phosphorous acid

- *Fosphite*, 1 to 3 qt. (0 days)

Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 2.5 to 5 pt every 7 - 14 days. (0 days)
- *Prophyt*, 6 pt. (0 days) See label for instructions on drench application.

**Note:** Most fungicides applied to control downy mildew may have limited efficacy against *Phytophthora* crown and fruit rot.

## Mint

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

Root-lesion, false root-lesion and needle nematodes can cause reduction in yields, especially in the presence of the *Verticillium* wilt fungus. Fields should be tested for nematodes prior to planting. If any of these nematodes exceed damage threshold estimates, soil fumigation in the fall may be recommended.

### FALL SOIL FUMIGATION (BROADCAST):

1,3-D

- *Telone* II, 25 gal/A (muck soil). Fumigate in the fall when soil temperatures at an 8-inch depth are above 50F. Inject the fumigant to a depth of 6 inches and seal the soil with a drag immediately after application. Use soil fumigants only as directed on the label.

Correct soil moisture, temperature and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or by immediate tarping.

### PREPLANT TREATMENT:

Ethoprop

- *Mocap* 15 G (Apply 40 lbs/A.) or *Mocap* 6EC (Apply 4 quarts in 20-30 gallons of water per acre.) Broadcast over the entire field using ground equipment. Incorporate during or immediately following application to a depth of 2-4 inches by mechanical means OR immediately irrigate with 1-2 inches of water. Repeat irrigation before the soil dries. For establishment of new mint. Do not harvest within 225 days of application. Only 1 application per year. (RUP)

### INSECTS

#### SOIL TREATMENT:

##### MINT ROOT BORER:

Ethoprop

- *Mocap* 15 G (20 lb.) or *Mocap* 6EC (2 qt.) (225 days) See label for application methods. (RUP)

#### FOLIAR TREATMENT:

##### MINT ROOT BORER:

Chlorpyrifos

- *Chlorpyrifos* 4E AG, 4 pt. (90 days) (RUP)
- *Govern*, 4 pt. (90 days) (RUP)
- *Hatchet*, 4 pt. (90 days) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced (2 to 4 pt.) or *Lorsban* 75 WG (2.67 lb.) (90 days) (RUP)
- *Nufos* 4E, 4 pt. (90 days) (RUP)
- *Vulcan*, 4 pt. (90 days) (RUP)
- *Warhawk*, 4 pt. (90 days) (RUP)

## Mint

- *Whirlwind*, 4 pt. (90 days) (RUP)

Apply post-harvest when larvae are present. Follow with at least 1 inch of irrigation.

*Coragen*, 3.5 to 5 fl oz. (3 days)

*Voliam Flexi*, 4 to 5 oz. (7 days)

**MINT FLEA BEETLE:** Apply prior to egg-laying activity (July 20 to August 10) if needed to control adult stage, which will reduce root-damaging populations of larvae the following year. Three applications, 7 to 10 days apart, may be needed to control severe infestations (common only in older fields). Timing is critical.

*Actara*, 1.5 to 3 oz. (7 days)

### Malathion

- *Malathion* 5, or *Malathion* 5 EC (1.5 pt.) or *Malathion* 57 EC (1 to 1.5 pt.) or *Malathion* 8 (1 pt.) or *Malathion* 8 Aquamul (0.94 pt.) (7 days)

### Methomyl

- *Lannate* LV (2.25 to 3 pt.) or *Lannate* SP (0.75 to 1 lb.) (14 days) (RUP)

- *Nudrin* LV (2.25 to 3 pt.) or *Nudrin* SP (0.75 to 1 lb.) (14 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Voliam Flexi*, 2 to 4 oz. (7 days)

**CUTWORM, LOOPERS:** Apply before worms are 3/4 inch long for best results.

### Acephate

- *Acephate* 90 WDG (1.11 lb.) or *Acephate* 90 WSP (1.1 lb.) or *Acephate* 97 (1.1 lb.) or *Acephate* 97 UP (1 lb.) (14 days)
- *Bracket* 97, 1 lb. (14 days)
- *Orthene* 97, 1 lb. (14 days)

*Avaunt*, 3.5 oz. (7 days)

### Bacillus thuringiensis

- *Agree* WG, 1 to 2 lb. (0 days)
- *Javelin* WG, 0.12 to 1.5 lb. (0 days)
- *XenTari*, . (0 days)

*Coragen*, 3.5 to 5 fl oz. (3 days)

*Intrepid* 2F, 10 to 16 fl oz. (14 days)

*Malathion* 57 EC, 1 to 1.5 pt. (7 days)

### Methomyl

- *Lannate* LV (3 pt.) or *Lannate* SP (1 lb.) (14 days) (RUP)
- *Nudrin* LV (3 pt.) or *Nudrin* SP (1 lb.) (14 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 4 to 12 fl oz. (7 days)

### Spinosad

- *Entrust* (1.25 to 3 oz.) or *Entrust* SC (4 to 10 fl oz.) (7 days)

*Voliam Flexi*, 4 to 5 oz. (7 days)

**APHIDS:** Apply when damage is first seen or when insects are noticeable.

### Acephate

- *Acephate* 90 WDG (1.11 lb.) or *Acephate* 90 WSP (1.1 lb.) or *Acephate* 97 (1 lb.) or *Acephate* 97 UP (1 lb.) (14 days)
- *Bracket* 97, 1 lb. (14 days)
- *Orthene* 97, 1 lb. (14 days)

*Actara*, 1.5 to 3 oz. (7 days)

### Malathion

- *Malathion* 5, or *Malathion* 5 EC (1.5 pt.) or *Malathion* 57 EC (1 to 1.5 pt.) or *Malathion* 8 Aquamul (0.94 pt.) (7 days)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Voliam Flexi*, 2 to 4 oz. (7 days)

**LOOPERS:**

### Bacillus thuringiensis

- *Biobit* HP, 0.5 to 1 lb. (0 days)
- *DiPel* DF, 0.5 to 1 lb. (0 days)

- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Confirm* 2F, 6 to 8 fl oz. (early-season); 8 to 16 fl oz. (mid- to late-season). (7 days)

**CUTWORM:**

### Chlorpyrifos

- *Chlorpyrifos* 4E AG, 2 to 4 pt. (90 days) (RUP)
- *Govern*, 2 to 4 pt. (90 days) (RUP)
- *Hatchet*, 2 to 4 pt. (90 days) (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced (2 to 4 pt.) or *Lorsban* 75 WG (1.33 to 2.67 lb.) (90 days) (RUP)
- *Nufos* 4E, 2 to 4 pt. (90 days) (RUP)
- *Vulcan*, 2 to 4 pt. (90 days) (RUP)
- *Warhawk*, 2 to 4 pt. (90 days) (RUP)
- *Whirlwind*, 2 to 4 pt. (90 days) (RUP)

## MITES

Apply if needed.

### Abamectin

- *Agri-Mek* 0.15 EC (8 to 12 fl oz.) or *Agri-Mek* SC (1.75 to 2.5 fl oz.) (28 days) Use with a non-ionic surfactant. (RUP)

### Bifenazate

- *Acramite* 4SC (12 to 24 fl oz.) or *Acramite* 50WS (0.75 to 1.5 lb.) (7 days)

### Etoazazole

- *Zeal*, 2 to 3 oz. (7 days)

### Fenpyroximate

- *Portal*, 1 to 2 pt. (1 day)

### Malathion

- *Malathion* 5, or *Malathion* 5 EC (1.5 pt.) or *Malathion* 57 EC (1 to 1.5 pt.) or *Malathion* 8 Aquamul (0.94 pt.) (7 days)

## DISEASES

### **PREPLANT SOIL FUMIGATION:**

**VERTICILLIUM WILT** (*Verticillium dahliae*): See Bulletin E-2099. Apply as a broadcast or row treatment, placing the fumigant at least 12 to 14 inches below the final soil surface.

Soil sterilization by fumigation is best achieved by proper application of material. Correct soil moisture, temperature, and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or immediate tarping.

### 1,3 Dichloropropene/chloropicrin

- *Telone* C35, 13-35 gal. (RUP)

### Metam Potassium

- *Sectagon-K54*, 30-60 gal. (RUP)

### Metam Sodium

- *Sectagon* 42, 37.5-75 gal. (RUP)

### **FOLIAR TREATMENT:**

**MINT RUST** (*Puccinia menthae*): Apply to plants 4 to 8 inches tall at 7 to 10 day intervals. Do not apply more than 3 times. Do not feed hay to livestock.

### \* Azoxystrobin + Propiconazole

- *Quilt* (14 fl oz) or *Quilt Xcel* (10.5 - 14 fl oz) (7 days)

### Azoxystrobin

- *Quadris*, 6 to 15.5 fl oz. (0 days fresh; 7 days processed)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

### Chlorothalonil

- *Bravo* Ultrex, 1.2 lb. (80 days)
- *Bravo* Weather Stik, *Echo* 720, *Equus* 720 SST, 1 3/8 pt. (80 days)

Myclobutanil

- *Rally* 40 WSP, 4 to 5 oz. (30 days)

Pyraclostrobin

- *Headline* SC, 9-12 fl oz. (14 days)

POWDERY MILDEW (ERYSPHE CICHORACEARUM):

Azoxystrobin

- *Quadris*, 6 to 15.5 fl oz. (0 days fresh; 7 days processed)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

Azoxystrobin + Propiconazole

- *Quilt* (14 fl oz) or *Quilt Xcel* (10.5 - 14 fl oz) (7 days)

Myclobutanil

- *Rally* 40 WSP, 4 to 5 oz. (30 days)

Pyraclostrobin

- *Headline* SC, 9-12 fl oz. (14 days)

Sulfur

- *Kumulus* DF, 4 to 6 lb, 21-day intervals. (28 days) Do not apply unless buyer of oil has authorized use.
- *Microthiol* Disperss, *Thiolux*, 4 to 6 lb, 30-day intervals. (30 days) Maximum 3 applications.

## Onions

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

Northern root-knot, root-lesion, onion bloat, common needle and stubby-root nematodes can reduce onion yields. Fields with soil or root problems of undetermined cause should be tested for nematodes (see Appendix C). If the plant-parasitic nematodes are present in population densities above the economic threshold for onions, crop rotation or application of a nematicide is recommended. The following nematicides are suitable for control of northern root-knot, root-lesion, onion bloat and stubby-root nematodes in onion production.

#### FALL SOIL FUMIGATION (BROADCAST):

1,3-D

- *Telone* II, 25 gal/A (muck soil), 9-18 gal/A (mineral soil). Fumigate in the fall when soil temperatures at a 6-inch depth are above 50F. Inject the fumigant to a soil depth of 6 to 8 inches and lightly seal the soil immediately after application. Use soil fumigants only as directed on the label. In some limited situations soil fumigants can be applied in the spring in Michigan. Correct soil moisture, temperature and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or by immediate tarping.

#### AT-PLANTING TREATMENT:

Oxamyl

- *Vydate* L, 3/4 to 1 gal per acre. Apply at planting as an in-furrow drench using 100-150 gallons of water per acre or 1-1/2 to 2 gal per acre as an in-furrow band using 20-50 gallons of water per acre or 1/2 to 1 gal/A as an in-furrow spray followed by 1 to 2 postemergence band treatments at 1/2 to 1 gal/A in a minimum of 20 gal water per acre. Do not apply within 14 days of harvest. Do not apply more than 2 1/4 gal of Vydate L/acre/season. Do not use on green onions. (RUP)

## INSECTS

### SEED TREATMENT:

ONION MAGGOT: Trigard-treated seed is available as a pelleted or film-coated seed. Check with your seed supplier.

### AT-PLANTING TREATMENT:

ONION MAGGOT: Apply to open furrow immediately after seeding but before furrow is closed. Use on dry bulb onions only.

Chlorpyrifos

- *Chlorpyrifos* 15G (3.7 oz/1000 row ft.) or *Chlorpyrifos* 4E AG (1.1 fl oz/1000 row ft.) (60 days) (RUP)
- *Govern*, 32 fl oz. (60 days) (RUP)
- *Hatchet*, 32 fl oz. (60 days) (RUP)
- *Lorsban* 15 G (3.7 oz/1,000 row ft.) or *Lorsban* 4 E / *Lorsban* Advanced (32 fl oz.) or *Lorsban* 75 WG (1.33 lb.) (RUP)
- *Nufos* 4E, 32 fl oz. (60 days) (RUP)
- *Saurus*, 3.7 oz/1000 row ft. (60 days) (RUP)
- *Vulcan*, 32 fl oz. (60 days) (RUP)
- *Warhawk*, 1.1 fl oz/1000 row ft. (60 days) (RUP)
- *Whirlwind*, 32 fl oz. (60 days) (RUP)

## THRIPS:

*Admire* Pro, 14 fl oz. (21 days)

## LEAF MINERS, THRIPS, WHITEFLIES:

*Scorpion* 35SL, 8.75 to 10.5 fl oz/A. (1 day)

## LEAF MINERS:

### FOLIAR TREATMENT:

ONION MAGGOT: Apply as a directed spray or drench in a minimum of 100 gallons of water to the base of onion seedlings or transplants during peak egg laying of the onion maggot adults. Proper timing is critical.

Cypermethrin

- *Ammo* 2.5 EC, 2.5 to 5 fl oz. (7 days) (RUP)
- *Cypermethrin*, 2.5 to 5 fl oz. (7 days) (RUP)
- *Holster*, 2.5 to 5 fl oz. (7 days) (RUP)
- *UP-Cyde* 2.5 EC, 2.5 to 5 fl oz. (7 days) (RUP)

Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (14 days) (RUP)
- *Warrior* II with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (14 days) (RUP)

*Lorsban* 4 E / *Lorsban* Advanced, 1 qt. (60 days) Use on dry bulb onions only. Maximum of 2 applications, maximum of 1 application if *Lorsban* 4 E or 15 G was used at planting (Special Michigan SLN label). (RUP)

Malathion

- *Malathion* 5, or *Malathion* 5 EC (1.5 to 2.5 pt.) or *Malathion* 57 EC (2.5 pt.) or *Malathion* 8 (2 pt.) or *Malathion* 8 Aquamul (1.56 pt.) (3 days)

*Mustang* Max, 2.24 to 4 oz. (7 days) (RUP)

Permethrin

- *Ambush* 25 W, 6.4 to 19.2 oz. (1 day) (RUP)
- *Perm-UP* 25DF (9.6 to 19.2 oz.) or *Perm-UP* 3.2 EC (4 to 12 oz.) (1 day) (RUP)
- *Pounce* 25 WP, 6.4 to 19.2 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (14 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

THRIPS: Usually appear around mid-summer. Damage is most severe on the new growth. Dry growing conditions usually intensify the problem. Treat when damage becomes visible or numbers exceed 10 to 15 per plant. Repeat as needed.

\* *Movento*, 5 fl oz/A. (7 days) *Movento* must be tank-mixed with a penetrating adjuvant. Use for the first two applications in the season, applied one week apart.

## Onions

\* *Radiant SC*, 6 to 10 fl oz. (1 day) Mix with penetrating surfactant

### Abamectin

- *Agri-Mek* 0.15 EC (8 to 16 fl oz.) or *Agri-Mek SC* (1.75 to 3.5 fl oz.) (30 days) Use with a non-ionic surfactant. (RUP)

### Acetamiprid

- *Assail 30 SG* (5 to 8 oz.) or *Assail 70WP* (2.1 to 3.4 oz.) (7 days)

### Cypermethrin

- *Ammo* 2.5 EC, 4 to 5 fl oz. (7 days) (RUP)
- *Cypermethrin*, 4 to 5 fl oz. (7 days) (RUP)
- *Holster*, 4 to 5 fl oz. (7 days) (RUP)
- *UP-Cyde* 2.5 EC, 4 to 5 fl oz. (7 days) (RUP)

*Diazinon AG 500*, 0.5 to 1 pt. (10 days) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (14 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (14 days) (RUP)

### Malathion

- *Malathion 5*, or *Malathion 5 EC* (1.5 to 2 pt.) or *Malathion 57 EC* (1.5 pt.) or *Malathion 8* (1 to 2 pt.) or *Malathion 8 Aquamul* (1 to 1.56 pt.) (3 days)

### Methomyl

- *Lannate LV* (3 pt.) or *Lannate SP* (1 lb.) (7 days) (RUP)
- *Nudrin LV* (3 pt.) or *Nudrin SP* (1 lb.) (7 days) (RUP)

*Mustang Max*, 2.88 to 4 oz. (7 days) (RUP)

### Parathion-methyl

- *Methyl 4 EC*, 1 pt. (15 days) (RUP)
- *PennCap-M*, 2 pt. (15 days) (RUP)

### Permethrin

- *Ambush 25 W*, 9.6 to 19.2 oz. (1 day) (RUP)
- *Perm-UP 25DF* (9.6 to 19.2 oz.) or *Perm-UP 3.2 EC* (6 to 12 oz.) (1 day) (RUP)
- *Pounce 25 WP*, 9.6 to 19.2 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (14 days) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

Regardless of application method of SCORPION do not exceed 15 fl oz/A per crop season

*Scorpion 35SL*, 3.5 to 7 fl oz/A. (1 day)

*Vydate L*, 1 to 2 pt. (14 days) Dry bulb onions only. (RUP)

### ARMYWORM:

#### *Bacillus thuringiensis*

- *Agree WG*, 1 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 2 lb. (0 days)
- *DiPel DF*, 1 to 2 lb. (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

*Coragen*, 3.5 to 5 fl oz. (1 day)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (14 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (14 days) (RUP)

#### Methomyl

- *Lannate LV* (1.5 to 3 pt.) or *Lannate SP* (0.5 to 1 lb.) (7 days) (RUP)
- *Nudrin LV* (1.5 to 3 pt.) or *Nudrin SP* (0.5 to 1 lb.) (7 days) (RUP)

#### Permethrin

- *Ambush 25 W*, 9.6 to 19.2 oz. (1 day) (RUP)
- *Perm-UP 3.2 EC*, 6 to 12 oz. (1 day) (RUP)
- *Pounce 25 WP*, 9.6 to 19.2 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (14 days) (RUP)

*Radiant SC*, 5 to 10 fl oz. (1 day)

#### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust SC* (3 to 6 fl oz.) (1 day)

### CUTWORM:

#### *Bacillus thuringiensis*

- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF*, 0.5 to 1 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (14 days) (RUP)
- *Warrior II* with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (14 days) (RUP)

#### Methomyl

- *Lannate LV* (3 pt.) or *Lannate SP* (1 lb.) (7 days) (RUP)
- *Nudrin LV* (3 pt.) or *Nudrin SP* (1 lb.) (7 days) (RUP)

#### Permethrin

- *Ambush 25 W*, 6.4 to 19.2 oz. (1 day) (RUP)
- *Perm-UP 3.2 EC*, 4 to 12 oz. (1 day) (RUP)
- *Pounce 25 WP*, 6.4 to 19.2 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (14 days) (RUP)

### FLEA BEETLE, LEAFHOPPERS:

*Scorpion 35SL*, 3.5 to 7 fl oz/A. (1 day) Regardless of application method of SCORPION do not exceed 15 fl oz/A per crop season.

### GRASSHOPPERS:

*Scorpion 35SL*, 3.5 to 7 fl oz/A. (1 day)

### STINK BUGS:

*Scorpion 35SL*, 5.25 to 7 fl oz/A. (1 day) Regardless of application method of Scorpion do not exceed 15 fl oz/A per crop season

### LEAFMINERS:

*Exirel*, 13.5-20.5 oz/A. (1)

*Scorpion 35SL*, 3.5 to 7 fl oz/A. (1 day)

### WHITEFLIES:

*Scorpion 35SL*, 3.5 to 7 fl oz/A. (1 day)

## DISEASES

### PREPLANT SOIL FUMIGATION:

PINK ROOT (*Phoma terrestris*): See Bulletin E-2099. Apply as a broadcast or row treatment, placing the fumigant at least 12 to 14 inches below the final soil surface.

Soil sterilization by fumigation is best achieved by proper application of material. Correct soil moisture, temperature, and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or immediate tarping.

#### 1,3 Dichloropropene/chloropicrin

- *Telone C35*, 13-35 gal. (RUP)

#### Metam Potassium

- *Sectagon-K54*, 30-60 gal. (RUP)

#### Metam Sodium

- *Sectagon 42*, 37.5-75 gal. (RUP)

### AT-PLANTING TREATMENT:

SMUT (*Urocystis cepulae*): Apply in planter box at seeding or purchase treated seed. **Note:** Use only as directed; overtreatment may cause injury.

#### Mancozeb

- *Dithane F-45 Rainshield*, 2.4 qt. Apply as an in-furrow drench at planting in 75 to 125 gallons of water per acre (field-seeded onions only).
- *Dithane M-45*, 3 lb per acre. Apply as an in-furrow drench at planting in 75 to 125 gallons of water per acre (field-seeded onions only).
- *Manzate Max*, 2.4 qt. (7 days)
- *Manzate Pro-Stick*, 3 lb per acre. Apply as an in-furrow drench at planting in 75 to 125 gallons of water per acre (field-seeded onions only).

- *Penncozeb 75 DF, Penncozeb 80WP*, 3 lb. Apply as an in-furrow drench at planting in 75 to 125 gallons of water per acre (field-seeded onions only).

#### Thiophanate-Methyl

- *Topsin M 70 WSB*, 2 lb (broadcast).

#### DAMPING OFF (*Pythium* spp. only):

Mefenoxam. Apply as a broadcast preplant incorporation or a surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone after planting with 1/2 to 1 in. of sprinkler irrigation.

- *Ridomil Gold SL*, 0.5-1 pt.
- *Ultra Flourish*, 1 to 2 pt.

#### AT PLANTING OR SIDE DRESS:

PINK ROOT (*Phoma terrestris*):

#### Penthiopyrad

- *Fontelis*, 24 fl oz.

WHITE ROT (*Sclerotium cepivorum*):

#### Thiophanate-Methyl

- *Cercobin 4.1F*, 43.6 fl oz. Spray directly into the open furrow at time of planting. Rate is broadcast.

#### FOLIAR TREATMENT:

BOTRYTIS LEAF BLIGHT (*Botrytis squamosa*): Apply every 7 to 10 days after the 4-leaf stage or according to the onion leaf blight predictor.

#### \* Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 1.6 to 3.2 pt. (7 days)

#### \* Azoxystrobin + Difenconazole

- *Quadris Top*, 14 fl oz. (1 day) One application before alternating with another chemical.

#### \* Chlorothalonil

- *Bravo Ultrex*, 0.9 to 2.7 lb. (7 days) 1.4 to 2.7 lb for green bunching onions (14 day PHI) May be applied through sprinkler irrigation systems. Applications of more than 9 lb of Bravo Ultrex per season may result in yield reductions.
- *Bravo Weather Stik, Equus 720 SST*, 1 1/2 to 3 pt (green bunching) (14 days) or 1 to 3 pt (dry bulb) (7 days). Do not apply more than 3 times per season on green bunching onions.
- *Bravo ZN*, 1 1/2 to 4 1/4 pt. (7 days) 2 1/4 to 4 1/4 rate for green bunching onions (14 day PHI)
- *Echo 720*, 1 to 3 pt. (7 days)
- *Echo 90 DF*, 7/8 to 1 5/8 lb. (7 days) 1 1/8 to 1 5/8 lb for green bunching onions (14 day PHI)
- *Equus DF*, 0.9 to 2.7 lb. (7 days)

#### \* Difenconazole + Cyprodinil

- *Inspire Super*, 16 to 20 fl oz. (7 days)

#### \* Iprodione

- *Iprodione 4L AG*, 1.5 pt. (7 days)
- *Meteor*, 1.5 pt. (7 days)
- *Rovral 4 Flowable*, 1 1/2 pt, 14-day interval. (7 days) Or 1 pt as tank mix with another fungicide, 7-day intervals. **Note:** See label for permissible crop rotations. Maximum 5 applications.

#### \* Mancozeb

- *Dithane F-45 Rainshield*, 2.4 qt. (7 days)
- *Dithane M-45*, 3 lb. (7 days)
- *Koverall*, 3 lb. (7 days)
- *Manzate Max*, 1.6 to 2.4 qt. (7 days)
- *Manzate Pro-Stick*, 3 lb. (7 days) Do not apply to exposed bulbs. Maximum 30 lb/year.
- *Penncozeb 75 DF*, 2 to 3 lb. (7 days)

#### Azoxystrobin

- *Quadris*, 9.2 to 15.4 fl oz. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

#### Azoxystrobin + Propiconazole

- *Quilt* (14 to 27.5 fl oz) or *Quilt Xcel* (17.5 to 26 fl oz) (14 days)

#### Boscalid

- *Endura*, 6.8 oz. (7 days)

#### Cyprodinil + Fludioxonil

- *Switch 62.5 WG*, 11 - 14 oz every 7 to 10 days. (7 days)

#### Fluxapyroxad + Pyraclostrobin

- *Merivon Xemium Brand Fungicide*, 8 to 11 fl oz. (7 days)

#### Mancozeb + Copper Hydroxide

- *ManKocide*, 2 1/2 lb. (7 days)

#### Mancozeb + Zoxamide

- *Gavel 75 DF*, 1.5 - 2.0 lb. (7 days)

#### Mefenoxam + Chlorothalonil

- *Ridomil Gold Bravo*, 2.5 pt. (7 days) 14 day PHI for green onions

#### Neem Oil

- *Trilogy*, 2 pt. (0 days)

#### Penthiopyrad

- *Fontelis*, 16 - 24 fl oz. (3 days)

#### Propiconazole

- *Propimax EC*, 4 to 8 fl oz. (14 days)
- *Tilt*, 4-8 fl oz. (14 days)

#### Pyraclostrobin

- *Cabrio*, 12 oz (suppression). (7 days) Do not apply more than one application before alternating with another chemical.

#### Pyraclostrobin/Boscalid

- *Pristine*, 14.5 to 18.5 oz. (7 days)

#### Pyrimethanil

- *Scala*, 18 fl oz. (7 days) 12 hr REI.

#### Zoxamide + chlorothalonil

- *Zing!*, 30 fl oz. (7 days)

DOWNY MILDEW (*Peronospora destructor*): Apply after 4-leaf stage.

#### \* Famoxadone + Cymoxanil

- *Tanos*, 8 oz. (1 day) Apply as preventative and tank mix.

#### \* Fosetyl-Aluminum

- *Aliette WDG*, 2 to 3 lb, 7- to 14-day intervals. (7 days) Do not make more than 7 applications per season. Do not tank mix with copper fungicides.

#### \* Mancozeb

- *Dithane DF Rainshield, Dithane M-45*, 3 lb. (7 days) Do not apply to exposed bulbs. Maximum 30 lb/year.
- *Dithane F-45 Rainshield*, 2.4 qt. (7 days)
- *Koverall*, 3 lb. (7 days)
- *Manzate Max*, 1.6 to 2.4 qt. (7 days)
- *Manzate Pro-Stick*, 3 lb. (7 days)
- *Penncozeb 75 DF*, 2 to 3 lb. (7 days)

#### \* Mancozeb + Copper Hydroxide

- *ManKocide*, 2.5 lb. (7 days)
- *Ridomil Gold Copper*, 2 lb. (10 days dry bulb onions, maximum 4 applications; 7 days green onion) Maximum 3 applications.

#### \* Mefenoxam + Chlorothalonil

- *Ridomil Gold Bravo*, 2.5 pt. (7 days dry bulb onions; 14 days green onion) Maximum 3 applications.

#### \* Mefenoxam + Copper Hydroxide

- *ManKocide*, 2.5 lb. (7 days)
- *Ridomil Gold Copper*, 2 lb. (10 days dry bulb onions, maximum 4 applications; 7 days green onion) Maximum 3 applications.

## Onions

### \* Mefenoxam + Mancozeb

- *Ridomil* Gold MZ, 2.5 lb (7 days). (7 days) See label.

**Note:** See label for plant back restrictions.

### Ametoctradin + Dimethomorph

- *Zapro*, 14 fl. oz. (0 days)

### Azoxystrobin

- *Quadris*, 9.2 to 15.4 fl oz. (0 days)

Do not apply more than one foliar application of Amistar, Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

### Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 2.4 to 3.6 pt. (7 days)

### Chlorothalonil. Downy mildew suppression.

- *Bravo* Ultrex, 0.9 - 2.7 lb every 7 to 10 days. (7 days)
- *Bravo* Weather Stik, *Equus* 720 SST, 1 to 3 pt. (7 days dry bulb onions; 14 days green bunching onions)
- *Bravo* ZN, 1 1/2 to 4 1/4 pt. (7 days)
- *Echo* 90 DF, 1 1/4 to 2 1/2 lb. (7 days)

### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1.5 pt. (0 days)

### Dimethomorph

- *Forum*, 6 fl oz. (0 days)

### Fenamidon

- *Reason* 500 SC, 5.5 fl oz every 5 to 10 days. (7 days)

### Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 8 to 11 fl oz. (7 days) Suppression only

### Mancozeb + Zoxamide

- *Gavel* 75 DF, 1.5 - 2.0 lb. (7 days)

### Mandipropamid

- *Revus*, 8 fl oz. (7 day)

### Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 2.5 to 3.75 pt every 7 - 14 days. (0 days)
- *Prophyt*, 4 pt. (0 days)

### Neem Oil

- *Trilogy*, 2 pt. (0 days)

### Potassium phosphite/chlorothalonil

- *Catamaran*, 4-7 pt. (7 days) 14 day PHI for green onions

### Pyraclostrobin

- *Cabrio*, 12 oz. (7 days) Do not apply more than one application before alternating with another chemical.

### Pyraclostrobin/Boscalid

- *Pristine*, 18.5 oz (suppression). (7 days)

### Zoxamide + chlorothalonil

- *Zing!*, 30 fl oz. (7 days)

**Note:** Most fungicides that protect against purple blotch may also provide limited downy mildew protection.

PURPLE BLOTCH (*Alternaria porri*): Apply every 7 to 10 days after the 4-leaf stage.

### \* Azoxystrobin

- *Quadris*, 6.2 to 12.3 fl oz. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

### \* Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 1.6 to 3.2 pt. (7 days)

### \* Azoxystrobin + Difenconazole

- *Quadris* Top, 12 to 14 fl oz. (7 days)

### \* Azoxystrobin + Propiconazole

- *Quilt* (14 to 27.5 fl oz) or *Quilt* Xcel (14 to 21 fl oz) (14 days)

### \* Chlorothalonil

- *Bravo* Ultrex, 0.9 to 2.7 lb. (7 days) 1.4 to 2.7 lb for green bunching onions (14 day PHI) May be applied through sprinkler irrigation systems. Applications of more than 9 lb of Bravo Ultrex per season may result in yield reductions.

- *Bravo* Weather Stik, *Equus* 720 SST, 1 1/2 to 3 pt (green bunching) (14 days) or 1 to 3 pt (dry bulb) (7 days). (14 days) Do not apply more than 3 times per season on green bunching onions.

- *Bravo* ZN, 1 1/2 to 4 1/4 pt. (7 days) 2 1/4 to 4 1/4 rate for green bunching onions (14 day PHI)

- *Echo* 720, 1 to 2 pt. (7 days)

- *Echo* 90 DF, 7/8 to 1 5/8 lb. (7 days) 1 1/8 to 1 5/8 lb for green bunching onions (14 day PHI)

- *Equus* DF, 0.9 to 2.7 lb. (7 days)

### \* Cyprodinil + Fludioxonil

- *Switch* 62.5 WG, 11-14 oz. (7 days)

### \* Difenoconazole + Cyprodinil

- *Inspire* Super, 16 to 20 fl oz. (7 days)

### \* Iprodione

- *Iprodione*, *Rovral* 4 Flowable, 1.5 pt, 14-day intervals or 1 pt as tank mix with another fungicide, 7-day intervals. (7 days)

- *Meteor*, 1.5 pt. (7 days)

**Note:** See label for permissible crop rotations. Maximum 5 applications.

### \* Mancozeb

- *Dithane* F-45 Rainshield, 2.4 qt. (7 days)

- *Dithane* M-45, 3 lb. (7 days)

- *Koverall*, 3 lb. (7 days)

- *Manzate* Max, 1.6 to 2.4 qt. (7 days)

- *Manzate* Pro-Stick, 3 lb. (7 days) Do not apply to exposed bulbs. Maximum 30 lb/year.

- *Penncozeb* 75 DF, 2 to 3 lb. (7 days)

### \* Pyraclostrobin

- *Cabrio*, 8-12 oz. (7 days) Do not apply more than one application before alternating with another chemical.

### \* Pyraclostrobin/Boscalid

- *Pristine*, 10.5 to 18.5 oz. (7 days)

### Boscalid

- *Endura*, 6.8 oz. (7 days)

### Copper Ammonium Carbonate

- *Copper* Count N, 2 qt. (0 days)

### Copper Hydroxide

- *Champ* DP Dry Prill, 1 1/3 lb. (0 days)

- *Champ* Formula 2 F, 1 1/3 pt. (0 days)

- *Kocide* 2000, 1 1/2 lb. (0 days)

- *Kocide* 3000, 0.75-1.5 lb. (0 day)

- *Nu-Cop* 3 L, 1 1/3 to 2 2/3 pt. (0 days)

- *Nu-Cop* 50 DF, 2 lb. (0 days)

### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1.5 pt. (0 days)

### Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 1.25 to 2.5 lb. (0 days)

### Famoxadone + Cymoxanil

- *Tanos*, 8 oz. (1 day) Apply as preventative and tank mix.

### Fenamidon

- *Reason* 500 SC, 5.5 fl oz every 5 to 10 days. (7 days)

### Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 4 - 11 fl oz. (7 days)

### Fosetyl-Aluminum

- *Aliette* WDG, 2 to 3 lb, 7- to 14-day intervals. (7 days) Do not tank mix with copper fungicides.

Mancozeb + Copper Hydroxide

- *ManKocide*, 2.5 lb. (7 days)

Mancozeb + Zoxamide

- *Gavel* 75 DF, 1.5 - 2.0 lb. (7 days)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Mefenoxam + Chlorothalonil

- *Ridomil* Gold Bravo, 2.5 pt. (7 days dry bulb onions; 14 days green onion)

Penthiopyrad

- *Fontelis*, 16 - 24 fl oz. (3 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 4-7 pt. (7 days)

Propiconazole

- *Propimax* EC, 4 to 8 fl oz. (14 days)
- *Tilt*, 4-8 fl oz. (14 days)

Pyrimethanil

- *Scala*, 18 fl oz. (7 days) 12 hr REI.

Tebuconazole

- *Orius* 3.6F, Tebuzol 3.6, 4-6 fl oz. (7 days) Maximum 12 fl oz/acre/season. 12 hr REI.

Zoxamide + chlorothalonil

- *Zing!*, 30 fl oz. (7 days)

NECK ROT (*Botrytis* spp.):Bacillus subtilis

- *Serenade* ASO, 2 - 6 qts. (0 days) Biological control product that needs to be applied before disease development. Control may be limited under heavy disease pressure.

Chlorothalonil

- *Bravo* Ultrex, 1.25 - 2.7 lb every 7 days. (7 days)

Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 8 to 11 fl oz. (7 days)

Mancozeb

- *Koverall*, 3 lb. (7 days)
- *Manzate* Max, 1.6 to 2.4 qt. (7 days)
- *Manzate* Pro-Stick, 3 lb. (7 days)
- *Penncozeb* 75 DF, 2 to 3 lb. (7 days)

Mancozeb + Zoxamide

- *Gavel* 75 DF, 1.5 - 2.0 lb. (7 days)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

**Note:** Treatments for onion leaf blight may retard or prevent symptomless spread in the field prior to harvest.

BACTERIAL BLIGHT (*Erwinia carotovora* subsp. *carotovora*, *Pseudomonas* spp.):

Copper Hydroxide. Apply at 7 to 10 day intervals when plants are 4-6 in. tall. Can cause foliar phytotoxicity.

- *Champ* DP Dry Prill, 2/3 to 1 lb. (0 days)
- *Champ* Formula 2 F, 2/3 to 1 pt. (0 days)
- *Kocide* 2000, 3/4 to 1 1/4 lb. (0 days)
- *Kocide* 3000, 0.75-1.5 lb. (0 day)

Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1.5 pt. (0 days)

Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 1.25 to 2.5 lb. (0 days)

Famoxadone + Cymoxanil

- *Tanos*, 8 to 10 oz. (1 day) Apply as preventative and tank mix.

WHITE ROT (*Sclerotium cepivorum*):\* Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 1.6 to 3.2 pt. (7 days)

PINK ROOT (*Phoma terrestris*):Penthiopyrad

- *Fontelis*, 24 fl oz.

## STEMPHYLIUM LEAF BLIGHT and STALK ROT:

Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 4 - 11 fl oz. (7 days)

## Parsnips

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

Northern root-knot nematodes can reduce parsnip yields. Fields with soil or root problems of undetermined cause should be tested for nematodes (see Appendix C). If the plant-parasitic nematodes are present in population densities above the economic threshold for parsnips, crop rotation or application of a nematicide is recommended. The following nematicide is suitable for control of root-knot nematodes in parsnip production.

### FALL SOIL TREATMENT (BROADCAST):

1,3-D

- *Telone* II, 25 gal/A (muck soil), 9-18 gal/A (mineral soil).

Fumigate in the fall when soil temperatures at a 6 inch depth are above 50F. Inject the fumigant to a soil depth of 8 inches and lightly seal the soil immediately after application. Use soil fumigants only as directed on the label.

In some limited situations soil fumigants can be applied in the spring in Michigan.

Correct soil moisture, temperature and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or by immediate tarping.

### INSECTS

#### SOIL TREATMENT:

LEAFHOPPERS, APHIDS, FLEA BEETLE: See label for application methods.

Imidacloprid

- *Admire* Pro, 4.4 to 10.5 fl oz. (21 days)
- *Nuprid* 2 F, 10 to 24 fl oz. (21 days)

Thiamethoxam

- *Platinum* (5 to 12 fl oz.) or *Platinum* 75 SG (1.7 to 4.01 oz.) (30 days) See label for application methods.

## APHIDS, LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

## WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

#### FOLIAR TREATMENT:

FLEA BEETLE: Apply as needed, usually soon after plants come up.

*Actara*, 1.5 to 3 oz. (7 days)

Bifenthrin

- *Bifenure* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (21 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)

## Parsnips

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (2.6 to 6.1 oz.) or *Hero* EW (2.8 to 6.7 oz.) (21 days) (RUP)

- *Steed*, 2.5 to 3.5 fl oz. (21 days) (RUP)

*Bifenture* 10 DF, 12.8 to 16 oz/A. (21 days)

### Carbaryl

- *Carbaryl* 4L, 0.5 to 1 qt. (7 days)

- *Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (7 days)

### Imidacloprid

- *Admire* Pro, 1.2 fl oz. (7 days)

- *Nuprid* 1.6 F, 3.5 fl oz. (7 days)

*Malathion* 8, 2 pt. (7 days)

*Mustang* Max, 1.76 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 0.5 to 1 qt. (7 days)

*Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (7 days)

### Spinosad

- *Blackhawk* (1.7-3.3 oz/A) or *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (3 days)

LEAFHOPPERS: Apply when first seen. Repeat as needed.

*Actara*, 1.5 to 3 oz. (7 days)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (21 days) (RUP)

- *Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

### Carbaryl

- *Carbaryl* 4L, 0.5 to 2 qt. (7 days)

- *Sevin* 4 F (0.5 to 2 qt.) or *Sevin* 80 S (0.63 to 2.5 lb.) or *Sevin* XLR Plus (0.5 to 2 qt.) (7 days)

### Imidacloprid

- *Admire* Pro, 1.2 fl oz. (7 days)

- *Nuprid* 1.6 F, 3.5 fl oz. (7 days)

*Malathion* 8, 2 pt. (7 days)

*Mustang* Max, 1.76 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 0.5 to 2 qt. (7 days)

*Sevin* 4 F (0.5 to 2 qt.) or *Sevin* 80 S (0.63 to 2.5 lb.) or *Sevin* XLR Plus (0.5 to 2 qt.) (7 days)

*Sivanto*, 7 - 10.5 fl oz/A.

ARMYWORM, CUTWORM: Apply if needed. Repeat as needed.

### Bifenthrin

- *Bifenture* 10 DF, 12.8 to 16 oz/A. (21 days)

- *Bifenture* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)

- *Brigade @* 2EC (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (21 days) (RUP)

- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (21 days) (RUP)

- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)

- *Tundra* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)

### Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (7 days)

- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (7 days)

*Javelin* WG, 0.12 to 1.5 lb. (0 days)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 1 to 2 qt. (7 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (7 days)

APHIDS: Apply if necessary.

*Actara*, 1.5 to 3 oz. (7 days)

*Beleaf* 50 SG, 2 to 2.8 oz. (3 days)

### Bifenthrin

- *Bifenture* 10 DF, 12.8 to 16 oz/A. (1 day)

- *Bifenture* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)

- *Brigade @* 2EC (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (21 days) (RUP)

- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (21 days) (RUP)

- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)

- *Tundra* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (21 days) (RUP)

- *Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

### Imidacloprid

- *Admire* Pro, 1.2 fl oz. (7 days)

- *Nuprid* 1.6 F, 3.5 fl oz. (7 days)

### Malathion

- *Malathion* 5, or *Malathion* 5 EC (1.5 to 2 pt.) or *Malathion* 57 EC (1 to 2 pt.) or *Malathion* 8 (2 pt.) or *Malathion* 8 Aquamul (1 to 1.25 pt.) (21 days for *Malathion* 5 EC, 7 days for others)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 7 - 10.5 fl oz/A.

ARMYWORM:

*Agree* WG, 0.5 to 2 lb. (0 days)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (21 days) (RUP)

- *Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

*Coragen*, 3.5 to 5 fl oz. (1 day)

*Intrepid* 2F, 6 to 16 fl oz. (14 days) 4 to 10 fl oz with PHI of 1 day when harvesting leaves.

*Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

*Radiant* SC, 6 to 8 fl oz. (3 days) See label for treating and harvesting of leaves.

### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (3 days)

CUTWORM:

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (2.6 to 6.1 oz.) or *Hero* EW (2.8 to 6.7 oz.) (21 days) (RUP)

- *Steed*, 2.5 to 3.5 fl oz. (21 days) (RUP)

*Mustang* Max, 1.28 to 4 oz. (1 day) (RUP)

WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

## MITES

### Bifenthrin

- *Bifenture* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)

- *Bifenture* 10 DF, 12.8 to 16 oz/A. (1 day)

- *Brigade @* 2EC (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (21 days) (RUP)

- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (21 days) (RUP)

- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero* EW (11.2 oz.) (21 days) (RUP)

## DISEASES

### SEED TREATMENT:

DAMPING OFF (*Pythium* spp., *Rhizoctonia solani*):

#### Fludioxinil

- *Maxim* 4 FS, 0.08 to 0.16 oz/100 lb seed

(*Rhizoctonia*). Commercial seed treatment plants only.

#### Mefenoxam

- *Apron* XL, 0.085 - 0.64 fl oz/100 lb seed (*Pythium*).

**PREPLANT INCORPORATED:**DAMPING OFF (*Pythium* and *Phytophthora* spp., *Rhizoctonia solani*):Fluopicolide

- *Presidio*, 3-4 fl oz. (7 days) Must be mixed with another fungicide active on pathogen.

Mefenoxam. Apply as a broadcast preplant incorporation or a surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone after planting with 1/2 to 1 in. sprinkler irrigation.

- *Ridomil* Gold SL, 1-2 pt.
- *Ultra* Flourish, 2 to 4 pt.

**FOLIAR TREATMENT:**CERCOSPORA LEAF SPOT (*Cercospora* spp.), ALTERNARIA LEAF SPOT (*Alternaria* spp.): Apply at first sign of disease and repeat every 7 to 10 days.\* Azoxystrobin

- *Quadris*, 6 to 15.5 fl oz (Alternaria); 9.0 to 15.5 fl oz (Cercospora). (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

\* Pyraclostrobin

- *Cabrio*, 8-12 oz. (0 days) Do not apply more than one application before alternating with another chemical.

\* Trifloxystrobin

- *Flint* (2 to 3 oz) or *Gem* 500 (1.9 to 2.9 fl oz) (7 days) Do not apply more than three sequential foliar applications of strobilurin fungicides before alternating with a fungicide that has a different mode of action. 12 hr REI.

Chlorothalonil

- *Bravo* Ultrex, *Equus* DF, 1.4 to 1.8 lb. (10 days) (Alternaria) Do not apply more than 4 times per season.
- *Bravo* Weather Stik, *Echo* 720, 1.5 to 2 pt. (10 days) (Alternaria) Do not apply more than 4 times per season.
- *Echo* 90 DF, 1 1/4 to 1 5/8 lb. (10 days)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Penthiopyrad

- *Fontelis*, 16 - 30 fl oz. (0 days)

POWDERY MILDEW, RUST:

\* Penthiopyrad

- *Fontelis*, 16 - 30 fl oz. (0 days)

Trifloxystrobin

- *Flint* (2 to 3 oz) or *Gem* 500 (1.9 to 2.9 fl oz) (7 days) Maximum 12 oz/year. 12 hr REI.

## Peas

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

**INSECTS****SEED TREATMENT:** Treatments applied to seed prior to planting.

Insecticide and fungicide treatments can be combined according to directions. Handle seed carefully to prevent cracking.

APHIDS, BEAN LEAF BEETLE, MEXICAN BEAN BEETLE, LEAFHOPPERS, SEED CORN MAGGOT: Early season protection.

*Cruiser* 5 FS, 1.28 fl oz/100 lb seed.

SEED CORN MAGGOT:

*Lorsban* 50 W, 2 oz/100 lb seed. (RUP)

**SOIL TREATMENT:**

LEAFHOPPERS, APHIDS:

Imidacloprid

- *Admire* Pro, 7 to 10.5 fl oz. (21 days) See label for application methods.
  - *Nuprid* 2 F, 16 to 24 fl oz. (21 days) Apply preplant, in furrow, or as a post-planting drench.
- Sivanto*, 7 - 10.5 fl oz/A.

CUTWORM:

*Diazinon* 50 W, 4 to 8 lb. (RUP)

ARMYWORM, CUTWORM:

*Capture* LFR, 3.4 to 6.8 fl oz. (RUP)

SEEDCORN MAGGOT:

*Bifenxure* 10 DF, 8 to 16 oz/A.

*Brigade* WSB, 8 to 16 oz. (RUP)

Chlorpyrifos

- *Chlorpyrifos* 4E AG, . (RUP)
- *Govern*, . (RUP)
- *Hatchet*, . (RUP)
- *Lorsban* 4 E / *Lorsban* Advanced, *Lorsban* 75 WG, . (RUP)
- *Nufos* 4E, . (RUP)
- *Vulcan*, . (RUP)
- *Whirlwind*, . (RUP)

See labels for rates.

GRUBS:

*Bifenxure* 10 DF, 8 to 16 oz/A.

WIREWORMS:

*Bifenxure* 10 DF, 8 to 16 oz/A.

WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

**FOLIAR TREATMENT:**

ARMYWORM, CUTWORM: Apply if there are more than 1/25 sweeps. Pay special attention to grassy areas in the field.

\* Bifenthrin

- *Bifenxure* EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Brigade* @ 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (3 days) (RUP)

\* Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvalStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Belt* SC, 2 to 3 fl oz. (1 day)

Bifenthrin + Imidacloprid

- *Brigadier*, 5.5 fl oz. (7 days) (RUP)
- *Swagger*, 10.2 to 11 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)
  - *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)
- Bifenxure* 10 DF, 4 to 16 oz/A. (3 days)
- Bifenxure* 10 DF, 5.3 to 16 oz/A. (3 days)
- Javelin* WG, 0.12 to 1.5 lb. (0 days)
- Leverage* 360, 2.4 to 2.8 fl oz. (7 days) (RUP)
- Pyrenone*, 1 to 12 fl oz. (0 days)

LEAFHOPPERS: Apply as necessary

Acetamiprid

- *Assail* 30 SG (2.5 to 5.3 oz.) or *Assail* 70WP (1 to 2.3 oz.) (7 days)

## Peas

*Admire Pro*, 1.2 fl oz. (21 days)

*Baythroid XL*, 0.8 to 1.6 fl oz. (3 days) (RUP)

### Bifenthrin

- *Bifenture EC*, 1.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (1.6 to 6.4 fl oz.) or *Brigade WSB* (4 to 16 oz.) (3 days) (RUP)
- *Capture 2 EC*, 1.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline 2EC*, 1.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare 2EC*, 1.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 1.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra EC*, 1.6 to 6.4 fl oz. (3 days) (RUP)

### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 5.5 fl oz. (7 days) (RUP)
- *Swagger*, 7.6 to 11 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

*Bifenture 10 DF*, 4 to 16 oz/A. (3 days)

### Carbaryl

- *Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

*Dibrom 8 Emulsive*, 1 pt. (1 day) (RUP)

### Imidacloprid

- *Admire Pro*, 1.2 fl oz. (7 days)
- *Nuprid 1.6 F*, 3.5 fl oz. (7 days) Do not exceed 10.5 oz/Acre per season.

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)

*Leverage 360*, 2.4 to 2.8 fl oz. (7 days) (RUP)

*Malathion 5 EC*, 1.25 to 4 pt. (3 days)

*Mustang Max*, 2.72 to 4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

*Sivanto*, 7 - 10.5 fl oz/A.

APHIDS: Apply if there are more than 1/pod or 10/sweep

### Acetamiprid

- *Assail 30 SG* (2.5 to 5.3 oz.) or *Assail 70WP* (1 to 2.3 oz.) (7 days)

*Admire Pro*, 1.2 fl oz. (7 days)

### Bifenthrin

- *Bifenture 10 DF*, 5.3 to 16 oz/A. (3 days)
- *Bifenture EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade WSB* (5.3 to 16 oz.) (3 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)

### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 5.5 fl oz. (7 days) (RUP)
- *Swagger*, 7.6 to 11 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

*Diazinon AG 500*, 1 pt. (7 days) (RUP)

*Dibrom 8 Emulsive*, 1 pt. (1 day) (RUP)

### Dimethoate

- *Dimethoate 4 EC* (0.3 pt.) or *Dimethoate 400* (0.32 pt.) or *Dimethoate 4E* (0.32 pt.) (0 days)

### Esfenvalerate

- *Adjourn*, 2.9 to 5.8 fl oz. (3 days) (RUP)
- *Asana XL*, 2.9 to 5.8 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 2.9 to 5.8 fl oz. (3 days) (RUP)

### Imidacloprid

- *Admire Pro*, 1.2 fl oz. (7 days)
- *Nuprid 1.6 F*, 3.5 fl oz. (7 days) Do not exceed 10.5 oz/Acre per season.

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)

*Leverage 360*, 2.4 to 2.8 fl oz. (7 days) (RUP)

### Malathion

- *Malathion 5 EC* (1.5 to 2 pt.) or *Malathion 57 EC* (1.5 to 1.6 pt.) or *Malathion 8* (1 to 2.5 pt.) or *Malathion 8 Aquamul* (1 pt.) (3 days)

### Methomyl

- *Lannate LV* (1.5 to 3 pt.) or *Lannate SP* (0.5 to 1 lb.) (1 day) (RUP)
- *Nudrin LV* (1.5 to 3 pt.) or *Nudrin SP* (0.5 to 1 lb.) (1 day) (RUP)

*Movento*, 4 to 5 fl oz. (1 day)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (7 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 7 - 10.5 fl oz/A.

PEA WEEVIL: Apply when they appear at blossom time, usually at 10 to 50% bloom and 7 days later.

### Bifenthrin

- *Bifenture EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade WSB* (5.3 to 16 oz.) (3 days) (RUP)
- *Capture 2 EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (3 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (3 days) (RUP)

### Bifenthrin + Imidacloprid

- *Brigadier*, 5.5 fl oz. (7 days) (RUP)
- *Swagger*, 10.2 to 11 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

*Bifenture 10 DF*, 5.3 to 16 oz/A. (3 days)

### Carbaryl

- *Carbaryl 4L*, 1.5 qt. (3 days)
- *Sevin 4 F* (1.5 qt.) or *Sevin 80 S* (1.87 lb.) or *Sevin XLR Plus* (1.5 qt.) (3 days)

*Leverage 360*, 2.4 to 2.8 fl oz. (7 days) (RUP)

### Malathion

- *Malathion 5* (1.6 pt.) or *Malathion 8* (1 to 2.5 pt.) or *Malathion 8 Aquamul* (1 pt.) (3 days)

*Mustang Max*, 2.72 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl 4L*, 1.5 qt. (3 days)

*Sevin 4 F* (1.5 qt.) or *Sevin 80 S* (1.87 lb.) or *Sevin XLR Plus* (1.5 qt.) (3 days)

## CUTWORM:

\* Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (7 days) (RUP)
- *Warrior II* with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (7 days) (RUP)

*Baythroid XL*, 0.8 to 1.6 fl oz. (3 days) (RUP)

Carbaryl

- *Carbaryl* 4L, 1 to 1.5 qt. (3 days)
- *Sevin* 4 F (1 to 1.5 qt.) or *Sevin* 80 S (1.25 to 1.87 lb.) or *Sevin* XLR Plus (1 to 1.5 qt.) (3 days)

*Danitol* 2.4 EC, 10.67 fl oz. (7 days) (RUP)

Methomyl

- *Lannate* LV (1.5 to 3 pt.) or *Lannate* SP (0.5 to 1 lb.) (1 day) (RUP)
- *Lannate* SP (0.5 to 1 lb.) or *Nudrin* LV (1.5 to 3 pt.) (1 day) (RUP)

*Mustang Max*, 1.28 to 4 oz. (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (7 days) (RUP)

*Carbaryl* 4L, 1 to 1.5 qt. (3 days)

*Sevin* 4 F (1 to 1.5 qt.) or *Sevin* 80 S (1.25 to 1.87 lb.) or *Sevin* XLR Plus (1 to 1.5 qt.) (3 days)

## ARMYWORM:

Bacillus thuringiensis

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *Biobit* HP, 0.5 to 2 lb. (0 days)
- *DiPel* DF (1 to 2 lb.) or *DiPel* ES (2 to 4 pt.) (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

*Baythroid XL*, 1.6 to 2.1 fl oz. (3 days) (RUP)

Carbaryl

- *Carbaryl* 4L, 1 to 1.5 qt. (3 days)
- *Sevin* 4 F (1 to 1.5 qt.) or *Sevin* 80 S (1.25 to 1.87 lb.) or *Sevin* XLR Plus (1 to 1.5 qt.) (3 days)

*Coragen*, 3.5 to 5 fl oz. (1 day)

*Intrepid* 2F, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (7 days)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)

Methomyl

- *Lannate* LV (0.75 to 3 pt.) or *Lannate* SP (0.25 to 1 lb.) (1 day) (RUP)
- *Nudrin* LV (0.75 to 3 pt.) or *Nudrin* SP (0.25 to 1 lb.) (1 day) (RUP)

*Mustang Max*, 2.72 to 4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (7 days) (RUP)

*Radiant* SC, 4 to 8 fl oz. (3 days)

*Carbaryl* 4L, 1 to 1.5 qt. (3 days)

*Sevin* 4 F (1 to 1.5 qt.) or *Sevin* 80 S (1.25 to 1.87 lb.) or *Sevin* XLR Plus (1 to 1.5 qt.) (3 days)

Spinosad

- *Entrust* (1.25 to 2 oz.) or *Entrust* SC (4 to 6 fl oz.) (3 days)

## LOOPERS:

Bacillus thuringiensis

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *Biobit* HP, 0.5 to 1 lb. (0 days)
- *DiPel* DF (0.5 to 1 lb.) or *DiPel* ES (1 to 2 pt.) (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Danitol* 2.4 EC, 10.67 fl oz. (7 days) (RUP)

*Dibrom* 8 Emulsive, 1 to 1.5 pt. (1 day) (RUP)

*Intrepid* 2F, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (7 days)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)

Methomyl

- *Lannate* LV (1.5 to 3 pt.) or *Lannate* SP (0.5 to 1 lb.) (1 day) (RUP)
- *Nudrin* LV (1.5 to 3 pt.) or *Nudrin* SP (0.5 to 1 lb.) (1 day) (RUP)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (7 days) (RUP)

*Radiant* SC, 4 to 8 fl oz. (3 days)

Spinosad

- *Entrust* (1.25 to 2 oz.) or *Entrust* SC (4 to 6 fl oz.) (3 days)

## CUCUMBER BEETLE, BEAN LEAF BEETLE, MEXICAN BEAN BEETLE:

\* Acetamiprid

- *Assail* 30 SG, 2.5 to 5.3 oz. (7 days)
- *Assail* 70WP, 1 to 2.3 oz. (7 days)

## WHITEFLIES:

Acetamiprid

- *Assail* 30 SG, 4.5 to 5.3 oz/A. (7 days)
- *Assail* 70WP, 1.9 to 2.3 oz/A. (7 days)

*Admire* Pro, 1.2 fl oz. (7 days)

*Movento*, 4.0 to 5.0 fl oz/A. (1 day)

*Sivanto*, 10.5 - 14 fl oz/A.

## THRIPS:

Acetamiprid

- *Assail* 30 SG, 4.5 to 5.3 oz/A. (7 days)
- *Assail* 70WP, 1.9 to 2.3 oz/A. (7 days)

*Admire* Pro, 7.0 to 10.5 fl oz. (21 days)

## FLEA BEETLE:

*Brigade* @ 2EC, 1.6 to 6.4 fl oz. (3 days) (RUP)

## MITES

Apply if necessary. Usually most serious in dry weather.

Bifenazate

- *Acramite* 4SC (16 to 24 fl oz.) or *Acramite* 50WS (1 to 1.5 lbs.) (3 days)

Bifenthrin

- *Bifenture* EC, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Bifenture* 10 DF, 12.8 to 16 oz/A. (3 days)
- *Brigade* @ 2EC (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (3 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero* EW (11.2 oz.) (3 days) (RUP)

Fenpropathrin

- *Danitol* 2.4 EC, 10 2/3 fl oz. (7 days) (RUP)

Naled

- *Dibrom* 8 Emulsive, 1 pt. (1 day) (RUP)

## DISEASES

## SEED TREATMENT:

DAMPING OFF (*Pythium* spp., *Rhizoctonia solani*): Use slurry or dust method. **Note:** If possible, buy fungicide treated seed instead of treating seed on the farm.

Captan

- *Captan* 4 Flowable, 2.6 fl oz/100 lb seed.

## Peppers

### Fludioxinil

- *Maxim* 4 FS, 0.08 to 0.16 fl oz/100 lb seed (*Rhizoctonia*). Commercial seed treatment plants only.

### Fludioxinil + mefenoxam

- *Apron* Maxx RFC, 1.5 fl oz/100 lb seed.

### Fludioxinil + mefenoxam

- *Apron* Maxx RFC, 1.5 fl oz/100 lb seed.

### Mefenoxam

- *Apron* XL, 0.16 to 0.64 fl oz/100 lb (*Pythium*); 0.64 fl oz/100 lb (*Phytophthora*); 1.28 fl oz/100 lb (Downy mildew).

### Metalaxyl

- *Allegiance-FL*, 0.75 fl oz/100 lb seed (*Pythium*) or 1.5 fl oz/100 lb seed (systemic down mildew).
- *Apron* 50 W, 1/2 to 1 oz/100 lb seed (*Pythium* and *Phytophthora*) or 2 1/4 oz/100 lb seed (*Pythium* and systemic downy mildew).
- *Apron* FS, 0.75 to 1.5 oz/100 lb seed (*Pythium*) or 3.4 oz/100 lb seed (*Pythium* and systemic downy mildew).

### Thiram

- 42-S Thiram (3 oz/100 lb seed) or *Thiram* 50 WP Dyed (8 oz/100 lb seed)

## PREPLANT INCORPORATED:

DAMPING OFF (*Pythium* spp.):

### Azoxystrobin

- *Quadris*, 0.4 to 0.8 fl oz per 1000 ft in furrow.

### Mefenoxam

- *Ridomil* Gold SL, 0.5-1 pt.

## FOLIAR TREATMENT:

POWDERY MILDEW (*Erysiphe polygoni*): Apply every 7 to 10 days after disease appears.

### \* Fluxapyroxad + Pyraclostrobin

- *Priaxor* Xemium Brand Fungicide, 4 - 8 fl oz. (7 days)

### \* Penthiopyrad

- *Fontelis*, 14 - 30 fl oz. (0 days)

### Copper Hydroxide

- *Champ* DP Dry Prill, 1 to 2 lb every 7 days. (0 days)
- *Champ* Formula 2 F, 1 to 2 pt. (0 days)
- *Kocide* 2000, 1 1/4 to 2 1/4 lb.
- *Kocide* 3000, 0.5-1.25 lb. (0 day)
- *Nu-Cop* 3 L, 1 to 2 pt. (0 days)
- *Nu-Cop* 50 DF, 1 1/2 lb. (7 days)

### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 2.5 pt. (0 days)

### Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 1 to 2 lb. (0 days)

### Sulfur

- *Kumulus* DF, 3 to 10 lb. (0 days)
- *Thiolux*, 3 to 10 lb. (0 days)

ANTHRACNOSE (*Colletotrichum lindemuthianum*), ALTERNARIA

BLIGHT (*Alternaria* spp.), RUST (*Phakospora* spp.):

### \* Fluxapyroxad + Pyraclostrobin

- *Priaxor* Xemium Brand Fungicide, 4 - 8 fl oz. (7 days)

### Azoxystrobin

- *Quadris*, 6.0 to 15.5 fl oz. Follow guidelines for resistance management.

### Penthiopyrad

- *Fontelis*, 14 - 30 fl oz. (0 days)

## Peppers

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

## NEMATODES

Northern root-knot nematodes can reduce pepper yields. Fields with soil or root problems of undetermined cause should be tested for nematodes (see Appendix C). If the plant parasitic nematode is present at a population density above the economic threshold for peppers, crop rotation or application of a nematicide is recommended. The following nematicides are suitable for control of root-knot nematodes in pepper production.

Correct soil moisture, temperature and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or by immediate tarping.

## FALL SOIL TREATMENT (BROADCAST):

### 1,3-D

- *Telone* II, 25 gal/A (muck soil), 9-18 gal/A (mineral soil). Fumigate in the fall when soil temperatures at 6-inch depth are above 50F. Inject the fumigant to soil depth of 8 inches and lightly seal the soil immediately after application. Use soil fumigants only as directed on the label. In some limited situations soil fumigants can be applied in the spring in Michigan.

## PREPLANT NEMATICIDE TREATMENT:

### Fluensulfone

- *Nimitz* 480EC, 3.5 - 5.0 pints/A. apply broadcast and incorporate either mechanically or with water to a depth of 6-8 inches at least 7 days prior to transplanting or planting. Do not apply if heavy rainfall is expected within 48 hours of application. This material can be applied in bands or by drip but apparently is most effective if applied broadcast and incorporated. Do not apply to extremely cold soils (<40 F) as nematodes have to be active for the product to be effective. Product has not been evaluated in Michigan.

TRANSPLANT WATER TREATMENT: Apply as needed.

### Oxamyl

- *Vydate* L, 2 pt in at least 200 gallons of water. Do not apply during periods of slow plant growth, such as when temperatures are below 45F. (RUP)

This treatment should be followed by broadcast or band applications using ground equipment at 1 gal/A in 20-50 gal water. Response is usually best if application is made to seedling plants from flag leaf to 2 or 3 true leaves.

## INSECTS

### SOIL TREATMENT:

LEAFHOPPERS, APHIDS, PSYLID, WHITEFLIES:

- *Sivanto*, 21 - 28 fl oz/A.

### AT PLANTING OR TRANSPLANTING:

APHIDS, FLEA BEETLE:

- *Belay* 50 WDG, 4.8 to 6.4 oz. See label for application methods.
- *Durivo*, 10 to 13 fl oz. (30 days) See label for application methods.

Imidacloprid. Additional generic brands available.

- *Admire* Pro, 7 to 14 fl oz. (21 days)
- *Nuprid* 2 F, 16 to 32 fl oz. (21 days)

### Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum* 75 SG (1.66 to 3.67 oz.) (30 days) See label for application methods.

Verimark, 6.75-13.5 oz/A. (1)

**FLEA BEETLE:**

Venom, 5 to 6 oz. (21 days)

**FLEA BEETLE, PEPPER WEEVIL:**

Scorpion 35SL, 9 to 10.5 fl oz. (21 days)

**CUTWORM, FLEA BEETLE LARVAE:**

Capture LFR, 3.4 to 6.8 fl oz. See label for application methods. (RUP)

**ARMYWORM:**

Verimark, 5-10 oz/A. (1)

**FOLIAR TREATMENT:**

**FLEA BEETLE:**

Actara, 2 to 3 oz. (0 days) Do not apply if a neonicotinoid was used at planting.

Athena, 7 to 17 fl oz. (7 days) (RUP)

Baythroid XL, 2.8 fl oz. (7 days) (RUP)

Belay 50 WDG, 1.6 to 2.1 oz. (7 days)

Bifenthrin

- Bifenture EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- Brigade @ 2EC (2.1 to 6.4 fl oz.) or Brigade WSB (5.3 to 12.8 oz.) (7 days) (RUP)
- Capture 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- Discipline 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- Fanfare 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- Sniper, 2.1 to 6.4 fl oz. (7 days) (RUP)
- Tundra EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

Bifenthrin + Imidacloprid

- Brigadier, 5.1 to 9.85 fl oz. (7 days) (RUP)
- Swagger, 10.2 to 19.7 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- Hero (10.3 oz.) or Hero EW (11.2 oz.) (7 days) (RUP)
- Steed, 3.5 to 4.7 fl oz. (7 days) (RUP)

Carbaryl

- Carbaryl 4L, 0.5 to 1 qt. (3 days)
- Sevin 4 F (0.5 to 1 qt.) or Sevin 80 S (0.63 to 1.25 lb.) or Sevin 80 WSP (0.67 to 1.25 lb.) or Sevin XLR Plus (0.5 to 1 qt.) (3 days)

Dibrom 8 Emulsive, 1 to 2 pt. (1 day) (RUP)

Dinotefuran

- Scorpion 35SL, 2 to 7 fl oz. (1 day)
- Venom, 1 to 4 oz. (1 day)

Endigo ZC, 4 to 4.5 fl oz. (5 days) (RUP)

Esfenvalerate

- Adjourm, 5.8 to 9.6 fl oz. (7 days) (RUP)
- Asana XL, 5.8 to 9.6 fl oz. (7 days) (RUP)
- S-FenvaloStar, 5.8 to 9.6 fl oz. (7 days) (RUP)

Gladiator, 10 to 19 fl oz. (7 days) (RUP)

Lambda-cyhalothrin

- Lambda-Cy, 2.56 to 3.84 fl oz. (5 days) (RUP)
- Warrior II with Zeon Technology (1.28 to 1.92 fl oz.) or Warrior with Zeon Technology (2.56 to 3.84 fl oz.) (5 days) (RUP)

Leverage 360, 4.1 fl oz. (7 days) (RUP)

Mustang Max, 2.24 to 4 oz. (1 day) (RUP)

Permethrin. Bell peppers only.

- Ambush 25 W, 6.4 to 12.8 oz. (3 days) (RUP)
- Perm-UP 25DF (6.4 to 12.8 oz.) or Perm-UP 3.2 EC (4 to 8 oz.) (3 days) (RUP)
- Pounce 25 WP, 6.4 to 12.8 oz. (3 days) (RUP)

Proaxis, 2.56 to 3.84 fl oz. (5 days) (RUP)

Pyrenone, 1 to 12 fl oz. (0 days)

Carbaryl 4L, 0.5 to 1 qt. (3 days)

Sevin 4 F (0.5 to 1 qt.) or Sevin 80 S (0.63 to 1.25 lb.) or Sevin 80 WSP (0.67 to 1.25 lb.) or Sevin XLR Plus (0.5 to 1 qt.) (3 days)  
Voliam Flexi, 4 to 7 oz. (1 day)

Consult label for rotation restrictions.

**CUTWORM:** Apply as needed to protect new transplants.

Athena, 7 to 17 fl oz. (7 days) (RUP)

Bacillus thuringiensis

- Biobit HP, 0.5 to 1 lb. (0 days)
- Javelin WG, 0.12 to 1.5 lb. (0 days)
- XenTari, 0.5 to 1.5 lb. (0 days)

Baythroid XL, 2.1 to 2.8 fl oz. (7 days) (RUP)

Belt SC, 1.5 fl oz. (1 day)

Bifenthrin

- Bifenture EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- Brigade @ 2EC (2.1 to 6.4 fl oz.) or Brigade WSB (5.3 to 12.8 oz.) (7 days) (RUP)
- Capture 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- Discipline 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- Empower, 3.5 to 8.7 lb. (7 days) (RUP)
- Sniper, 2.1 to 6.4 fl oz. (7 days) (RUP)
- Tundra EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- Hero (4 to 10.3 oz.) or Hero EW (4.5 to 11.2 oz.) (7 days) (RUP)

Carbaryl

- Carbaryl 4L, 2 qt. (3 days)
- Sevin 4 F (2 qt.) or Sevin 80 S (2.5 lb.) or Sevin 80 WSP (2.5 lb.) or Sevin XLR Plus (2 qt.) (3 days)

Confirm 2F, 6 to 8 fl oz. (early-season); 8 to 16 fl oz. (mid- to late-season). (7 days)

Endigo ZC, 4 to 4.5 fl oz. (5 days) (RUP)

Gladiator, 10 to 19 fl oz. (7 days) (RUP)

Intrepid 2F, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

Leverage 360, 3.8 to 4.1 fl oz. (7 days) (RUP)

Methomyl

- Lannate LV (0.75 to 1.5 pt.) or Lannate SP (0.25 to 0.5 lb.) (3 days) (RUP)
- Nudrin LV (0.75 to 1.5 pt.) or Nudrin SP (0.25 to 0.5 lb.) (3 days) (RUP)

Mustang Max, 2.24 to 4 oz. (1 day) (RUP)

Permethrin. Bell peppers only.

- Perm-UP 25DF (6.4 to 12.8 oz.) or Perm-UP 3.2 EC (4 to 8 oz.) (3 days) (RUP)
- Pounce 25 WP, 6.4 to 12.8 oz. (3 days) (RUP)

Proaxis, 1.92 to 3.2 fl oz. (5 days) (RUP)

Pyrenone, 1 to 12 fl oz. (0 days)

Carbaryl 4L, 2 qt. (3 days)

Sevin 4 F (2 qt.) or Sevin 80 S (2.5 lb.) or Sevin 80 WSP (2.5 lb.) or Sevin XLR Plus (2 qt.) (3 days)

Swagger, 10.2 to 19.7 fl oz. (7 days) (RUP)

Vetica, 12 to 17 fl oz. (1 day)

Warrior with Zeon Technology, 1.3 to 3.8 fl oz. (5 days) (RUP)

**APHIDS:** Apply if needed.

\* Acetamiprid

- Assail 30 SG (2 to 4 oz.) or Assail 70WP (0.8 to 1.7 oz.) (7 days)
- \* Actara, 2 to 3 oz. (0 days) Do not apply if a neonicotinoid was used at planting.

\* Imidacloprid. Additional generic brands available.

- Admire Pro, 1.3 to 2.2 fl oz. (0 days)
- Nuprid 1.6 F, 3.8 to 6.2 fl oz. (0 days)

## Peppers

Do not use if neoniticinoids were applied at planting. Do not exceed 19.2 oz/acre per season.

### Acephate

- *Acephate* 90 WDG (0.55 to 1.11 lb for bell; 0.55 lb for non-bell) or *Acephate* 90 WSP (0.5 to 1.1 lb for bell; 0.5 lb for non-bell) or *Acephate* 97 (0.5 to 1 lb for bell; 0.5 lb for non-bell) or *Acephate* 97 UP (0.5 to 1 lb for bell; 0.5 lb for non-bell) (7 days)
- *Bracket* 97, 8 to 16 oz for bell; 8 oz for non-bell. (7 days)
- *Orthene* 97, 8 to 17.6 oz for bell; 8 oz for non-bell. (7 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Baythroid* XL, 1.6 to 2.8 fl oz. (7 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

*Beleaf* 50 SG, 2 to 2.8 oz. (0 days)

### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 9.85 fl oz. (7 days) (RUP)
- *Swagger*, 7.6 to 19.7 fl oz. (7 days) (RUP)

*Dibrom* 8 Emulsive, 1 to 2 pt. (1 day) (RUP)

### Dimethoate

- *Dimethoate* 4 EC, or *Dimethoate* 400 (0.5 to 0.66 pt.) or *Dimethoate* 4E (0.5 to 0.66 pt.) (0 days)

*Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

*Endigo* ZC, 4 to 4.5 fl oz. (5 days) (RUP)

*Endosulfan* 3 EC, 0.66 to 1.33 qt. (9 days) (RUP)

*Exirel*, 13.5-20.5 oz. (1)

*Fulfill*, 2.75 oz. (7 days) May require 5 to 7 days for aphid mortality.

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

*Leverage* 360, 3.8 to 4.1 fl oz. (7 days) (RUP)

### Malathion

- *Malathion* 5 (1 pt.) or *Malathion* 5 EC (1 to 2.5 pt.) or *Malathion* 57 EC (1.25 to 1.5 pt.) or *Malathion* 8 (1.5 pt.) or *Malathion* 8 Aquamul (0.75 to 1.5 pt.) (3 days)

### Methomyl

- *Lannate* LV (1.5 to 3 pt.) or *Lannate* SP (0.5 to 1 lb.) (3 days) (RUP)
- *Nudrin* LV (1.5 to 3 pt.) or *Nudrin* SP (0.5 to 1 lb.) (3 days) (RUP)

*Movento*, 4 to 5 fl oz. (1 day) Must be tank mixed with adjuvant having spreading and penetrating properties.

*Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 7 - 12 fl oz/A.

*Voliam* Flexi, 4 to 7 oz. (1 day)

*Vydate* L, 2 to 4 pt. (7 days) (RUP)

EUROPEAN CORN BORER: Apply treatments to coincide with fruit formation and second-brood egg-laying period (usually around July 20 to August 15) and continue as needed. Direct spray to underside of leaves and cap area of fruit.

Acephate. Bell peppers only.

- *Acephate* 90 WDG (0.83 to 1.11 lb.) or *Acephate* 90 WSP (0.8 to 1.1 lb.) or *Acephate* 97 (0.75 to 1 lb.) or *Acephate* 97 UP (0.75 to 1 lb.) (7 days)

- *Bracket* 97, 12 to 16 oz. (7 days)

- *Orthene* 97, 12 to 16 oz. (7 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Avaunt*, 3.5 oz. (3 days) Bell peppers only.

*Baythroid* XL, 1.6 to 2.8 fl oz. (7 days) (RUP)

*Belt* SC, 1.5 fl oz. (1 day)

### Bifenthrin

- *Bifenture* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Brigade @* 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 12.8 oz.) (7 days) (RUP)
- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

### Bifenthrin + Imidacloprid

- *Brigadier*, 5.1 to 9.85 fl oz. (7 days) (RUP)

- *Swagger*, 10.2 to 19.7 fl oz. (7 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (7 days) (RUP)

- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

### Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (3 days)

- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (3 days)

*Confirm* 2F, 6 to 8 fl oz. (early-season); 8 to 16 fl oz. (mid- to late-season). (7 days)

*Coragen*, 3.5 to 5 fl oz. (1 day) Minimum of 5 days between applications; do not apply more than 15.4 fl oz. per season.

*Endigo* ZC, 4 to 4.5 fl oz. (5 days) (RUP)

### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (7 days) (RUP)

- *Asana* XL, 5.8 to 9.6 fl oz. (7 days) (RUP)

- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (7 days) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)

*Intrepid* 2F, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

*Javelin* WG, 0.12 to 1.5 lb. (0 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (5 days) (RUP)

- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (5 days) (RUP)

*Leverage* 360, 3.8 to 4.1 fl oz. (7 days) (RUP)

### Methomyl

- *Lannate* LV (3 pt.) or *Lannate* SP (1 lb.) (3 days) (RUP)

- *Nudrin* LV (3 pt.) or *Nudrin* SP (1 lb.) (3 days) (RUP)

*Mustang* Max, 2.24 to 4 oz. (1 day) (RUP)

Permethrin. Bell peppers only.

- *Ambush* 25 W, 12.8 oz. (3 days) (RUP)

- *Perm-UP* 25DF (12.8 oz.) or *Perm-UP* 3.2 EC (8 oz.) (3 days) (RUP)

- *Pounce* 25 WP, 12.8 oz. (3 days) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (5 days) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 5 to 10 fl oz. (1 day)

*Rimon* 0.83EC, 9 to 12 fl oz. (1 day)

*Carbaryl* 4L, 1 to 2 qt. (3 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (3 days)

### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (1 day)

*Vetiva*, 12 to 17 fl oz. (1 day)

### PEPPER WEEVIL:

#### Acetamiprid

- *Assail* 30 SG (2.5 to 4 oz.) or *Assail* 70WP (1.1 to 1.7 oz.) (7 days)

*Actara*, 3 to 5.5 oz. (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

#### Bifenthrin

- *Bifenture* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

- *Brigade @* 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 12.8 oz.) (7 days) (RUP)

- *Capture* 2 EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (7 days) (RUP)

Bifenthrin + Imidacloprid

- *Brigadier*, 5.1 to 9.85 fl oz. (7 days) (RUP)
- *Swagger*, 10.2 to 19.7 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (7 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

*Exirel*, 13.5-20.5 oz. (1)

*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)

Imidacloprid. Additional generic brands available.

- *Admire* Pro, 2.2 fl oz. (0 days)
- *Nuprid* 1.6 F, 6.2 fl oz. (0 days)

*Kryocide*, 8 to 12 lb. (14 days)

*Mustang* Max, 2.24 to 4 oz. (1 day) (RUP)

Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (3 days) (RUP)
- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (3 days) (RUP)
- *Pounce* 25 WP, 6.4 to 12.8 oz. (3 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Rimon* 0.83EC, 9 to 12 fl oz. (1 day)

*Scorpion* 35SL, 2 to 7 fl oz. (1 day)

*Voliam* Flexi, 4 to 7 oz. (1 day)

*Vydate* L, 2 to 4 pt. (7 days) (RUP)

SWEET POTATO WHITEFLY, SILVER LEAF WHITEFLY:

Acetamiprid

- *Assail* 30 SG, 2.5 to 4 oz. (7 days)
- *Assail* 70WP, 1.1 to 1.7 oz. (7 days)

*Exirel*, 13.5-20.5 oz/A. (1)

COLORADO POTATO BEETLE:

Acetamiprid

- *Assail* 30 SG, 1.5 to 2.5 oz. (7 days)
- *Assail* 70WP, 0.6 to 1.1 oz. (7 days)

*Exirel*, 7-13.5 oz/A. (1)

*Sivanto*, 10.5 - 14 fl oz/A.

THRIPS:

Acetamiprid

- *Assail* 30 SG, 4 oz. (7 days)
- *Assail* 70WP, 1.7 oz. (7 days)

*Exirel*, 13.5-20.5 oz/A. (1)

ARMYWORM:

*Exirel*, 7-13.5 oz/A. (1)

LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

PSYLID:

*Sivanto*, 10.5 - 14 fl oz/A.

**MITES** Apply if needed.

Abamectin

- *Agri-Mek* 0.15 EC (8 to 16 fl oz.) or *Agri-Mek* SC (1.75 to 3.5 fl oz.) (7 days) Use with a non-ionic surfactant. (RUP)

Bifenazate

- *Acramite* 50WS, 0.75 to 1 lb. (3 days)

Bifenthrin

- *Bifenture* EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Bifenture* 10 DF, 12.8 oz/A. (7 days)

- *Brigade @* 2EC (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (7 days) (RUP)

- *Capture* 2 EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Discipline* 2EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (7 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (7 days) (RUP)

Bifenthrin + Avermectin

- *Athena*, 13.5 to 17 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero* EW (11.2 oz.) (7 days) (RUP)

Etoxazole

- *Zeal*, 2 to 3 oz. (7 days)

Fenpyroximate

- *Portal*, 2 pt. (1 day)

Naled

- *Dibrom* 8 Emulsive, 1 to 2 pt. (1 day) (RUP)

Spiromesifen

- *Oberon* 2 SC, 7 to 8.5 fl oz. (7 days)

Zeta-Cypermethrin + Avermectin

- *Gladiator*, 19 fl oz. (7 days) (RUP)

**DISEASES****SEED TREATMENT:**

PRE-EMERGENCE DAMPING OFF (*Rhizoctonia solani*, *Pythium* spp., *Phytophthora* spp.):

Fludioxinil

- *Maxim* 4 FS, 0.08 to 0.16 fl oz/100 lb seed (*Rhizoctonia solani*).

Mefenoxam

- *Apron* XL, 0.085 - 0.64 fl oz/100 lb seed (*Pythium*).

Thiram

- 42-S Thiram, *Thiram* 480DP, *Thiram* 50 WP Dyed, 8 oz/100 lb seed.

**SOIL FUMIGATION:**

VERTICILLIUM WILT, PHYTOPHTHORA: Apply to production fields before planting. **Note:** Most fumigants applied to the soil for control of disease organisms will also control soil insects, nematodes and weed seeds.

Soil sterilization by fumigation is best achieved by proper application of material. Correct soil moisture, temperature, and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or immediate tarping.

1,3 Dichloropropene/chloropicrin

- *Telone* C35, 13-35 gal. (RUP)

Metam Potassium

- *Sectagon-K54*, 30-60 gal. (RUP)

Metam Sodium

- *Sectagon* 42, 37.5-75 gal. (RUP)

**GREENHOUSE PREPLANT INCORPORATION:**

DAMPING OFF (*Pythium* spp.) and ROOT ROT (*Rhizoctonia* spp.):

Gliocladium virens GL-21

- *SoilGard* 12 G, 1 to 1.5 lb per cubic yard. Biological control product that needs to be applied before disease development. Control may be limited under heavy disease pressure.

**PREPLANT OR AT PLANTING INCORPORATED:**

DAMPING OFF (*Pythium* spp.), PHYTOPHTHORA CROWN, STEM and FRUIT ROT (*Phytophthora capsici*):

Mefenoxam. Ridomil and Ultra Flourish must be applied to the soil before the plants are infected with *Phytophthora* to obtain satisfactory disease control).

## Peppers

- *Ridomil* Gold SL, 1 pt. (7 days)
- *Ultra Flourish*, 2 pt. (7 days)

Incorporate mechanically before planting or move into root zone after planting with 1/2 to 1 inch sprinkler water. For banded applications, use 12- to 16-inch band. One supplemental directed application at 1 pt (*Ridomil* Gold EC) or 2 pt (*Ultra Flourish*) should be made 30 days later followed by foliar applications of *Ridomil* Gold/Copper (MEFENOXAM/COPPER), 2 1/2 lb (1/4 lb a.i.) (7 days). Make 3 to 4 applications of *Ridomil* Gold/Copper at 10 to 14 day intervals.

**Note:** Observe limit of active ingredient/crop on label.

### DRIP APPLICATION:

PHYTOPHTHORA BLIGHT (*Phytophthora capsici*):

#### \* *Fluopicolide*

- *Presidio*, 3-4 fl oz. (2 days)

#### *Ametoctradin* + *Dimethomorph*

- *Zapro*, 14 fl oz. (4 days)

#### *Mefenoxam*

- *Ridomil* Gold SL (1 pt) or *Ultra Flourish* (2 pt) (7 days)

### FOLIAR TREATMENT:

GRAY MOLD (*Botrytis* spp.), CLADOSPORIUM LEAF MOLD (*Cladosporium capsici*), SCLEROTINIA WHITE MOLD (*Sclerotinia sclerotiorum*):

#### *Bacillus subtilis*

- *Serenade*, 2 to 6 qt. (0 days) Biological control product that needs to be applied before disease development. Control may be limited under heavy disease pressure.

#### *Fluxapyroxad* + *Pyraclostrobin*

- *Priaxor* Xemium Brand Fungicide, 4 - 8 fl oz. (0 days) Gray Mold and White Mold only.

#### *Neem Oil*

- *Trilogy*, 2 pt. (0 days)

#### *Potassium Bicarbonate*

- *Armicarb* 100, 2.5 to 5 lb (*Botrytis*). (0 days)

ANTHRACNOSE (*Colletotrichum* spp.), ALTERNARIA (RIPE) ROT (*Alternaria tenuis*): Apply when disease threatens and every 7 to 10 days.

#### \* *Azoxystrobin*

- *Quadris*, 6.0 to 15.5 fl oz. (0 days)

Do not apply more than one foliar application of *Amistar* and *Quadris* or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

#### \* *Boscalid*

- *Endura*, 2.5 to 3.5 oz (alternaria rot only). (0 days)

#### \* *Fluxapyroxad* + *Pyraclostrobin*

- *Priaxor* Xemium Brand Fungicide, 4 - 8 fl oz. (7 days)

#### \* *Penthiopyrad*

- *Fontelis*, 16 - 24 fl oz. (0 days)

#### \* *Pyraclostrobin*

- *Cabrio*, 8-12 oz. (0 days) Do not apply more than one application before alternating with another chemical.

#### \* *Trifloxystrobin*

- *Flint*, 3 to 4 oz. (3 days) Do not apply more than three sequential foliar applications of strobilurin fungicides before alternating with a fungicide that has a different mode of action.

#### *Bacillus amyloliquefaciens*

- *Serifel*, 4 - 16 fl oz. (0 day)

#### *Copper Hydroxide*

- *Kocide* 3000, 0.75 to 1.25 lb. (0 day)

#### *Copper Hydroxide* + *Copper Oxychloride*

- *Badge* SC, 1 to 2.25 pt. (0 days)

#### *Copper Sulfate*

- *Cuprofix* Ultra 40 Disperss, 0.75 to 2 lb. (0 days)

#### *Mancozeb*

- *Manzate* Max, 1.2 - 2.4 qt. (7 days)

#### *Neem Oil*

- *Trilogy*, 2 pt. (0 days)

#### *Potassium Bicarbonate*

- *Armicarb* 100, 2.5 to 5 lb.

BACTERIAL SPOT (*Xanthomonas campestris* pv. *vesicatoria*): Apply as needed every 5 to 7 days.

#### *Copper Ammonium Carbonate*

- *Copper Count* N, 1 1/2 to 3 qt. (0 days)

#### *Copper Hydroxide*

- *Champ* DP Dry Prill, 1 1/3 to 2 lb. (0 days)
- *Champ* Formula 2 F, 1 1/3 to 2 pt. (0 days)
- *Kocide* 2000, 1 1/2 to 2 1/4 lb. (0 days)
- *Kocide* 3000, 0.75 to 1.25 lb. (0 day)
- *Nu-Cop* 3 L, 1 1/3 to 2 pt. (0 days)
- *Nu-Cop* 50 DF, 1 1/2 lb. (0 days)

#### *Copper Hydroxide* + *Copper Oxychloride*

- *Badge* SC, 1 to 2.25 pt. (0 days)

#### *Copper Sulfate*

- *Basic* Copper 53, 1.5 lb. (0 days)
- *Cuprofix* Ultra 40 Disperss, 0.75 to 2 lb. (0 days)

#### *Famoxadone* + *Cymoxanil*

- *Tanos*, 8 - 10 oz every 5 - 7 days. (3 days)

#### *Quinoxifen*

- *Quintec*, 6 fl oz. (0 days) Suppression only

PHYTOPHTHORA BLIGHT (*Phytophthora capsici*):

#### \* *Dimethomorph*

- *Forum*, 6 fl oz. (0 days)

#### \* *Famoxadone* + *Cymoxanil*

- *Tanos*, 8 to 10 oz. (3 days)

#### \* *Fluopicolide*

- *Presidio*, 3-4 fl oz. (2 days)

#### \* *Mefenoxam* + *Copper Hydroxide*

- *Ridomil* Gold Copper, 2 lb. (7 days)

#### *Ametoctradin* + *Dimethomorph*

- *Zapro*, 14 fl. oz. (4 days)

#### *Copper Hydroxide* + *Copper Oxychloride*

- *Badge* SC, 1 to 2.25 pt. (0 days)

#### *Cyazofamid*

- *Ranman* 400SC, 2.75 fl oz. (0 days)

#### *Fenamidone*

- *Reason* 500 SC, 8.2 fl oz. (2 days) No more than 1 application before alternating.

#### *Mancozeb*

- *Koverall*, 3 lb. (7 days)
- *Manzate* Pro-Stick, 1.6 to 3.2 lb. (7 days)

#### *Mandipropamid*

- *Revus*, 8 fl oz. (1 day)

#### Mono-, dibasic sodium salts of phosphorous acid

- *Fosphite*, 1 to 3 qt per 100 gal (ground) or 10 gal (aerial) of water. (0 days)

#### Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 2 to 4 pt. (0 days)
- *Prophyt*, 6 pt. (0 days)

ANTHRACNOSE:

#### \* *Azoxystrobin* + *Difenoconazole*

- *Quadris* Top, 8 to 14 fl oz. (1 day) One application before alternating with another chemical.

Bacillus amyloliquefaciens

- *Serifel*, 4 - 16 fl oz. (0 day)

Mancozeb

- *Koverall*, 3 lb. (7 days)
- *Manzate Pro-Stick*, 1.6 to 3.2 lb. (7 days)

Trifloxystrobin

- *Flint*, 3 to 4 oz. (3 days) Suppression. 12 hr REI.

## GRAY LEAFSPOT:

\* Azoxystrobin + Difenoconazole

- *Quadris Top*, 8 to 14 fl oz. (1 day) One application before alternating with another chemical.

## Potatoes

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

Root-lesion, root-knot and potato rot nematodes can reduce potato yields. Fields with soil or root problems of undetermined cause should be tested for nematodes (see Appendix C). If these plant-parasitic nematodes are present in population densities above the economic threshold for potatoes, crop rotation or application of a nematicide is recommended. Potato growers should not rely on a single strategy or tactic for their total nematode control program. The following nematicides are suitable for control of these nematodes in potato production.

Correct soil moisture, temperature and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or by immediate tarping.

### FALL SOIL TREATMENT (BROADCAST):

1,3-D

- *Telone II*, 25 gal/A for muck soil, 9-18 gal/A for mineral soil.

1,3-D and chloropicrin

- *Telone C-17*, 27-30 gal/A for muck soil, 10-21 gal/A for mineral soil. (RUP)

Fumigate in the fall when soil temperatures at a 6-inch depth are above 50F. Inject the fumigant to a soil depth of 8 inches and lightly seal the soil immediately after application. Use soil fumigants only as directed on the label. In some limited situations, soil fumigants can be applied in the spring in Michigan.

### PREPLANT SOIL TREATMENT:

Ethoprop

- *Mocap 15 G*, broadcast 40 to 60 lb and incorporate to a depth of 2 to 4 inches. (RUP)

Ethoprop

- *Mocap 6EC*, broadcast 1 to 1.5 gal/A within 2 weeks before planting until crop emergence. (RUP)

### SOIL TREATMENT AT PLANTING:

Ethoprop

- *Mocap 15 G*, 20 lb/acre (36 inch row spacing) or 1/4 lb/1000 row feet in a band 12 inches wide on the row at planting. Mix with the top 2-4 inches of soil

**Note:** Mocap use may result in delayed emergence particularly if excessive quantities of material contact seed. (RUP)

Oxamyl

- *Vydate L*, 1 to 2 gal in at least 20 gallons of water in furrow at planting. May aid in early season insect control. (RUP)

### POST-PLANT TREATMENT:

Spirotetramat

- *Movento*, . Apply at 5 fl. oz/A as a foliar spray by ground or air when there is adequate foliage to suppress nematodes. It is most effective following fumigation or after Mocap or Vydate. Movento can be applied one additional time per growing season at 5 fl. oz/A preferably 10-14 days after the initial application. Early season applications should provide the best control.

### INSECTS

**RESISTANCE MANAGEMENT:** Insecticide resistance is a severe problem with Colorado potato beetle. Crop rotation is the single most effective practice for managing Colorado potato beetle and resistance problems. If a neonicotinoid insecticide is used at planting, foliar application of any neonicotinoid later in the season must be avoided. Likewise, repeated application of any insecticide is likely to result in resistance problems.

### SEED TREATMENT:

APHIDS, COLORADO POTATO BEETLE, FLEA BEETLE, LEAFHOPPERS:

*Belay*, 0.4 to 0.6 fl oz. (14 days)

Imidacloprid

- *Admire Pro*, 0.17 to 0.35 fl oz/100 lbs seed.
- *Nuprid 2 F*, 0.4 to 0.8 fl oz/100 lbs seed.

Thiamethoxam

- *Cruiser 5 FS*, *Cruiser Maxx Potato*, . See label for rates and application methods.

### SOIL TREATMENT AT PLANTING:

WIREWORM:

Bifenthrin

- *Bifenture EC*, 19.2 fl oz.. (RUP)
- *Brigade @ 2EC*, 9.6 to 19.2 fl oz. (RUP)
- *Capture LFR*, 12.75 to 25.5 fl oz.. (RUP)
- *Discipline 2EC*, 9.6 to 19.2 fl oz.. (21 days) (RUP)
- *Fanfare 2EC*, 19.2 fl oz. (21 days) (RUP)
- *Sniper*, 9.6 to 19.2 fl oz. (RUP)
- *Tundra EC*, 19.2 fl oz. (RUP)

See label for application methods.

Ethoprop

- *Mocap 15 G* (27 to 40 lb.) or *Mocap 6EC* (4.4 fl oz/1000 row ft.) See label for application methods. (RUP)
- *Regent 4SC*, 3.2 fl oz. (RUP)

WHITE GRUBS: Effective chemical control is not presently available. Rotation to a less sensitive crop like corn, with a soil insecticide, is recommended.

Bifenthrin

- *Bifenture EC*, 19.2 fl oz.. (21 days) (RUP)
- *Brigade @ 2EC*, 9.6 to 19.2 fl oz. (RUP)
- *Brigade @ 2EC*, 9.6 to 19.2 fl oz. (RUP)
- *Capture LFR*, 12.75 to 25.5 fl oz.. (RUP)
- *Discipline 2EC*, 9.6 to 19.2 fl oz.. (21 days) (RUP)
- *Sniper*, 9.6 to 19.2 fl oz. (21 days) (RUP)
- *Tundra EC*, 19.2 fl oz. (21 days) (RUP)

See label for rates and application methods.

APHIDS, LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

## Potatoes

COLORADO POTATO BEETLE, POTATO PSYLID, WHITEFLIES:  
*Sivanto*, 10.5 - 14 fl oz/A.

### FURROW TREATMENT:

APHIDS, FLEA BEETLE, LEAFHOPPERS:

*Belay*, 9.0 to 12.0 fl oz. (14 days)

#### Imidacloprid

- *Admire Pro*, 5.7 to 8.7 fl oz.
- *Nuprid 2 F*, 0.9 to 1.3 fl oz/1,000 row ft.

#### Thiamethoxam

- *Platinum* (5 to 8 fl oz.) or *Platinum 75 SG* (1.66 to 2.67 oz.) (30 days) See label for application methods.

*Thimet 20 G*, 8.5 to 11.3 oz. (for light, sandy soils) or 13 to 17.3 oz. (for heavy, clay soils) / 1,000 row ft. (90 days) May also help control Colorado potato beetle. See label for application methods. (RUP)

COLORADO POTATO BEETLE:

*Belay*, 9 to 12 fl oz. (14 days) See label for application methods.

#### Dinotefuran

- *Scorpion 35SL*, 11 to 13 fl oz.
- *Venom*, 6.5 to 7.5 oz.
- *Venom 20 SG*, 1.40- 1.65 lb/A.

See label for application methods.

Imidacloprid. Additional generic brands available.

- *Admire Pro*, 5.7 to 8.7 fl oz.
- *Nuprid 2 F*, 0.9 to 1.3 fl oz/1,000 row ft.

See label for application methods.

#### Thiamethoxam

- *Platinum* (5 to 8 fl oz.) or *Platinum 75 SG* (1.66 to 2.67 oz.) (30 days) See label for application methods.

*Thimet 20 G*, 13.0-17.3 oz per 1,000 ft for any row spacing (32-inch minimum) or no more than 17.7 lb/A. (90 days) (RUP)

FLEA BEETLE, LEAFHOPPERS:

#### Dinotefuran

- *Scorpion 35SL*, 11 to 13 fl oz. (21 days) See label for application methods.
- *Venom*, 6.5 to 7.5 oz.
- *Venom 20 SG*, 1.40- 1.65 lb/A.

#### Imidacloprid

- *Admire Pro*, 5.7 - 8.7 fl oz.
- *Nuprid 2 F*, 0.9 to 1.3 fl oz per 1,000 row ft..

*Thimet 20 G*, 8.5 to 11.3 oz. (for light, sandy soils) or 13 to 17.3 oz. (for heavy, clay soils) / 1,000 row ft. (90 days) (RUP)

WIREWORM:

*Thimet 20 G*, 8.5 to 11.3 oz. (for light, sandy soils) or 13 to 17.3 oz. (for heavy, clay soils) / 1,000 row ft. (90 days) no more than 11.5 lb/A (RUP)

APHIDS, COLORADO POTATO BEETLE, FLEA BEETLE, LEAFHOPPERS:

*Swagger*, 32 to 51.2 fl oz. (21 days) (RUP)

*Vydate L*, 1 to 2 gal in at least 20 gallons of water. (RUP)

APHIDS, LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

COLORADO POTATO BEETLE, POTATO PSYLID, WHITEFLIES:  
*Sivanto*, 10.5 - 14 fl oz/A.

### FOLIAR TREATMENT:

FLEA BEETLE: Apply if there are more than 50/25 sweeps. May occur soon after plants emerge and again in late July and August.

#### Acetamiprid

- *Assail 30 SG* (1.5 to 2.5 oz.) or *Assail 70WP* (0.6 to 1.1 oz.) (7 days)

*Actara*, 1.5 to 3 oz. (14 days) Do not apply if a neonicotinoid was used at planting. Do not exceed 6 oz/acre per season.

*Athena*, 7 to 17 fl oz. (21 days) (RUP)

*Baythroid XL*, 1.6 to 2.8 fl oz. (0 days) (RUP)

*Belay*, 2 to 3 fl oz. (14 days)

#### Bifenthrin

- *Bifenture EC*, 2.1 to 6.4 fl oz. (21 days) (RUP)
- *Brigade @ 2EC*, 2.1 to 6.4 fl oz. (21 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (21 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (21 days) (RUP)

#### Bifenthrin + Imidacloprid

- *Brigadier*, 4.8 to 6.14 fl oz. (21 days) (RUP)
- *Swagger*, 9.6 to 12.28 fl oz. (21 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (2.6 to 6.1 oz.) or *Hero EW* (2.8 to 6.7 oz.) (21 days) (RUP)
- *Steed*, 2.5 to 3.5 fl oz. (21 days) (RUP)

#### Carbaryl

- *Carbaryl 4L*, 0.5 to 1 qt. (7 days)
- *Sevin 4 F* (0.5 to 1 qt.) or *Sevin 80 S* (0.63 to 1.25 lb.) or *Sevin XLR Plus* (0.5 to 1 qt.) (7 days)

#### Dinotefuran

- *Scorpion 35SL*, 2 to 2.75 fl oz. (7 days)
- *Venom*, 1 to 1.5 oz. (7 days)

*Endigo ZC*, 3.5 to 4.5 fl oz. (14 days) (RUP)

*Endosulfan 3 EC*, 0.66 to 1.33 qt.. (12 days) (RUP)

#### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *Gladiator*, 8 to 19 fl oz. (14 days) (RUP)

Imidacloprid. Additional generic brands available.

- *Admire Pro*, 1.3 fl oz.
- *Nuprid 1.6 F*, 3.8 fl oz. (7 days)

Do not use if neonicotinoids were applied at planting. Do not exceed 19.2 oz/acre per season.

*Imidan 70-W*, 1.33 lb. (7 days)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)

*Leverage 360*, 2.8 fl oz. (14 days) (RUP)

#### Methomyl

- *Lannate LV* (1.5 pt.) or *Lannate SP* (0.5 lb.) (6 days) (RUP)
- *Nudrin LV* (1.5 pt.) or *Nudrin SP* (0.5 lb.) (6 days) (RUP)

*Mustang Max*, 1.76 to 4 oz. (1 day) (RUP)

#### Parathion-methyl

- *Methyl 4 EC*, 1.5 pt. (6 days) (RUP)
- *PennCap-M*, 2 to 4 pt. (5 days) (RUP)

#### Permethrin

- *Ambush 25 W*, 3.2 to 12.8 oz. (14 days) (RUP)
- *Perm-UP 25DF* (6.4 to 12.8 oz.) or *Perm-UP 3.2 EC* (4 to 8 oz.) (14 days) (RUP)
- *Pounce 25 WP*, 6.4 to 12.8 oz. (14 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl 4L*, 0.5 to 1 qt. (7 days)

*Sevin 4 F* (0.5 to 1 qt.) or *Sevin 80 S* (0.63 to 1.25 lb.) or *Sevin XLR Plus* (0.5 to 1 qt.) (7 days)

*Voliam Flexi*, 4 oz. (14 days)

*Vydate L*, 2 to 4 pt. (7 days) (RUP)

COLORADO POTATO BEETLE: Apply if there is more than 1 large larva or adult per plant. Piperonyl butoxide (Butacide, Prentox PBO-8, Incite) at 0.5 to 1 pt. per acre may be effective as a synergist to block resistance to organophosphate (Guthion, Imidan, etc.) and pyrethroid (Asana, etc.) insecticides.

**\* Abamectin**

- *Agri-Mek* 0.15 EC (8 to 16 fl oz.) or *Agri-Mek* SC (1.75 to 3.5 fl oz.) (14 days) Use with a non-ionic surfactant. (RUP)

\* *Radiant* SC, 4.5 to 8 fl oz. (7 days) Minimum of 7 days between applications; do not apply more than 32 fl oz. per season.

**Acetamiprid**

- *Assail* 30 SG (1.5 to 4 oz.) or *Assail* 70WP (0.6 to 1.7 oz.) (7 days) Do not apply if a neonicotinoid was used at planting.

*Actara*, 1.5 to 3 oz. (14 days) Do not apply if a neonicotinoid was used at planting. Do not exceed 6 oz/acre per season.

*Athena*, 7 to 17 fl oz. (21 days) (RUP)

*Avaunt*, 3.5 to 6 oz. (7 days)

*Baythroid* XL, 1.6 to 2.8 fl oz. (0 days) (RUP)

*Belay*, 2 to 3 fl oz. (14 days) Do not apply if a neonicotinoid was used at planting.

**Bifenthrin + Imidacloprid**

- *Brigadier*, 4.8 to 6.14 fl oz. (21 days) (RUP)
- *Swagger*, 9.6 to 12.28 fl oz. (21 days) (RUP)

Do not apply if a neonicotinoid was used at planting.

**Bifenthrin + Zeta-Cypermethrin**

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (21 days) (RUP)

**Carbaryl**

- *Carbaryl* 4L, 1 to 2 qt. (7 days)
- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (7 days)

*Coragen*, 3.5 to 5 fl oz. (14 days)

**Dinotefuran**

- *Scorpion* 35SL, 2 to 2.75 fl oz. (7 days)
- *Venom*, 1 to 1.5 oz. (7 days)

Do not apply if a neonicotinoid was used at planting.

*Endigo* ZC, 3.5 to 4.5 fl oz. (14 days) Do not apply if a neonicotinoid was used at planting. (RUP)

*Endosulfan* 3 EC, 0.66 to 1.33 qt. (12 days) (RUP)

**Esfenvalerate**

- *Adjour*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (7 days) (RUP)

*Gladiator*, 19 fl oz. (14 days) (RUP)

**Imidacloprid**. Additional generic brands available.

- *Admire* Pro, 1.3 fl oz.
- *Nuprid* 1.6 F, 3.8 fl oz. (7 days)

Do not use if neonicotinoids were applied at planting. Do not exceed 19.2 oz/acre per season.

*Imidan* 70-W, 1.33 lb. (7 days)

*Kryocide*, 10 to 12 lb.

**Lambda-cyhalothrin**

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)

*Leverage* 360, 2.8 fl oz. (14 days) Do not apply if a neonicotinoid was used at planting. (RUP)

*Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

*Penncap-M*, 2 to 6 pt. (5 days) (RUP)

**Permethrin**

- *Ambush* 25 W, 3.2 to 12.8 oz. (14 days) (RUP)
- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (14 days) (RUP)
- *Pounce* 25 WP, 6.4 to 12.8 oz. (14 days) (RUP)

*Pyrene*, 1 to 12 fl oz. (0 days)

*Rimon* 0.83EC, 9 to 12 fl oz. (14 days) Small larvae only. 2 applications per year.

*Carbaryl* 4L, 1 to 2 qt. (7 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (7 days)

*Sivanto*, 10.5 - 14 fl oz/A.

**Spinosad**

- *Blackhawk* (1.7-3.3 oz/A) or *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 10 fl oz.) (3 days)

*Torac*, 14-21 oz/A. (14) Do not make more than 2 applications per crop cycle. Do not apply more than 42 oz per acre per crop cycle.

*Torac*, 14-21 oz/A. (14) Do not make more than 2 applications per crop cycle

*Trigard*, 2.66 to 5.32 oz. (7 days)

*Voliam* Flexi, 4 oz. (14 days) Do not apply if a neonicotinoid was used at planting.

*Vydate* L, 1 to 4 pt. (7 days) (RUP)

LEAFHOPPERS: Apply if there are more than 0.5 adults/sweep or 1 nymph/10 leaves.

**Acetamiprid**

- *Assail* 30 SG (1.5 to 4 oz.) or *Assail* 70WP (0.6 to 1.7 oz.) (7 days) Do not apply if a neonicotinoid was used at planting.

*Actara*, 1.5 to 3 oz. (14 days) Do not apply if a neonicotinoid was used at planting. Do not exceed 6 oz/acre per season.

*Athena*, 7 to 17 fl oz. (21 days) (RUP)

*Baythroid* XL, 0.8 to 1.6 fl oz. (0 days) (RUP)

*Belay*, 2 to 3 fl oz. (14 days)

**Bifenthrin + Imidacloprid**

- *Brigadier*, 3.8 to 6.14 fl oz. (21 days) (RUP)
- *Swagger*, 7.6 to 12.28 fl oz. (21 days) (RUP)

Do not apply if a neonicotinoid was used at planting.

**Bifenthrin + Zeta-Cypermethrin**

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (21 days) (RUP)

**Carbaryl**

- *Carbaryl* 4L, 0.5 to 2 qt. (7 days)
- *Sevin* 4 F (0.5 to 2 qt.) or *Sevin* 80 S (0.63 to 2.5 lb.) or *Sevin* XLR Plus (0.5 to 2 qt.) (7 days)

*Closer* SC, 2.75 to 5.75 oz/A. (7 days)

**Dimethoate**

- *Dimethoate* 4 EC, *Dimethoate* 400, *Dimethoate* 4E, 0.5 to 1 pt. (0 days)

**Dinotefuran**

- *Scorpion* 35SL, 2 to 2.75 fl oz. (7 days)
- *Venom*, 1 to 1.5 oz. (7 days)

Do not apply if a neonicotinoid was used at planting.

*Endigo* ZC, 3.5 to 4.5 fl oz. (14 days) Do not apply if a neonicotinoid was used at planting. (RUP)

*Endosulfan* 3 EC, 0.66 to 1.33 qt. (12 days) (RUP)

**Esfenvalerate**

- *Adjour*, 2.9 to 9.6 fl oz. (7 days) (RUP)
- *Asana* XL, 2.9 to 9.6 fl oz. (7 days) (RUP)
- *S-FenvaloStar*, 2.9 to 9.6 fl oz. (7 days) (RUP)

*Gladiator*, 8 to 19 fl oz. (14 days) (RUP)

**Imidacloprid**. Additional generic brands available.

- *Admire* Pro, 1.3 fl oz.
- *Nuprid* 1.6 F, 3.8 fl oz. (7 days)

Do not use if neonicotinoids were applied at planting. Do not exceed 19.2 oz/acre per season.

*Imidan* 70-W, 1.33 lb. (7 days)

**Lambda-cyhalothrin**

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (7 days) (RUP)
- *Warrior* II with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (7 days) (RUP)

*Leverage* 360, 2.8 fl oz. (14 days) Do not apply if a neonicotinoid was used at planting. (RUP)

## Potatoes

### Malathion

- *Malathion* 5 (1 pt.) or *Malathion* 5 EC (2 pt.) or *Malathion* 57 EC (1 to 1.5 pt.) or *Malathion* 8 (1 pt.) or *Malathion* 8 Aquamul (1 to 1.5 pt.) (0 days)

### Methomyl

- *Lannate* LV (1.5 to 3 pt.) or *Lannate* SP (0.5 to 1 lb.) (6 days) (RUP)
- *Nudrin* LV (1.5 to 3 pt.) or *Nudrin* SP (0.5 to 1 lb.) (6 days) (RUP)
- Mustang* Max, 1.76 to 4 oz. (1 day) (RUP)

### Parathion-methyl

- *Methyl* 4 EC, 1.5 pt. (6 days) (RUP)
- *Penncap-M*, 2 to 4 pt. (5 days) (RUP)

### Permethrin

- *Ambush* 25 W, 3.2 to 12.8 oz. (14 days) (RUP)
- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (14 days) (RUP)
- *Pounce* 25 WP, 6.4 to 12.8 oz. (14 days) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 0.5 to 2 qt. (7 days)

*Sevin* 4 F (0.5 to 2 qt.) or *Sevin* 80 S (0.63 to 2.5 lb.) or *Sevin* XLR Plus (0.5 to 2 qt.) (7 days)

*Sivanto*, 7 - 10.5 fl oz/A.

*Torac*, 14-21 oz/A. (14)

*Transform* WG, 1.5 to 2.25 oz/A. (7) Do not apply more than a total of 8.5 oz of *Transform* WG per acre per year.

*Voliame* Flexi, 4 oz. (14 days) Do not apply if a neonicotinoid was used at planting.

*Vydate* L, 2 to 4 pt. (7 days) (RUP)

APHIDS: Treat if numbers exceed 1 per leaf (1/10 leaves for seed potatoes). Control is especially important to reduce virus disease in seed potato production.

\* *Fulfill*, 2.75 to 5.5 oz. (14 days) May require 5 to 7 days for aphid mortality.

### Acetamiprid

- *Assail* 30 SG (2.5 to 4 oz.) or *Assail* 70WP (1 to 1.7 oz.) (7 days)
- Actara*, 3 oz. (14 days) Do not apply if a neonicotinoid was used at planting. Do not exceed 6 oz/acre per season.
- Athena*, 7 to 17 fl oz. (21 days) (RUP)
- Belay*, 2 to 3 fl oz. (14 days)
- Beleaf* 50 SG, 2 to 2.8 oz. (7 days)

### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.14 fl oz. (21 days) (RUP)
- *Swagger*, 7.6 to 12.28 fl oz. (21 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

*Closer* SC, 1.5 to 2.0 oz/A. (7 days)

### Dimethoate

- *Dimethoate* 4 EC, *Dimethoate* 400, *Dimethoate* 4E, 0.5 to 1 pt. (0 days)

*Endigo* ZC, 4.5 fl oz. (14 days) (RUP)

*Endosulfan* 3 EC, 0.66 to 1.33 qt. (12 days) (RUP)

### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (7 days) (RUP)

*Gladiator*, 19 fl oz. (14 days) (RUP)

Imidacloprid. Additional generic brands available.

- *Admire* Pro, 1.3 fl oz.
- *Nuprid* 1.6 F, 3.8 fl oz. (7 days)

Do not use if neonicotinoids were applied at planting. Do not exceed 19.2 oz/acre per season.

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)
- Leverage* 360, 2.8 fl oz. (14 days) (RUP)

### Malathion

- *Malathion* 5 (1 pt.) or *Malathion* 5 EC (2 pt.) or *Malathion* 57 EC (1 to 1.5 pt.) or *Malathion* 8 (3 pt.) or *Malathion* 8 Aquamul (1 to 1.5 pt.) (0 days)

### Methomyl

- *Lannate* LV (1.5 to 3 pt.) or *Lannate* SP (0.5 to 1 lb.) (6 days) (RUP)
- *Nudrin* LV (1.5 to 3 pt.) or *Nudrin* SP (0.5 to 1 lb.) (6 days) (RUP)
- Movento*, 4 to 5 fl oz. (7 days) Must be tank mixed with adjuvant having spreading and penetrating properties.

### Parathion-methyl

- *Methyl* 4 EC, 1.5 pt. (6 days) (RUP)
- *Penncap-M*, 4 pt. (5 days) (RUP)

### Permethrin

- *Ambush* 25 W, 3.2 to 12.8 oz. (14 days) (RUP)
- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (14 days) (RUP)
- *Pounce* 25 WP, 6.4 to 12.8 oz. (14 days) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 7 - 10.5 fl oz/A.

*Torac*, 17-21 oz/A. (14) Do not make more than 2 applications per crop cycle

*Transform* WG, 0.75 to 1.5 oz/A. (7) Do not apply more than a total of *Transform* WG 8.5 oz/A per year

*Voliame* Flexi, 4 oz. (14 days)

*Vydate* L, 2 to 4 pt. (7 days) (RUP)

### TARNISHED PLANT BUG:

*Athena*, 10 to 17 fl oz. (21 days) (RUP)

*Baythroid* XL, 1.6 to 2.8 fl oz. (0 days) (RUP)

*Beleaf* 50 SG, 2 to 2.8 oz. (7 days)

### Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (7 days)
- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (7 days)

*Endigo* ZC, 4 to 4.5 fl oz. (14 days) (RUP)

*Endosulfan* 3 EC, 0.66 to 1.33 qt. (12 days) (RUP)

### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (7 days) (RUP)

*Gladiator*, 19 fl oz. (14 days) (RUP)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)

*Leverage* 360, 2.8 fl oz. (14 days) (RUP)

*Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

*Penncap-M*, 2 to 4 pt. (5 days) (RUP)

### Permethrin

- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (14 days) (RUP)
- *Pounce* 25 WP, 6.4 to 12.8 oz. (14 days) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 1 to 2 qt. (7 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (7 days)

EUROPEAN CORN BORER: Plan treatment to coincide with first generation egg laying if there is more than 1 egg mass per 25 leaves.

\* *Baythroid XL*, 1.6 to 2.8 fl oz. (0 days) (RUP)

\* *Radiant SC*, 4.5 to 8 fl oz. (7 days) Minimum of 7 days between applications; do not apply more than 32 fl oz. per season.

\* *Spinosad*

- *Entrust* (1 to 2 oz.) or *Entrust SC* (3 to 10 fl oz.) (7 days)

Acetamiprid

- *Assail 30 SG* (2.5 to 4 oz.) or *Assail 70WP* (1.1 to 1.7 oz.) (7 days)

For use as an ovicide.

*Athena*, 7 to 17 fl oz. (21 days) (RUP)

*Avaunt*, 3.5 to 6 oz. (3 days)

*Bacillus thuringiensis*

- *DiPel ES*, 1 to 2 pt. (0 days)
- *Javelin WG*, 0.12 to 1.5 lb. (0 days)

Bifenthrin + Imidacloprid

- *Brigadier*, 4.8 to 6.14 fl oz. (21 days) (RUP)
- *Swagger*, 9.6 to 12.28 fl oz. (21 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

Carbaryl

- *Carbaryl 4L*, 1 to 2 qt. (7 days)
- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (7 days)

*Coragen*, 3.5 to 5 fl oz. (14 days)

*Endigo ZC*, 4 to 4.5 fl oz. (14 days) (RUP)

*Endosulfan 3 EC*, 0.66 to 1.33 qt. (12 days) (RUP)

Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (7 days) (RUP)

*Gladiator*, 8 to 19 fl oz. (14 days) (RUP)

*Imidan 70-W*, 1.33 lb. (7 days)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)

*Leverage 360*, 2.8 fl oz. (14 days) (RUP)

*Mustang Max*, 1.76 to 4 oz. (1 day) (RUP)

*PennCap-M*, 2 to 4 pt. (5 days) (RUP)

Permethrin

- *Perm-UP 25DF* (6.4 to 12.8 oz.) or *Perm-UP 3.2 EC* (4 to 8 oz.) (14 days) (RUP)
- *Pounce 25 WP*, 6.4 to 12.8 oz. (14 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Rimon 0.83EC*, 6 to 12 fl oz. (14 days)

*Carbaryl 4L*, 1 to 2 qt. (7 days)

*Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (7 days)

*Voliam Flexi*, 4 oz. (14 days)

CABBAGE LOOPERS:

*Avaunt*, 2.5 to 6 oz. (7 days)

*Bacillus thuringiensis*

- *Agree WG*, 1 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF* (0.5 to 1 lb.) or *DiPel ES* (1 to 2 pt.) (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid XL*, 1.6 to 2.8 fl oz. (0 days) (RUP)

Bifenthrin + Imidacloprid

- *Brigadier*, 4.8 to 6.14 fl oz. (21 days) (RUP)

- *Swagger*, 9.6 to 12.28 fl oz. (21 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

*Coragen*, 3.5 to 5 fl oz. (14 days)

*Endigo ZC*, 4 to 4.5 fl oz. (14 days) (RUP)

*Gladiator*, 8 to 19 fl oz. (14 days) (RUP)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)
- *Leverage 360*, 2.8 fl oz. (14 days) (RUP)

Methomyl

- *Lannate LV* (1.5 to 3 pt.) or *Lannate SP* (0.5 to 1 lb.) (6 days) (RUP)

- *Nudrin LV* (1.5 to 3 pt.) or *Nudrin SP* (0.5 to 1 lb.) (6 days) (RUP)

*Mustang Max*, 1.76 to 4 oz. (1 day) (RUP)

Permethrin

- *Ambush 25 W*, 3.2 to 12.8 oz. (14 days) (RUP)
- *Pounce 25 WP*, 6.4 to 12.8 oz. (14 days) (RUP)

*Radiant SC*, 6 to 8 fl oz. (7 days) Minimum of 7 days between applications; do not apply more than 32 fl oz. per season.

*Rimon 0.83EC*, 6 to 12 fl oz. (14 days)

Spinosad

- *Blackhawk* (2.25-3.5 oz/A) or *Entrust* (1.5 to 3 oz.) or *Entrust SC* (4.5 to 10 fl oz.) (7 days)

*Voliam Flexi*, 4 oz. (14 days)

ARMYWORM:

*Bacillus thuringiensis*

- *Agree WG*, 1 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 2 lb. (0 days)
- *DiPel DF* (1 to 2 lb.) or *DiPel ES* (2 to 4 pt.) (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (21 days) (RUP)

Carbaryl

- *Carbaryl 4L*, 1 to 2 qt. (7 days)
- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (7 days)

*Coragen*, 3.5 to 5 fl oz. (14 days)

*Endigo ZC*, 4 to 4.5 fl oz. (14 days) (RUP)

*Endosulfan 3 EC*, 0.66 to 1.33 qt. (12 days) (RUP)

*Gladiator*, 19 fl oz. (14 days) (RUP)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)

Methomyl

- *Lannate LV* (1.5 to 3 pt.) or *Lannate SP* (0.5 to 1 lb.) (6 days) (RUP)

- *Nudrin LV* (1.5 to 3 pt.) or *Nudrin SP* (0.5 to 1 lb.) (6 days) (RUP)

*Methyl 4 EC*, 1.5 pt. (6 days) (RUP)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Radiant SC*, 6 to 8 fl oz. (7 days) Minimum of 7 days between applications; do not apply more than 32 fl oz. per season.

*Rimon 0.83EC*, 6 to 12 fl oz. (14 days)

*Carbaryl 4L*, 1 to 2 qt. (7 days)

*Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (7 days)

## Potatoes

### Spinosad

- *Blackhawk* (2.25-3.5 oz/A) or *Entrust* (1.5 to 3 oz.) or *Entrust SC* (4 to 10 fl oz.) (7 days)

*Voliam Flexi*, 4 oz. (14 days)

### CUTWORM:

#### Bacillus thuringiensis

- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF* (0.5 to 1 lb.) or *DiPel ES* (1 to 2 pt.) (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid XL*, 0.8 to 1.6 fl oz. (0 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (2.6 to 6.1 oz.) or *Hero EW* (2.8 to 6.7 oz.) (21 days) (RUP)

#### Carbaryl

- *Carbaryl 4L*, 1 to 2 qt. (7 days)
- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1.5 to 2 qt.) (7 days)

*Endigo ZC*, 3.5 to 4.5 fl oz. (14 days) (RUP)

*Gladiator*, 8 to 19 fl oz. (14 days) (RUP)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (7 days) (RUP)
- *Warrior II* with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (7 days) (RUP)

*Leverage 360*, 2.8 fl oz. (14 days) (RUP)

#### Methomyl

- *Lannate LV* (1.5 pt.) or *Lannate SP* (0.5 lb.) (6 days) (RUP)
- *Nudrin LV* (1.5 pt.) or *Nudrin SP* (0.5 lb.) (6 days) (RUP)

*Mustang Max*, 1.28 to 4 oz. (1 day) (RUP)

*PennCap-M*, 2 to 4 pt. (5 days) (RUP)

*Carbaryl 4L*, 1 to 2 qt. (7 days)

*Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1.5 to 2 qt.) (7 days)

### WHITE GRUBS, WIREWORM:

#### Bifenthrin

- *Bifenture EC*, 2.1 to 6.4 fl oz. (21 days) (RUP)
- *Brigade @ 2EC*, 2.1 to 6.4 fl oz. (21 days) (RUP)
- *Discipline 2EC*, 2.1 to 6.4 fl oz. (21 days) (RUP)
- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (21 days) (RUP)
- *Tundra EC*, 2.1 to 6.4 fl oz. (21 days) (RUP)

### WHITEFLIES:

*Closer SC*, 4.25 to 5.75 oz/A. (7 days)

*Transform WG*, 2.0 to 2.25 oz/A. (7) Do not apply more than a total of 8.5 of Transform WG per acre per year.

*Sivanto*, 10.5 - 14 fl oz/A.

*Closer SC*, 4.25 to 5.75 oz/A. (7 days)

*Transform WG*, 2.0 to 2.25 oz/A. (7) Do not apply more than a total of 8.5 of Transform WG per acre per year.

### CUCUMBER BEETLE:

#### Acetamiprid

- *Assail 30 SG*, 1.5 to 4 oz. (7 days)
- *Assail 70WP*, 0.6 to 1.7 oz/A. (7 days)

### THRIPS:

*Blackhawk*, 2.25-3.5 oz/A. (3 days) Add adjuvant

*Torac*, 17-21 oz/A. (14) Do not make more than 2 applications per crop cycle

### POTATO PSYLID:

*Sivanto*, 10.5 - 14 fl oz/A.

## MITES

#### Abamectin

- *Agri-Mek 0.15 EC* (8 to 16 fl oz.) or *Agri-Mek SC* (1.75 to 3.5 fl oz.) (14 days) Use with a non-ionic surfactant. (RUP)

#### Bifenazate

- *Acramite 4SC*, 16 to 24 fl oz. (14 days)

#### Bifenthrin

- *Bifenture EC*, 2.1 to 6.4 fl oz. (21 days) (RUP)
- *Brigade @ 2EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)

#### Bifenthrin + Avermectin

- *Athena*, 10 to 17 fl oz. (21 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero EW* (11.2 oz.) (21 days) (RUP)

#### Parathion-methyl

- *Methyl 4 EC*, 1.5 pt. (6 days) (RUP)

#### Spiromesifen

- *Oberon 2 SC*, 8 to 16 fl oz. (7 days)

#### Zeta-Cypermethrin + Avermectin

- *Gladiator*, 19 fl oz. (14 days) (RUP)

## DISEASES

### SEED TREATMENT:

FUSARIUM TUBER ROT (*Fusarium* spp.): Fall treatment. Treat seed going into storage or at the time of shipping. This must be done at least 6 weeks before planting.

#### Thiabendazole

- *Mertect 340*, 0.42 fl oz/ton of potatoes. Apply in enough water for complete coverage. Apply as a spray to potato tubers (seed and table stock) at time of storage and again at removal. See manufacturer's recommendations for equipment and methods to use. Treatment may be applied to washed or unwashed potatoes.

SOFT ROT and BLACKLEG (*Pectobacterium carotovorum*):

#### Streptomycin sulfate

- *Agri-mycin 17*, 100 ppm. Mix with Maxim 4FS or Maxim MZ.
- *Bac-master*, 100 ppm. Mix with Maxim 4FS or Maxim MZ.

### SEED TREATMENT AND HANDLING:

FUSARIUM TUBER ROT (*Fusarium* spp.): Pre-planting treatment. Dust or spray cut or whole seed before planting.

#### Captan

- *Captan 10* Potato Seed Protectant, 0.75 lb per 100 lb cut seed pieces.

#### Fludioxinil

- *Maxim MZ 0.5 D*, 0.5 lb per 100 lb seed potatoes.

#### Mancozeb

- *Dithane F-45* Rainshield, 2 pt per 50 gal water. Treat as above.
- *Dithane M-45*, 1.25 lb per 50 gal water. Treat as above.
- *Koverall*, 1.25 lb. per 50 gal water. Treat as above.
- *Manzate 200 80 W*, 2.5 lb per 100 gal water. Drain and plant as soon as possible.

*Moncoat MZ*, 0.75-1.0 lb/100 lb of seed potatoes.

**Note:** Use only as directed. DO NOT feed treated seed to livestock.

RHIZOCTONIA DISEASE (*Rhizoctonia solani*): Dust cut or whole seed just before planting.

#### Fludioxinil

- *Maxim 0.5 D*, 0.5 lb per 100 lb seed potatoes.
- *Maxim 4 FS*, 0.08 fl oz. **Note:** If Maxim 4 FS is used for potatoes for seed production, a labeled rate of mancozeb seed treatment dust must be applied to seed tubers after the Maxim 4 FS treatment. Alternatively, an in-furrow application of Quadris at 6.1 - 9.2 fl oz/A may be used (34" row spacing).
- *Maxim MZ 0.5 D*, 0.5 lb per 100 lb seed potatoes.

#### Flutoloniol

- *Moncut*, 0.71 - 1.1 lb/A in-furrow at planting with a minimum of 3 gal/A. 1.1 lb maximum per season.

Moncoat MZ, 0.75-1.0 lb/100 lb seed potatoes.

SILVER SCURF (*Helminthosporium solani*):

Fludioxinil

- Maxim 0.5 D, 0.5 lb per 100 lb seed potatoes.
- Maxim 4 FS, 0.08 fl oz/100 lb seed potatoes. **Note:** If Maxim 4 FS is used for potatoes for seed production, a labeled rate of mancozeb seed treatment dust must be applied to seed tubers after the Maxim 4 FS treatment.
- Maxim MZ 0.5 D, 0.5 lb per 100 lb seed potatoes.

Moncoat MZ, 0.75 - 1.0 lb pre-plant per 100 lb seed. Maximum 1.0 lb per season.

DISINFECTION OF CUTTING KNIVES: Spray or mist surface of knives:

Quaternary ammonium compounds

- Green Shield, 0.5 fl oz per gallon of water.
- Hypochlorite 5.25% bleach, 1 part commercial formulation in 50 parts of water (2%).

**PRE-PLANT TREATMENT:**

WHITE MOLD (*Sclerotinia sclerotiorum*):

Coniothyrium Minitans

- Contans, 1 - 4 lb.

**IN FURROW AT PLANTING TREATMENTS:** For control of seed-borne and soil-borne diseases.

BLACK DOT (*Colletotrichum coccodes*):

Azoxystrobin

- Quadris, in-furrow at planting at 6.1 - 9.2 fl oz/A (34" row spacing). Maximum 7.5 pt/A/per season. **Note:** It is recommended that a protectant partner such as an EDBC (mancozeb or metiram) or chlorothalonil product is added in tank mixture to any strobilurin product. Strobilurins should also be used in rotation with a fungicide with a different mode of action.

RHIZOCTONIA DISEASE (*Rhizoctonia solani*):

Azoxystrobin

- Quadris, in-furrow at planting at 6.1 - 9.2 fl oz/A (34" row spacing). Maximum of 7.5 pt/A/season. **Note:** It is recommended that a protectant partner such as an EDBC (mancozeb or metiram) or chlorothalonil product is added in tank mixture to any strobilurin product. Strobilurins should also be used in rotation with a fungicide with a different mode of action.

Flutoloni

- Moncut, 0.71 - 1.1 lb/A with a minimum of 3 gal/A. Maximum of 1.1 lb/season.

SILVER SCURF (*Helminthosporium solani*):

Azoxystrobin

- Quadris, 6.2 to 9.2 fl oz. Maximum 7.5 pt/A/season. **Note:** It is recommended that a protectant partner such as an EDBC (mancozeb or metiram) or chlorothalonil product is added in tank mixture to any strobilurin product. Strobilurins should also be used in rotation with a fungicide with a different mode of action.

BLACK DOT, PINK ROT, PYTHIUM LEAK, PYTHIUM SEEDLING BLIGHT, RHIZOCTONIA STEM CANKER:

Quadris Ridomil Gold, 12.6 fl oz. (48 hours) See label for plantback restrictions.

PINK ROT (*Phytophthora erythroseptica*), PYTHIUM LEAK (*Pythium ultimum*):

Cyazofamid

- Ranman 400SC, 0.42 fl oz.

Mono-, dibasic sodium, potassium and ammonium phosphites

- Prophyt, 4 - 10 pt. Apply at least 3 gallons of mix per acre. Add Ridomil.

BLACK SCURF/STEM CANKER (*Rhizoctonia solani*):

Bacillus amyloliquefaciens

- Double Nickel 55 WDG, 0.25 - 3.0 lb. (0 days) Organic approval.
- Double Nickel LC, 1 - 2 pt. (0 days) Organic approval.

**FOLIAR TREATMENT:**

BLACK DOT (*Colletotrichum coccodes*):

Azoxystrobin + Chlorothalonil

- Quadris Opti, 1.6 pt/A every 7 - 14 days. Maximum of 9.6 pt/season. (14 days).

Mandipropamid + Difenconazole

- Revus Top, 5.5-7 fl oz every 7-10 days. (14 days) Maximum 28 fl oz/A/season.

Potassium Bicarbonate

- Armicarb 100, 2.5 to 5 lb every 5-14 days. (0 days)

Pyrimethanil + Fluopyram

- Luna Tranquility, 11.2 fl oz every 7-14 days. (7 days) Maximum of 43.6 fl oz per season.

EARLY BLIGHT (*Alternaria solani*): Apply every 5 to 7 days after emergence.

Azoxystrobin

- Quadris, 6.2 to 15.4 fl oz. Maximum 7.5 pt/A/per season. **Note:** It is recommended that a protectant partner such as an EDBC (mancozeb or metiram) or chlorothalonil product is added in tank mixture to any strobilurin product. Strobilurins should also be used in rotation with a fungicide with a different mode of action.

Azoxystrobin + Chlorothalonil

- Quadris Opti, 1.6 pt/A every 5 - 7 days. (14 days) Maximum of 9.6 pt/season.

Bacillus amyloliquefaciens

- Double Nickel 55 WDG, 0.25 - 3.0 lb. (0 days) Apply every 7 - 10 days. Organic approval.
- Double Nickel LC, 0.5 - 6 qts. (0 days) Apply every 7 - 10 days. Organic approval.

Bacillus pumilis

- Sonata, 4 - 8 pt/A every 5 - 7 days.

Bacillus subtilis

- Serenade, 6 lb/A every 5 - 7 days.

Boscalid

- Endura, 2.5 - 4.5 oz every 7 - 14 days. (10 days) Maximum of 20 oz/season.

Chlorothalonil

- Applause 720, 1.0 to 1.5 pt. (7 days) Apply every 5-10 days. Do not apply more than 15 pt/A/season.
- Bravo Ultrex, 0.9 to 1.4 lb. (7 days) Do not apply more than 14.5 lb in a growing season.
- Bravo Weather Stik, 1 to 1.5 pt. (7 days) Do not apply more than 16 pt in a growing season.
- Echo Zn, 1.5 to 2.2 pt. (7 days) Do not apply more than 21.5 pt in a growing season.
- Equus 720 SST, 1 to 1.5 pt. (7 days) Do not apply more than 15 pt in a growing season.
- Initiate 720, 1.0 to 1.5 pt. (7 days) Apply every 5-10 days. Maximum 15 pt/A/season.

**Note:** All chlorothalonil products may be applied through irrigation water.

Copper Hydroxide + Copper Oxychloride

- Badge SC, 0.9 - 3.7 pt every 7 - 10 days.
- C-O-C-S WDG [potato], 1.5 to 4 lb every 7-10 days. (0 days)
- Kentan DF, 3 lb every 7-10 days.
- Kocide 2.4 LF, 2 lb. (0 days)

Copper-based compounds

- Badge SC, 0.9 - 3.7 pt every 7 - 10 days.

## Potatoes

- C-O-C-S WDG [potato], 1.5 to 4 lb every 7-10 days. (0 days)
- *Kentan* DF, 3 lb every 7-10 days.
- *Kocide* 2.4 LF, 2 lb. (0 days)

### Famoxadone + Cymoxanil

- *Tanos*, 6 oz/A every 7 to 10 days. (14 days) Maximum 3.0 lb/season.

### Fenamidon

- *Reason* 500 SC, 5.5 - 8.2 fl oz every 5 to 10 days. 24.6 fl oz maximum per season.. (7 days) **Note:** It is recommended that a protectant partner such as an EDBC (mancozeb or metiram) or chlorothalonil product is added in tank mixture to any strobilurin product. Strobilurins should also be used in rotation with a fungicide with a different mode of action.

### Fluoxastrobin

- *Evito* 480SC, 3.8 fl oz every 7-10 days. It is recommended that a protectant partner such as an EDBC (mancozeb or metiram) or chlorothalonil product is added in tank mixture to any strobilurin product. Strobilurins should also be used in rotation with a fungicide with a different mode of action.

### Iprodione

- *Iprodione* 4L, 1 - 2 pt every 14-21 days. (14 days) Maximum 8 pt/A/season.
- *Meteor*, 1 - 2 pt. (14 days)
- *Nevado* 4F, 1 - 2 pt every 14-21 days. (14 days) Maximum 8 pt/A/season.
- *Rovral* 4 Flowable, 1 to 2 pt. (7 days) See label for rotational crop and other restrictions.
- *Rovral* 50 W, 2 lb. (14 days) See label for rotational crop restrictions.

**Note:** Garlic, dry bulb onions, broccoli, lettuce, peanuts, carrots, beans and potatoes can be rotated after harvest. Root crops, tomatoes and cotton may be rotated one month after last application.

### Mancozeb

- *Dithane* DF Rainshield, *Dithane* M-45, 2 lb. (3 days) May be used through irrigation equipment.
- *Koverall*, 1 to 2 lb. (3 days)
- *Manex* II, 3.2 pt. (3 days)
- *Manzate* Max, 0.4 to 1.6 qt. (3 days)
- *Manzate* Pro-Stick, 1 to 2 lb. (3 days) May be used through irrigation equipment.
- *Penncozeb* 75 DF, 2 lb. (3 days)

### Mancozeb + Zoxamide

- *Gavel* 75 DF, 1.5 - 2.0 lb every 5 - 7 days. Maximum 12.0 lb/season.. (3 days)

### Mandipropamid + Difenconazole

- *Revus* Top, 5.5-7 fl oz every 7-10 days. (14 days) Maximum 28 fl oz/A/season.

### Organotin-Based Compounds

- *AgriTin* 80 WP, *Supertin* 80 WP, 2.5 to 3.75 oz. (21 days) Use only in tank mixture with other fungicides. Do not apply more than 11.5 oz/acre in a growing season.
- *Supertin* 4L, 4 to 6 fl oz. (7 days)

*Polyram* 80 DF, 2 lb. (3 days)

### Potassium Bicarbonate

- *Armicarb* 100, 2.5 to 5 lb every 5-14 days. (0 days)

### Pyraclostrobin

- *Headline* EC, *Headline* SC, 6-9 fl oz. (3 days) Do not apply more than 72 fl. oz per season. **Note:** It is recommended that a protectant partner such as an EDBC (mancozeb or metiram) or chlorothalonil product is added in tank mixture to any strobilurin

product. Strobilurins should also be used in rotation with a fungicide with a different mode of action.

### Pyrimethanil

- *Scala*, 7 fl oz every 7 - 14 days. (7 days) Maximum of 35 fl oz per season. **Note:** It is recommended that *Scala* is used in a tank mix with a labeled dose rate of another effective early blight fungicide.

### Pyrimethanil + Fluopyram

- *Luna* Tranquility, 11.2 fl oz every 7-14 days. (7 days) Maximum of 35 fl oz per season.

### Trifloxystrobin

- *Gem* 25 WDG (6.0-8.0 oz) or *Gem* 500 (2.9 to 3.8 fl oz) (7 days) Do not apply more than 48 oz. per season. **Note:** It is recommended that a protectant partner such as an EDBC (mancozeb or metiram) or chlorothalonil product is added in tank mixture to any strobilurin product. Strobilurins should also be used in rotation with a fungicide with a different mode of action.

LATE BLIGHT (*Phytophthora infestans*): Apply after plants are 6 inches tall and every 5-7 days until vines are completely dead.

### Ametoctradin + Dimethomorph

- *Zapro*, 11 - 14 fl. oz. (4 days) Maximum of three applications at full rate to 42 fl. oz/season.

### Azoxystrobin

- *Quadris*, 6.2-15.4 fl oz.

**Note:** It is recommended that a protectant partner such as an EDBC (mancozeb or metiram) or chlorothalonil product is added in tank mixture to any strobilurin product. Strobilurins should also be used in rotation with a fungicide with a different mode of action.

### Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 1.6 pt/A every 5 - 7 days. (14 days) Maximum 9.6 pt/season.

### Bacillus amyloliquefaciens

- *Double Nickel* 55 WDG, 0.25 - 3.0 lb. (0 days) Apply every 7 - 10 days. Organic approval.

- *Double Nickel* LC, 0.5 - 6 qts. (0 days) Apply every 7 - 10 days. Organic approval.

### Bacillus pumilis

- *Sonata*, 4 - 8 pt/A every 5 - 7 days.

### Bacillus subtilis

- *Serenade*, 6 lb/A every 5 - 7 days.

### Chlorothalonil

- *Applause* 720, 1.0 to 1.5 pt. (7 days) Apply every 5-10 days. Do not apply more than 15 pt/A/season.
- *Bravo* Ultrex, 0.9 to 1.4 lb. (7 days)
- *Bravo* Weather Stik, 1 to 1.5 pt. (7 days) Do not apply more than 16 pt in a growing season.
- *Bravo* Weather Stik Zn, 1.0 to 1.5 pt. (7 days) Do not apply more than 16 pt in a growing season.
- *Echo* Zn, 1.5 to 2 pt/A. (7 days) Do not apply more than 21.5 pt in a growing season.
- *Equus* 720 SST, 1 to 1.5 pt. (7 days) Do not apply more than 15 pt in a growing season.
- *Initiate* 720, 1.0 to 1.5 pt. (7 days) Apply every 5-10 days. Maximum 15 pt/A/season.

**Note:** All chlorothalonil products may be applied through irrigation water.

### Cyazofamid

- *Ranman* 400SC, 1.4 to 2.75 fl oz every 7 to 10 days. (7 days) Maximum 27.5 fl oz/A/season.

### Cymoxanil

- *Curzate* 60 DF, 0.21 lb. (14 days) Use only in tank mixture with other fungicides from when foliage meets within rows to early senescence. May be used to prevent spread to uninfected foliage

from within infected fields. Must be mixed with a fungicide partner such as an EBDC or chlorothalonil

#### Dimethomorph

- *Forum*, 4 to 6 fl oz. (4 days) Use from when foliage meets within rows to late senescence. May be used to prevent spread to uninfected foliage from within infected fields. Must be mixed with a fungicide partner such as an EBDC or chlorothalonil.

#### Famoxadone + Cymoxanil

- *Tanos*, 6 - 8 oz/A every 7 to 10 days. (14 days) Maximum 3.0 lb/season.

#### Fenamidone

- *Reason 500 SC*, 5.5 - 8.2 fl oz every 5 to 10 days. (7 days) Maximum 24.6 fl oz/season.

**Note:** It is recommended that a protectant partner such as an EBDC (mancozeb or metiram) or chlorothalonil product is added in tank mixture to any strobilurin product. Strobilurins should also be used in rotation with a fungicide with a different mode of action.

#### Fluazinam

- *Omega 500 F*, 5.5 fl oz/A. (14 days) Do not apply more than 3.5 pt in a growing season.

#### Fluoxastrobin

- *Evito 480SC*, 3.8 fl oz every 7-10 days. It is recommended that a protectant partner such as an EBDC (mancozeb or metiram) or chlorothalonil product is added in tank mixture to any strobilurin product. Strobilurins should also be used in rotation with a fungicide with a different mode of action.

#### Mancozeb

- *Dithane DF Rainshield* (2 lb) or *Manzate Pro-Stick* (1 to 2 lb) (3 days) May be used through irrigation equipment.
- *Koverall*, 1 to 2 lb. (3 days)
- *Manex II*, 3.2 pt. (3 days)
- *Manzate Max*, 0.4 to 1.6 qt. (3 days)
- *Penncozeb 75 DF*, 2 lb. (3 days)

#### Mancozeb + Zoxamide

- *Gavel 75 DF*, 1.5 - 2.0 lb every 5 - 7 days. (3 days) Maximum 12.0 lb/season.

#### Mandipropamid + Difenconazole

- *Revus Top*, 5.5-7 fl oz every 7-10 days. (14 days) Maximum 28 fl oz/A/season.

#### Mefenoxam + Chlorothalonil

- *Ridomil Gold Bravo*, 2 lb. (7 days)
- *Ridomil Gold Copper*, 2 lb. (7 days) Apply when foliage meets within the row and may be applied once more after 14 days. Use protectant fungicides between applications.
- *Ridomil Gold MZ*, 2.5 lb. (7 days)

#### Mefenoxam + Copper Hydroxide

- *Ridomil Gold Bravo*, 2 lb. (7 days)
- *Ridomil Gold Copper*, 2 lb. (7 days) Apply when foliage meets within the row and may be applied once more after 14 days. Use protectant fungicides between applications.
- *Ridomil Gold MZ*, 2.5 lb. (7 days)

#### Mefenoxam + Mancozeb

- *Ridomil Gold Bravo*, 2 lb. (7 days)
- *Ridomil Gold Copper*, 2 lb. (7 days) Apply when foliage meets within the row and may be applied once more after 14 days. Use protectant fungicides between applications.
- *Ridomil Gold MZ*, 2.5 lb. (7 days)

#### Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 3.75 - 10 pt/A every 5 to 10 days. **Note:** It is recommended that a protectant partner such as an EBDC (mancozeb or metiram) or chlorothalonil product is added in tank mixture.

- *Prophyt*, 4 pt every 5-10 days.

#### Organotin-Based Compounds

- *Agritin 80 WP*, *Supertin 80 WP*, 2.5 to 3.75 oz. (21 days) Use only in tank mixture with other fungicides. Do not apply more than 11.5 oz per growing season.
- *Supertin 4L*, 4 to 6 fl oz. (7 days)
- *Polyram 80 DF*, 2 lb. (3 days)

#### Propamocarb

- *Previcur Flex*, 0.9 to 1.2 pt/acre depending on disease pressure; with chlorothalonil-based product at 2/3 rate or with EBDC-based product at 2/3 rate. (14 days)

#### Pyraclostrobin

- *Headline EC*, *Headline SC*, 6-9 fl oz. (3 days) Do not apply more than 72 fl. oz per season. **Note:** It is recommended that a protectant partner such as an EBDC (mancozeb or metiram) or chlorothalonil product is added in tank mixture to any strobilurin product. Strobilurins should also be used in rotation with a fungicide with a different mode of action.

#### Trifloxystrobin

- *Gem 25 WDG*, 6.0-8.0 oz. (7 days) Do not apply more than 48 oz. per season. **Note:** It is recommended that a protectant partner such as an EBDC (mancozeb or metiram) or chlorothalonil product is added in tank mixture to any strobilurin product. Strobilurins should also be used in rotation with a fungicide with a different mode of action.
- *Gem 500*, 3.8 fl oz. (7 days) Tank mix only with protectant.

LATE BLIGHT TUBER ROT (*Phytophthora infestans*), LEAK (*Phythium* spp.), PINK ROT (*Phytophthora erythroseptica*): Apply at flowering and again 14 days later.

#### Mefenoxam + Chlorothalonil

- *Ridomil Gold Bravo*, or *Ridomil Gold Copper* (2 lb) or *Ridomil Gold MZ* (2.5 lb) (21 days) Apply when foliage meets within the row and may be applied once more after 14 days. Use protectant fungicides between applications.

#### Mefenoxam + Copper Hydroxide

- *Ridomil Gold Bravo*, or *Ridomil Gold Copper* (2 lb) or *Ridomil Gold MZ* (2.5 lb) (21 days) Apply when foliage meets within the row and may be applied once more after 14 days. Use protectant fungicides between applications.

#### Mefenoxam + Mancozeb

- *Ridomil Gold Bravo*, or *Ridomil Gold Copper* (2 lb) or *Ridomil Gold MZ* (2.5 lb) (21 days) Apply when foliage meets within the row and may be applied once more after 14 days. Use protectant fungicides between applications.

BOTRYTIS BLIGHT (*Botrytis cinerea*): Apply after mid-season when disease symptoms are likely to appear.

#### Chlorothalonil

- *Applause 720*, 1.0 to 1.5 pt. (7 days) Apply every 5-10 days. Do not apply more than 15 pt/A/season.
- *Bravo Ultrex*, 0.9 to 1.4 lb. (7 days) Do not apply more than 21.5 lb in a growing season.
- *Bravo Weather Stik*, *Equus 720 SST*, 1 to 1.5 pt. (7 days) Do not apply more than 15 pt in a growing season.
- *Echo Zn*, 1.5 to 2.2 pt. (7 days) Do not apply more than 21.5 pt in a growing season.
- *Initiate 720*, 1.0 to 1.5 pt. (7 days) Apply every 5-10 days. Maximum 15 pt/A/season.

**Note:** All chlorothalonil products may be applied through irrigation water.

#### Mancozeb

- *Dithane DF Rainshield*, 2 lb. (3 days) May be used through irrigation equipment.

## Potatoes

- *Koverall*, 1 to 2 lb. (3 days)
- *Manzate Pro-Stick*, 1 to 2 lb. (3 days)
- *Penncozeb 75 DF*, 2 lb. (3 days)

*Polyram 80 DF*, 2 lb. (3 days)

### Pyrimethanil

- *Scala*, 7 fl oz every 7 - 14 days. (7 days) Maximum of 35 fl oz per season. **Note:** It is recommended that *Scala* is used in a tank mix with a labeled dose rate of another effective early blight fungicide.

### Pyrimethanil

- *Scala*, 7 fl oz every 7 - 14 days. (7 days) Maximum of 35 fl oz per season. It is recommended that *Scala* is used in a tank mix with a labeled dose rate of another effective early blight fungicide.

### Pyrimethanil + Fluopyram

- *Luna Tranquility*, 11.2 fl oz every 7-14 days. (7 days) Maximum 43.6 fl oz per season.

WHITE MOLD (*Sclerotinia sclerotiorum*): Apply at first sign of disease or immediately prior to row closing, and again 28 days later if needed.

### Bacillus amyloliquefaciens

- *Double Nickel 55 WDG*, 0.25 - 3.0 lb. (0 days) Apply every 7 - 10 days. Organic approval.
- *Double Nickel LC*, 0.5 - 6 qts. (0 days) Apply every 7 - 10 days. Organic approval.

### Boscalid

- *Endura*, 5.5 - 10 oz/A every 14 days. (30 days) Maximum 20 oz/season.

### Fluazinam

- *Omega 500 F*, 5.5 fl oz. (14 days) Do not apply more than 3.5 pt in a growing season.

### Iprodione

- *Iprodione 4L*, 1 - 2 pt every 14-21 days. (14 days) Maximum 8 pt/A/season.
- *Meteor*, 1.5 - 2.0 pt. (14 days)
- *Nevado 4F*, 1 - 2 pt every 14-21 days. (14 days) Maximum 8 pt/A/season.
- *Rovral 4 Flowable*, 2 pt in at least 10 gallons of water per acre. (14 days) See label for rotational crop restrictions.

### Pyrimethanil + Fluopyram

- *Luna Tranquility*, 11.2 fl oz every 7-14 days. (7 days) Maximum of 43.6 fl oz per season.

### Thiophanate-Methyl

- *Topsin M 70 WSB*, 1-2 lb. (21 days) Do not apply more than 4 lb per season.

BROWN LEAF SPOT (*Alternaria alternata*):

### Bacillus amyloliquefaciens

- *Double Nickel 55 WDG*, 0.25 - 3.0 lb. (0 days) Apply every 7 - 10 days. Organic approval.
- *Double Nickel LC*, 0.5 - 6 qts. (0 days) Apply every 7 - 10 days. Organic approval.

### Famoxadone + Cymoxanil

- *Tanos DF*, 6 oz every 7-10 days. (14) Maximum 3 lb/A/season. It is recommended that a protectant partner such as an EBDC (mancozeb or metiram) or chlorothalonil product is added in tank mixture to any strobilurin product. Strobilurins should also be used in rotation with a fungicide with a different mode of action.

### Mandipropamid + Difenconazole

- *Revus Top*, 5.5-7 fl oz every 7-10 days. (14 days) Maximum 28 fl oz/A/season.

GRAY MOLD (*Botrytis cinerea*):

### Bacillus amyloliquefaciens

- *Double Nickel 55 WDG*, 0.25 - 3.0 lb. (0 days) Apply every 7 - 10 days. Organic approval.

- *Double Nickel LC*, 0.5 - 6 qts. (0 days) Apply every 7 - 10 days. Organic approval.

### PRE-HARVEST SPRAYS:

LATE BLIGHT: When vines are seriously infected at harvest time.

Apply as necessary.

*Blue Viking Star Glow Powder 100 SC*, 10 lb.

*Blue Viking Star Shine Crystals 100 SC*, 10 lb.

**Note:** The *Blue Viking Concentrates* should only be applied at vine-kill as they are phytotoxic.

### Copper Hydroxide

- *Champ Formula 2 F*, 2 to 5 pt.

### Copper-based compounds

- *Kocide 2.4 LF*, 2 lb.

### STORAGE DISINFECTION:

To disinfect storages, boxes, truck beds, bags and equipment (tools, farm machinery), spray or drench surfaces with one of the following compounds:

### Quaternary ammonium compounds

- *Aquahyme (E-Z Flo)*, Use according to manufacturer's recommendations.
- *Green Shield*, 0.5 fl oz per gallon of water.
- *Hy 2389 (Rohm & Haas)*, Use according to manufacturer's recommendations.
- *Odorless Disinfectant (Haviland)*, Use according to manufacturer's recommendations.

The addition of a wetting agent with quaternary ammonium sprays or drenches is suggested to obtain more uniform coverage of surfaces.

Use only those wetting agents recommended by the manufacturer because some are not compatible. Rinse food containers and implements that come in contact with food after treatment.

### Sodium Hypochlorite

- *Chlorine solution*, 1,000 to 2,000 ppm concentration. Commercial formulations vary in concentration; therefore, follow manufacturer's recommendation when mixing solutions. Example: Perchlorin is a granule containing 70% calcium hypo-chlorite. It takes 5 teaspoons in 3 gallons of water to make a solution of 1,000 ppm. Rinse food containers and implements that come in contact with food after treatment.

*Soluble copper sulfate (blue vitriol; bluestone; etc.)*, 10 to 15 lb in 100 gallons of water.

**Note:** It is important to remove all dirt and trash from surfaces to be treated.

### PRE-STORAGE TREATMENTS FOR STORAGE DISEASES:

BACTERIAL SOFT ROT (*Erwinia carotovora*): Wash potatoes in chlorinated water to (1) disinfect tuber surfaces; (2) cauterize wounds; and (3) promote rapid formation of protective tissue over injured surfaces.

### Sodium Hypochlorite

- *Chlorine solution*, . Add a concentrated stock solution of chlorine to wash water to give a concentration of 200 ppm ( = 2 pt household bleach (5.25% sodium hypochlorite) per 60 gallons of water or 1 gal of bleach per 240 gallons of water).

Mix stock solutions of chlorine in earthen-ware crocks or plastic containers. DO NOT USE metal containers. Dry washed potatoes before bagging or bulk storing by passing hot air over the end of the sorting table. Usually, the sponge drying technique is inadequate without the addition of heat.

FUSARIUM DRY ROT (*Fusarium spp.*):

### Azoxystrobin + Difenconazole + Fludioxinil

- *Mertect 340*, 42 oz flowable formulation in 100 gallons of water. Apply as a spray to potato tubers (seed and table stock) at

time of storage and again at removal; 1 gal of solution per 2,000 lb of tubers. See manufacturer's recommendations for equipment and methods to use. Treatment may be applied to washed or unwashed potatoes. Addition of chlorine (200 ppm) to solution will help control bacterial soft rot. It is advisable to add a wetting agent when treating before storage to ensure good coverage.

- *Stadium*, 1 fl oz/ton. Apply as a spray to potato tubers (not seed) at time of storage and again at removal; 1 gal of solution per 2,000 lb of tubers. See manufacturer's recommendations for equipment and methods to use. Treatment may be applied to washed or unwashed potatoes.

#### Thiabendazole

- *Mertect* 340, 42 oz flowable formulation in 100 gallons of water. Apply as a spray to potato tubers (seed and table stock) at time of storage and again at removal; 1 gal of solution per 2,000 lb of tubers. See manufacturer's recommendations for equipment and methods to use. Treatment may be applied to washed or unwashed potatoes. Addition of chlorine (200 ppm) to solution will help control bacterial soft rot. It is advisable to add a wetting agent when treating before storage to ensure good coverage.
- *Stadium*, 1 fl oz/ton. Apply as a spray to potato tubers (not seed) at time of storage and again at removal; 1 gal of solution per 2,000 lb of tubers. See manufacturer's recommendations for equipment and methods to use. Treatment may be applied to washed or unwashed potatoes.

LATE BLIGHT (*Phytophthora infestans*):

#### Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 0.1 gal/ton. Apply at 2-4 pt/2000 lb of tubers.
- *Prophyt*, 13 fl oz/ton.

PINK ROT (*Phytophthora erythroseptica*):

#### Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 0.1 gal/ton. Apply at 2-4 pt/2000 lb of tubers.
- *Prophyt*, 13 fl oz/ton.

PYTHIUM LEAK (*Pythium ultimum*):

#### Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 0.1 gal/ton. Apply at 2-4 pt/2000 lb of tubers.

SILVER SCURF (*Helminthosporium solani*):

#### Azoxystrobin + Difenoconazole + Fludioxinil

- *Stadium*, 1 fl oz/ton. Apply as a spray to potato tubers (not seed) at time of storage and again at removal; 1 gal of solution per 2,000 lb of tubers. See manufacturer's recommendations for equipment and methods to use. Treatment may be applied to washed or unwashed potatoes.

## Pumpkins

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

Pumpkins are hosts for root-knot and lesion nematodes. These nematodes can reduce pumpkin yields but yield losses in Michigan have not been documented. If you suspect nematodes are reducing pumpkin yields collect root and soil samples for analysis as described in Appendix C. If the numbers of nematodes recovered from those samples exceed damage thresholds; control options will be suggested. Vydate 2L is labeled for use in pumpkins.

### PREPLANT NEMATICIDE TREATMENT:

#### Fluensulfone

- *Nimitz* 480EC, 3.5 - 5.0 pints/A. apply broadcast and incorporate either mechanically or with water to a depth of 6-8 inches at least 7 days prior to transplanting or planting. Do not apply if heavy rainfall is expected within 48 hours of application. This material can be applied in bands or by drip but apparently is most effective if applied broadcast and incorporated. Do not apply to extremely cold soils (<40 F) as nematodes have to be active for the product to be effective. Product has not been evaluated in Michigan.

### INSECTS

#### SEED TREATMENT:

##### CUCUMBER BEETLE:

- *Cruiser* 5 FS, . See label for rates and application methods.

#### SOIL TREATMENT:

##### APHIDS, FLEA BEETLE, LEAFHOPPER, THRIPS:

- *Durivo*, 10 to 13 fl oz. (30 days)

#### Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum* 75 SG (1.66 to 3.67 oz.) (30 days) See label for application methods.

##### THRIPS, LEAFHOPPERS, SQUASH BUG:

- *Venom*, 5 to 6 oz. (21 days) See label for application methods

##### CUTWORM, FLEA BEETLE LARVAE:

- *Capture* LFR, 3.4 to 6.8 fl oz. See label for application methods. (RUP)

##### SEED CORN MAGGOT:

- *Athena*, 8.5 to 17 fl oz. (RUP)

#### Bifenthrin

- *Brigade* WSB, 8 to 16 oz. (RUP)
- *Capture* LFR, 3.4 to 6.8 fl oz. (RUP)

See label for application methods.

- *Bifenture* 10 DF, 8 to 16 oz/A. (3 days)

##### APHIDS, CUCUMBER BEETLES, LEAFHOPPERS, THRIPS:

- *Belay* 50 WDG, 4.8 to 6.4 oz.

#### Imidacloprid

- *Admire* Pro, 7 to 10.5 fl oz. (21 days)
- *Nuprid* 2 F, 16 to 24 fl oz. (21 days)
- *Scorpion* 35SL, 9 to 10.5 fl oz. (21 days)

##### ARMYWORM:

- *Verimark*, 6.75-13.5 oz/A. (1)

##### APHIDS and THRIPS:

- *Verimark*, 10-13.5 oz/A. (1)

##### LEAFHOPPERS:

- *Sivanto*, 21 - 28 fl oz/A.

##### APHIDS:

- *Sivanto*, 21 - 28 fl oz/A.

##### WHITEFLIES:

- *Sivanto*, 21 - 28 fl oz/A.

**FOLIAR TREATMENT:** Pumpkin plants may be sensitive to insecticide formulations under certain conditions. Be sure a problem exists before treatment. Read and observe restrictions or the label. To avoid killing bees, do not treat pumpkins during bloom. See the Insecticide Effectiveness table for bee toxicity.

CUTWORM: Apply when damage is first seen and repeat as needed.

- \* *Baythroid* XL, 0.8 to 1.6 fl oz. (0 days) (RUP)

#### \* Bifenthrin

- *Bifenture* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade* @ 2EC (2.6 to 6.4 fl oz.) or *Brigade* WSB (8 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)

## Pumpkins

- *Empower*, 3.5 to 8.7 lb. (3 days) (RUP)
- *Fanfare 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

### \* Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

### \* Permethrin

- *Ambush 25 W*, 6.4 to 12.8 oz. (0 days) (RUP)
- *Perm-UP 25DF* (6.4 to 12.8 oz.) or *Perm-UP 3.2 EC* (4 to 8 oz.) (0 days) (RUP)
- *Pounce 25 WP*, 6.4 to 12.8 oz. (0 days) (RUP)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Belt SC*, 1.5 fl oz. (1 day)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

*Gladiator*, 6 to 19 fl oz. (7 days) (RUP)

*Javelin WG*, 0.12 to 1.5 lb. (0 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Mustang Max*, 1.28 to 4 oz. (1 day) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Vetiva*, 12 to 17 fl oz. (7 days)

STRIPED and SPOTTED CUCUMBER BEETLE: Apply as soon as beetle are seen and repeat as needed to prevent bacterial wilt disease.

### Acetamiprid

- *Assail 30 SG* (2.5 to 5.3 oz.) or *Assail 70WP* (1.1 to 2.3 oz.) (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Baythroid XL*, 2.4 to 2.8 fl oz. (0 days) (RUP)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

### Bifenthrin

- *Bifenture EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.6 to 6.4 fl oz.) or *Brigade WSB* (8 to 16 oz.) (3 days) (RUP)
- *Capture 2 EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

*Bifenture 10 DF*, 8 to 16 oz/A. (3 days)

### Carbaryl

- *Carbaryl 4L*, 1 qt. (3 days)
- *Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

*Danitol 2.4 EC*, 10.66 to 16 fl oz. (7 days) (RUP)

### Dinotefuran

- *Scorpion 35SL*, 2 to 7 fl oz. (1 day)
- *Venom*, 3 to 4 oz. (1 day)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

*Endosulfan 3 EC*, 0.66 to 1.33 qt. (11 days) (RUP)

### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (3 days) (RUP)

- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

*Kryocide*, 8 to 16 lb. (14 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

### Malathion

- *Malathion 5* (1.5 pt.) or *Malathion 8 Aquamul* (1 pt.) (1 day)

*Mustang Max*, 2.8 to 4 oz. (1 day) (RUP)

### Permethrin

- *Ambush 25 W*, 6.4 to 12.8 oz. (0 days) (RUP)
- *Perm-UP 25DF* (6.4 to 12.8 oz.) or *Perm-UP 3.2 EC* (4 to 8 oz.) (0 days) (RUP)
- *Pounce 25 WP*, 6.4 to 12.8 oz. (0 days) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Rimon 0.83EC*, 9 to 12 fl oz. (1 day)

*Carbaryl 4L*, 1 qt. (3 days)

*Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

FLEA BEETLE: Apply as needed.

*Actara*, 1.5 to 3 oz. (0 days)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

### Carbaryl

- *Carbaryl 4L*, 1 qt. (3 days)
- *Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

### Dinotefuran

- *Scorpion 35SL*, 2 to 7 fl oz. (1 day)
- *Venom*, 3 to 4 oz. (1 day)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

*Endosulfan 3 EC*, 0.66 to 1.33 qt. (11 days) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

*Kryocide*, 8 to 16 lb. (14 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Carbaryl 4L*, 1 qt. (3 days)

*Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

*Voliam Flexi*, 4 to 7 oz. (1 day)

LEAFHOPPERS: Apply when damage is seen.

### Acetamiprid

- *Assail 30 SG* (2.5 to 4 oz.) or *Assail 70WP* (1.1 to 1.7 oz.) (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Baythroid XL*, 0.8 to 1.6 fl oz. (0 days) (RUP)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

### Bifenthrin

- *Bifenture 10 DF*, 8 to 16 oz/A. (3 days)
- *Bifenture EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.6 to 6.4 fl oz.) or *Brigade WSB* (8 to 16 oz.) (3 days) (RUP)
- *Capture 2 EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (3 days) (RUP)

- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

Carbaryl

- *Carbaryl* 4L, 1 qt. (3 days)
- *Sevin* 4 F (1 qt.) or *Sevin* 80 S (1.25 lb.) or *Sevin* XLR Plus (1 qt.) (3 days)

Dinotefuran

- *Scorpion* 35SL, 2 to 7 fl oz. (1 day)
- *Venom*, 1 to 4 oz. (1 day)

*Endigo* ZC, 4 to 4.5 fl oz. (1 day) (RUP)

Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Mustang* Max, 2.8 to 4 oz. (1 day) (RUP)

Permethrin

- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (0 days) (RUP)
- *Pounce* 25 WP, 6.4 to 12.8 oz. (0 days) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 1 qt. (3 days)

*Sevin* 4 F (1 qt.) or *Sevin* 80 S (1.25 lb.) or *Sevin* XLR Plus (1 qt.) (3 days)

*Sivanto*, 21 - 28 fl oz/A.

*Vetiva*, 14 to 17 fl oz. (7 days)

SQUASH BUG: Apply as needed.

\* Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

\* Permethrin

- *Ambush* 25 W, 12.8 oz. (0 days) (RUP)
- *Perm-UP* 25DF (12.8 oz.) or *Perm-UP* 3.2 EC (8 oz.) (0 days) (RUP)
- *Pounce* 25 WP, 12.8 oz. (0 days) (RUP)

Acetamiprid

- *Assail* 30 SG (5.3 oz.) or *Assail* 70WP (2.3 oz.) (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

Bifenthrin

- *Bifenture* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade* @ 2EC (2.6 to 6.4 fl oz.) or *Brigade* WSB (8 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

*Bifenture* 10 DF, 8 to 16 oz/A. (3 days)

Carbaryl

- *Carbaryl* 4L, 1 qt. (3 days)
- *Sevin* 4 F (1 qt.) or *Sevin* 80 S (1.25 lb.) or *Sevin* XLR Plus (1 qt.) (3 days)

Dinotefuran

- *Scorpion* 35SL, 2 to 7 fl oz. (1 day)

- *Venom*, 3 to 4 oz. (1 day)

*Endigo* ZC, 4 to 4.5 fl oz. (1 day) (RUP)

*Endosulfan* 3 EC, 0.66 to 1.33 qt. (11 days) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Mustang* Max, 2.8 to 4 oz. (1 day) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Rimon* 0.83EC, 12 fl oz. (1 day)

*Carbaryl* 4L, 1 qt. (3 days)

*Sevin* 4 F (1 qt.) or *Sevin* 80 S (1.25 lb.) or *Sevin* XLR Plus (1 qt.) (3 days)

SQUASH VINE BORER: Apply to base of plants when moths are active, usually starting when plants start to vine. Repeat every 3 to 5 days for 3 weeks.

Acetamiprid

- *Assail* 30 SG (5.3 oz.) or *Assail* 70WP (2.3 oz.) (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Belt* SC, 1.5 fl oz. (1 day)

Bifenthrin

- *Bifenture* 10 DF, 8 to 16 oz/A. (3 days)
- *Bifenture* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade* @ 2EC (2.6 to 6.4 fl oz.) or *Brigade* WSB (8 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

*Endigo* ZC, 4 to 4.5 fl oz. (1 day) (RUP)

*Endosulfan* 3 EC, 0.66 to 1.33 qt. (11 days) (RUP)

Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Malathion* 5, 1.5 pt. (3 days)

*Mustang* Max, 2.8 to 4 oz. (1 day) (RUP)

Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (0 days) (RUP)
- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (0 days) (RUP)
- *Pounce* 25 WP, 6.4 to 12.8 oz. (0 days) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Vetiva*, 12 to 17 fl oz. (7 days)

APHIDS: Apply as needed to prevent disease transmission to plants. Repeat as needed.

Acetamiprid

- *Assail* 30 SG (2.5 to 4 oz.) or *Assail* 70WP (1.1 to 1.7 oz.) (0 days)

*Actara*, 1.5 to 3 oz. (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

## Pumpkins

*Beleaf 50 SG*, 2 to 2.8 oz. (0 days)

### Bifenthrin

- *Bifenture EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.6 to 6.4 fl oz.) or *Brigade WSB* (8 to 16 oz.) (3 days) (RUP)
- *Capture 2 EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (3 days) (RUP)

*Bifenture 10 DF*, 8 to 16 oz/A. (3 days)

*Endigo ZC*, 4.5 fl oz. (1 day) (RUP)

*Endosulfan 3 EC*, 0.66 to 1.33 qt. (11 days) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

*Fulfill*, 2.75 oz. (7 days) May require 5 to 7 days for aphid mortality.

*Gladiator*, 19 fl oz. (7 days) (RUP)

### Lambda-cyhalothrin

- *Lambda-Cy*, 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.92 fl oz.) or *Warrior* with Zeon Technology (3.84 fl oz.) (1 day) (RUP)

### Malathion

- *Malathion 5*, or *Malathion 57 EC* (1.5 pt.) or *Malathion 8 Aquamul* (1 pt.) (1 day)

### Permethrin

- *Perm-UP 25DF* (12.8 oz.) or *Perm-UP 3.2 EC* (8 oz.) (0 days) (RUP)

- *Pounce 25 WP*, 12.8 oz. (0 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 21 - 28 fl oz/A.

*Voliam Flexi*, 4 to 7 oz. (1 day)

*Vydate L*, 2 to 4 pt. (1 day) (RUP)

### THRIPS:

*Athena*, 13.5 to 17 fl oz. (7 days) (RUP)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

*Exirel*, 13.5-20.5 oz. (1)

*Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)

*Malathion 8 Aquamul*, 1 pt. (1 day)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant SC*, 6 to 10 fl oz. (3 days)

*Rimon 0.83EC*, 12 fl oz. (1 day)

*Scorpion 35SL*, 2 to 7 fl oz. (1 day)

### Spinosad

- *Entrust* (2 to 2.5 oz.) or *Entrust SC* (6 to 8 fl oz.) (3 days)

*Vydate L*, 2 to 4 pt. (1 day) (RUP)

### SEED CORN MAGGOT:

*Empower*, 3.5 to 8.7 lb. (3 days) (RUP)

### ARMYWORM:

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Avaunt*, 3.5 to 6 oz. (3 days)

### Bacillus thuringiensis

- *Agree WG*, 0.5 to 2 lb. (0 days)

- *Javelin WG*, 0.12 to 1.5 lb. (0 days)

*Baythroid XL*, 1.6 to 2.4 fl oz. (0 days) (RUP)

*Beleaf 50 SG*, 10.66 to 16 fl oz. (7 days)

*Belt SC*, 1.5 fl oz. (1 day)

### Bifenthrin

- *Bifenture EC*, 2.6 to 6.4 oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.6 to 6.4 fl oz.) or *Brigade WSB* (8 to 16 oz.) (3 days) (RUP)
- *Capture 2 EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

- *Discipline 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

- *Fanfare 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)

- *Tundra EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (3 days) (RUP)

- *Steed*, 3.5 to 4.7 fl oz. (7 days) (RUP)

*Bifenture 10 DF*, 8 to 16 oz/A. (3 days)

*Coragen*, 3.5 to 5 fl oz. (1 day)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

*Gladiator*, 19 fl oz. (7 days) (RUP)

*Intrepid 2F*, 4 to 10 fl oz. (3 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)

- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant SC*, 5 to 10 fl oz. (3 days)

*Rimon 0.83EC*, 9 to 12 fl oz. (1 day)

### Spinosad

- *Entrust* (1.25 to 2.5 oz.) or *Entrust SC* (4 to 8 fl oz.) (3 days)

*Vetiva*, 12 to 17 fl oz. (7 days)

### MELONWORM, PICKLEWORM:

#### Acetamiprid

- *Assail 30 SG*, 2.5 to 5.3 oz. (0 days)

- *Assail 70WP*, 1.1 to 2.3 oz/A. (0 days)

*Exirel*, 7-13.5 oz/A. (1)

### WHITEFLIES:

*Sivanto*, 21 - 28 fl oz/A.

**MITES** Apply when needed. Usually a problem only in hot dry weather.

#### Abamectin

- *Agri-Mek 0.15 EC* (8 to 16 fl oz.) or *Agri-Mek SC* (1.75 to 3.5 fl oz.) (7 days) Use with a non-ionic surfactant. (RUP)

#### Bifenazate

- *Acramite 50WS*, 0.75 to 1 lb. (3 days)

#### Bifenthrin

- *Bifenture EC*, 5.12 to 6.4 fl oz. (3 days) (RUP)

- *Bifenture 10 DF*, 12.8 to 16 oz/A. (3 days)

- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade WSB* (12.8 to 16 oz.) (3 days) (RUP)

- *Capture 2 EC*, 5.12 to 6.4 fl oz. (3 days) (RUP)

- *Discipline 2EC*, 5.12 to 6.4 fl oz. (3 days) (RUP)

- *Fanfare 2EC*, 5.12 to 6.4 fl oz. (3 days) (RUP)

- *Sniper*, 5.12 to 6.4 fl oz. (3 days) (RUP)

- *Tundra EC*, 5.12 to 6.4 fl oz. (3 days) (RUP)

#### Bifenthrin + Avermectin

- *Athena*, 13.5 to 17 fl oz. (7 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero EW* (11.2 oz.) (3 days) (RUP)

#### Etoxazole

- *Zeal*, 2 to 3 oz. (7 days)

#### Fenpropathrin

- *Danitol 2.4 EC*, 10 2/3 fl oz. (7 days) (RUP)

#### Malathion

- *Malathion 5*, or *Malathion 57 EC* (1.5 pt.) or *Malathion 8 Aquamul* (1 pt.) (1 day)

#### Spiromesifen

- *Oberon 2 SC*, 7 to 8.5 fl oz. (7 days)

Zeta-Cypermethrin + Avermectin

- *Gladiator*, 19 fl oz. (7 days) (RUP)

**SLUGS**

Deadline M-Ps 4% (20 to 40 lb) or Metaldehyde 3.5 G (30 to 40 lb) Apply between rows. Avoid contact with edible product.

**DISEASES****SEED TREATMENT:**

DAMPING OFF (*Pythium* spp., *Phytophthora* spp., *Rhizoctonia solani*):

Use only as directed; over-treatment may cause injury.

Captan

- *Captan* 4 Flowable, 2 fl oz/100 lb seed.

Fludioxinil

- *Maxim* 4 FS, 0.08 to 0.16 fl oz/100 lb seed (*Rhizoctonia*).

Thiram

- 42-S Thiram, *Thiram* 480DP, *Thiram* 50 WP Dyed, 4 1/2 oz/100 lb seed.

**PRE-PLANT FUMIGATION:**

PHYTOPHTHORA: Apply to production fields before planting. **Note:** Most fumigants applied to the soil for control of disease organisms will also control soil insects, nematodes and weed seeds.

Soil sterilization by fumigation is best achieved by proper application of material. Correct soil moisture, temperature, and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or immediate tarping.

1,3 Dichloropropene/chloropicrin

- *Telone* C35, 13-35 gal. (RUP)

Metam Potassium

- *Sectagon-K54*, 30-60 gal. (RUP)

Metam Sodium

- *Sectagon* 42, 37.5-75 gal. (RUP)

Do not plant for 14 to 30 days after treatment (the wetter the soil, the longer the waiting period).

**GREENHOUSE PREPLANT INCORPORATION:**

DAMPING OFF (*Pythium* spp.), ROOT ROT (*Rhizoctonia* spp.):

*Gliricium virens* GL-21

- *SoilGard* 12 G, 1 to 1.5 lb per cubic yard.

Biological control product that needs to be applied before disease development. Control may be limited under heavy disease pressure.

**PREPLANT INCORPORATED:**

DAMPING OFF and COTTONY LEAK (*Pythium* spp.):

Mefenoxam. Apply as a broadcast preplant incorporation or a surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone after planting with 1/2 to 1 in. of sprinkler irrigation.

- *Ridomil* Gold SL, 1-2 pt.
- *Ultra* Flourish, 2 to 4 pt.

**DRIP APPLICATION:**

PHYTOPHTHORA BLIGHT (*Phytophthora capsici*), DOWNY MILDEW (*Pseudoperonospora cubensis*):

\* Ametocradin + Dimethomorph

- *Presidio*, 3-4 fl oz. (2 days)
- *Zampro*, 14 fl oz. (0 days)

\* Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days)
- *Zampro*, 14 fl oz. (0 days)

PYTHIUM ROOT ROT:

Mefenoxam

- *Ridomil* Gold SL, 0.25-0.4 pt. (5 days)

**FOLIAR TREATMENT:**

ALTERNARIA LEAF SPOT (*Alternaria cucumerina*), ANTHRACNOSE (*Colletotrichum lagenarium*): Apply every 7 to 14 days after disease appears.

\* Azoxystrobin

- *Quadris*, 11.0 to 15.5 fl oz. (1 day)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

\* Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 3.2 pt. (1 day)

\* Azoxystrobin + Difenconazole

- *Quadris* Top, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

\* Chlorothalonil

- *Bravo* Ultrex (1.4 to 1.8 lb (*Anthracnose*) or 1.8 to 2.7 lb (*Alternaria*)) or *Equus* DF (1.4 to 1.8 lb) (0 days)
- *Bravo* Weather Stik, *Echo* 720, *Equus* 720 SST, 1.5 to 2 pt. (*Anthracnose*) or 2 to 3 pt. (*Alternaria*). (0 days)
- *Echo* 90 DF, 1 1/4 to 1 5/8 lb (*Anthracnose*); 1 5/8 to 2 1/2 (*Alternaria*). (0 days)

\* Fluxaproxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 4 - 5.5 fl oz. (0 days)

\* Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days) Do not apply more than one application before alternating with another chemical.

\* Pyraclostrobin/Boscalid

- *Pristine*, 12.5 to 18.5 oz for *Alternaria*, 18.5 oz for *Anthracnose*. (0 days) See label for use of adjuvants.

\* Thiophanate-Methyl

- *Cercobin* 4.1F, 10.9 fl oz. (1 day)
- *Topsin* 4.5 FL, 10 fl oz. (1 day) *Anthracnose* only.
- *Topsin* M 70 WP, *Topsin* M WSB, 0.5 lb. (1 day) *Anthracnose* only.

*Bacillus amyloliquefaciens*

- *Serifel*, 4 - 16 fl oz. (0 day)

Boscalid

- *Endura*, 6.5 oz. (0 days) *Alternaria* only.

Copper Ammonium Carbonate

- *Copper* Count N, 1 1/2 to 2 qt. (0 days)

Copper Hydroxide

- *Champ* DP Dry Prill, 1 1/3 lb. (0 days)
- *Champ* Formula 2 F, 1 1/3 pt. (0 days)
- *Champion* WP, 1.5 to 3 lb. (0 days)
- *Kocide* 2000, 1 1/2 lb. (0 days)
- *Kocide* 3000, 0.5-1.25 lb. (0 day)
- *Nu-Cop* 3 L, 1 1/3 to 2 2/3 pt. (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 2.5 pt. (0 days)

Copper Oxychloride + Copper Sulfate

- C-O-C-S WDG, 1 to 2 lb. (0 days)

Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 1 to 2 lb. (0 days)

Difenconazole + Cyprodinil

- *Inspire* Super, 16 to 20 fl oz. (7 days)

Famoxadone + Cymoxanil

- *Tanos*, 8 oz. (3 days)

Fenamidone

- *Reason* 500 SC, 5.5 fl oz. (14 days) *Alternaria* only.

Mancozeb

- *Dithane* M-45, 2 to 3 lb. (5 days)
- *Koverall*, 2 - 3 lb. (5 days)

## Pumpkins

- *Manzate Max*, 1.6 to 2.4 qt. (5 days)
- *Manzate Pro-Stick*, 2 to 3 lb. (5 days)

### Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days)

### Mancozeb + Zoxamide

- *Gavel 75 DF*, 1.5 - 2.0 lb. (5 days) *Alternaria* only.

### Mefenoxam + Chlorothalonil

- *Ridomil Gold Bravo*, 2.5 to 3.25 pt. (0 days)

### Neem Oil

- *Trilogy*, 2 pt. (0 days)

### Penthiopyrad

- *Fontelis*, 12 - 16 fl oz. (1 day) *Alternaria* only.

### Potassium Bicarbonate

- *Armicarb 100*, 2.5 to 5 lb. (0 days)

### Potassium phosphite/chlorothalonil

- *Catamaran*, 6 pt (*Alternaria*), 4 pt (*Anthraco*se). (1 day)

### Zoxamide + chlorothalonil

- *Zing!*, 36 fl oz. (0 days)

ANGULAR LEAF SPOT (*Pseudomonas lachrymans*): Spray every 7 days, starting before the first fruit forms and continue to protect fruit at all stages of development.

### Copper Ammonium Carbonate

- *Copper Count N*, 1 1/2 to 2 qt. (0 days)

### Copper Hydroxide

- *Champ DP Dry Prill*, 1 1/3 lb. (0 days)
- *Champ Formula 2 F*, 1 1/3 pt. (0 days)
- *Champion WP*, 1.5 to 3 lb. (0 days)
- *Kocide 2000*, 1 1/2 lb. (0 days)
- *Kocide 3000*, 0.5-1.25 lb. (0 day)
- *Nu-Cop 3 L*, 1 1/3 to 2 2/3 pt. (0 days)

### Copper Hydroxide + Copper Oxychloride

- *Badge SC*, 1 to 2.5 pt. (0 days)

### Copper Sulfate

- *Cuprofix Ultra 40 Disperss*, 1 to 2 lb. (0 days)

### Neem Oil

- *Trilogy*, 2 pt. (0 days)

SCAB (*Cladosporium cucumerinum*): Apply every 7 to 10 days after plants are 2 to 3 inches tall.

### \* Chlorothalonil

- *Bravo Ultrex*, *Equus DF*, 1.8 to 2.7 lb. (0 days)
- *Bravo Weather Stik*, *Echo 720*, *Equus 720 SST*, 2 to 3 pt. (0 days)
- *Echo 90 DF*, 1 5/8 to 2 1/2 lb. (0 days)

### Mancozeb

- *Koverall*, 2 - 3 lb. (5 days)
- *Manzate Max*, 1.6 to 2.4 qt. (5 days)
- *Manzate Pro-Stick*, 2 to 3 lb. (5 days)

### Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days)

### Mefenoxam + Chlorothalonil

- *Ridomil Gold Bravo*, 2.5 to 3.25 pt. (0 days)

### Neem Oil

- *Trilogy*, 2 pt. (0 days)

### Potassium phosphite/chlorothalonil

- *Catamaran*, 6 pt. (1 day)

POWDERY MILDEW (*Sphaerotheca fuliginea*, *Erysiphe cichoracearum*): Treat at disease appearance and at 7-day intervals.

### \* Azoxystrobin + Difenconazole

- *Quadris Top*, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

### \* Cyflufenamid

- *Torino*, 3.4 oz. (0 day)

### \* Kresoxim-methyl

- *Sovran*, 3.2 to 4.8 oz. (0 days)

### \* Myclobutanil

- *Rally 40 WSP*, 2.5 to 5 oz, 7 to 10 day schedule. (0 days) Do not apply more than 1.5 lb per acre per crop.

### \* Penthiopyrad

- *Fontelis*, 12 - 16 fl oz. (1 day)

### \* Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days) Do not apply more than one application before alternating with another chemical.

### \* Pyraclostrobin/Boscalid

- *Pristine*, 12.5 to 18.5 oz. (0 days) See label for use of adjuvants.

### \* Quinoxifen

- *Quintec*, 4 to 6 fl oz. (3 days)

### \* Thiophanate-Methyl

- *Cercobin 4.1F*, 10.9 fl oz. (1 day)
- *Topsin 4.5 FL*, 10 fl oz. (1 day)
- *Topsin M 70 WP*, *Topsin M WSB*, 0.5 lb. (1 day)

### \* Trifloxystrobin

- *Flint*, 1 1/2 to 2 oz, 7- to 14-day intervals. (0 days) Maximum 2 consecutive applications, 4 applications/year and 16 oz/season.

### Azoxystrobin

- *Quadris*, 11.0 to 15.5 fl oz. (1 day)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

### Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 3.2 pt. (1 day)

### Bacillus amyloliquefaciens

- *Serifel*, 4 - 16 fl oz. (0 day)

### Bacillus subtilis

- *Serenade ASO*, 2 - 6 qt. (0 days)
- *Serenade Max*, 1 - 3 lb every 7 to 10 days. (0 days)

Biological control product that needs to be applied before disease development. Control will be limited under heavy disease pressure.

### Boscalid

- *Endura*, 6.5 oz. (0 days)

### Chlorothalonil

- *Bravo Ultrex*, *Equus DF*, 1.8 to 2.7 lb (*Sphaerotheca*). (0 days)
- *Bravo Weather Stik*, *Echo 720*, *Equus 720 SST*, 2 to 3 pt (*Sphaerotheca*). (0 days)
- *Echo 90 DF*, 1 5/8 to 2 1/2 lb. (0 days)

### Copper Ammonium Carbonate

- *Copper Count N*, 1 1/2 to 2 qt. (0 days)

### Copper Hydroxide

- *Champ DP Dry Prill*, 1 1/3 lb. (0 days)
- *Champ Formula 2 F*, 1 1/3 pt. (0 days)
- *Champion WP*, *Nu-Cop 50 DF*, 1 1/2 to 3 lb. (0 days)
- *Kocide 2000*, 1 1/2 lb. (0 days)
- *Kocide 3000*, 0.5-1.25 lb. (0 day)
- *Nu-Cop 3 L*, 1 1/3 to 2 2/3 pt. (0 days)

### Copper Hydroxide + Copper Oxychloride

- *Badge SC*, 1 to 2.5 pt. (0 days)

### Copper Sulfate

- *Cuprofix Ultra 40 Disperss*, 1 to 2 lb. (0 days)

### Difenoconazole + Cyprodinil

- *Inspire Super*, 16 to 20 fl oz. (7 days)

### Fluxapyroxad + Pyraclostrobin

- *Merivon Xemium Brand Fungicide*, 4 - 5.5 fl oz. (0 days)

### Metrafenone

- *Vivando*, 15.4 fl oz. (0 day)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Potassium Bicarbonate

- *Armicarb 100*, 2.5 to 5 lb. (0 days)

Sulfur

- *Microthiol Disperss*, 5 to 10 lb. (0 days)

Tebuconazole

- *Orius 3.6F*, *Tebuzol 3.6*, 4-6 fl oz. (7 days)

Triflumizole

- *Procure 480 SC*, 4 to 8 fl oz. (0 days)

GUMMY STEM BLIGHT, BLACK ROT (*Didymella bryoniae* also called *Mycosphaerella melonis*): Begin at the 2-leaf stage and apply every 7 to 14 days.

\* Azoxystrobin. Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action

- *Quadris*, 11.0 to 15.5 fl oz. (1 day)

\* Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 3.2 pt. (1 day)

\* Chlorothalonil

- *Bravo Ultrex*, *Equus DF*, 1.8 to 2.7 lb. (0 days)
- *Bravo Weather Stik*, *Echo 720*, *Equus 720 SST*, 2 to 3 pt. (0 days)
- *Echo 90 DF*, 1 5/8 to 2 1/2 lb. (0 days)

\* Thiophanate-Methyl

- *Topsin 4.5 FL*, 10 fl oz. (1 day)
- *Topsin M 70 WP*, *Topsin M WSB*, 0.5 lb. (0 days)

Azoxystrobin + Difenoconazole

- *Quadris Top*, 12 to 14 fl oz. (0 days)

Azoxystrobin + Difenoconazole

- *Quadris Top*, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

Boscalid

- *Endura*, 6.5 oz. (0 days)

Copper Ammonium Carbonate

- *Copper Count N*, 1 1/2 to 2 qt. (0 days)

Copper Hydroxide

- *Champ DP Dry Prill*, 1 1/3 lb. (0 days)
- *Champ Formula 2 F*, 1 1/3 pt. (0 days)
- *Champion WP*, 1.5 to 3 lb. (0 days)
- *Kocide 2000*, 1 1/2 lb. (0 days)
- *Nu-Cop 3 L*, 1 1/3 to 2 2/3 pt. (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge SC*, 1 to 2.5 pt. (0 days)

Copper Sulfate

- *Cuprofix Ultra 40 Disperss*, 1 to 2 lb. (0 days)

Difenoconazole + Cyprodinil

- *Inspire Super*, 16 to 20 fl oz. (7 days)

Kresoxim-methyl

- *Sovran*, 4.8 oz. (0 days)

Mancozeb

- *Manzate Max*, 1.6 to 2.4 qt. (5 days)
- *Manzate Pro-Stick*, 2 to 3 lb. (5 days)

Mefenoxam + Chlorothalonil

- *Ridomil Gold Bravo*, 2.5 to 3.25 pt. (0 days)

Penthiopyrad

- *Fontelis*, 12 - 16 fl oz. (1 day)

Potassium phosphite/chlorothalonil

- *Catamaran*, 6 pt. (1 day)

Pyraclostrobin

- *Cabrio*, 12 to 16 oz. (0 days) Do not apply more than one application before alternating with another chemical.

Pyraclostrobin/Boscalid

- *Pristine*, 12.5 to 18.5 oz. (0 days) See label for use of adjuvants.

Tebuconazole

- *Orius 3.6F*, *Tebuzol 3.6*, 8 fl oz. (7 days) Approved for gummy stem blight. Suppression only.

Tebuconazole

- *Orius 3.6F*, *Tebuzol 3.6*, 8 fl oz. (7 days) Suppression only.

Thiophanate-Methyl

- *Topsin 4.5 FL*, 10 fl oz. (1 day)
- *Topsin M 70 WP*, *Topsin M WSB*, 0.5 lb. (1 day)

DOWNY MILDEW (*Pseudoperonospora cubensis*): Begin applications when conditions are favorable for disease, but before infection.

\* Ametoctradin + Dimethomorph

- *Zapro*, 14 fl. oz. (0 days)

\* Chlorothalonil

- *Bravo Ultrex*, *Equus DF*, 1.4 to 1.8 lb. (0 days)
- *Bravo Weather Stik*, *Echo 720*, *Equus 720 SST*, 1.5 to 2 pt. (0 days)
- *Echo 90 DF*, 1 1/4 to 1 5/8 lb. (0 days)

\* Cyazofamid

- *Ranman 400SC*, 2.1 to 2.75 fl oz every 7 to 10 days. (0 days)

\* Cymoxanil

- *Curzate 60 DF*, 3.2 to 5 oz. (3 days)

\* Famoxadone + Cymoxanil

- *Tanos*, 8 oz. (3 days)

\* Mancozeb + Zoxamide

- *Gavel 75 DF*, 1.5 - 2.0 lb. (5 days)

\* Propamocarb

- *Previcur Flex*, 1.2 pt every 7 - 14 days. (2 days)

Azoxystrobin

- *Quadris*, 11.0 to 15.5 fl oz. (1 day)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 3.2 pt. (1 day)

Azoxystrobin + Difenoconazole

- *Quadris Top*, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

Bacillus amyloliquefaciens

- *Serifel*, 4 - 16 fl oz. (0 day)

Copper Hydroxide + Copper Oxychloride

- *Badge SC*, 1 to 2.5 pt. (0 days)

Dimethomorph

- *Forum*, 6 fl oz. (0 days)

Fenamidonone

- *Reason 500 SC*, 5.5 fl oz every 5 to 10 days. (14 days)

Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days)

Fluxapyroxad + Pyraclostrobin

- *Merivon Xemium Brand Fungicide*, 5.5 fl oz. (0 days) Suppression only

Fosetyl-Aluminum

- *Aliette WDG*, 2 to 5 lb, 7- to 14-day intervals. (0 days) Do not tank mix with copper fungicides.

Mancozeb

- *Koverall*, 2 - 3 lb. (5 days)
- *Manzate Max*, 1.6 to 2.4 qt. (5 days)
- *Manzate Pro-Stick*, 2 to 3 lb. (5 days)

Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days)

## Radishes

### Mandipropamid

- *Revus*, 8 fl oz. (0 day)

### Mefenoxam + Chlorothalonil

- *Ridomil Gold Bravo*, 2.5 pt. Do not apply to mature or senescent plants. Maximum 4 applications.

### Mefenoxam + Copper Hydroxide

- *Ridomil Gold Copper*, 2 lb. (5 days) Maximum 4 applications.

### Mono-, dibasic sodium salts of phosphorous acid

- *Fosphite*, 1 to 3 qt. (0 days)

### Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 2.5 to 5 pt every 7 - 14 days. (0 days)
- *Prophyt*, 2 to 4 pt. (0 days)

### Neem Oil

- *Trilogy*, 2 pt.

### Potassium Bicarbonate

- *Armcarb 100*, 2.5 to 5 lb. (0 days)

### Potassium phosphite/chlorothalonil

- *Catamaran*, 4 pt. (1 day)

### Pyraclostrobin

- *Cabrio*, 8-12 oz. (0 days) Do not apply more than one application before alternating with another chemical.

### Pyraclostrobin/Boscalid

- *Pristine*, 12.5 to 18.5 oz. (0 days) See label for use of adjuvants.

### Trifloxystrobin

- *Flint*, 4 oz, 7- to 14-day intervals. (0 days) Maximum 1 consecutive application, 4 applications/year and 16 oz/season. Alternate with Ridomil Gold Bravo.

### Zoxamide + chlorothalonil

- *Zing!*, 36 fl oz. (0 days)

### PHYTOPHTHORA ROOT and FRUIT ROT (*Phytophthora* spp.):

#### \* Dimethomorph

- *Forum*, 6 fl oz. (0 days)

#### \* Famoxadone + Cymoxanil

- *Tanos*, 8 - 10 oz every 5 - 7 days. (3 days)

#### \* Fosetyl-Aluminum

- *Aliette WDG*, 2 to 5 lb, 7- to 14-day intervals. (0 days) Do not tank mix with copper fungicides.

#### \* Mancozeb + Zoxamide

- *Gavel 75 DF*, 1.5 - 2.0 lb. (5 days)

### Ametoctradin + Dimethomorph

- *Zapro*, 14 fl. oz. (0 days)

### Cyazofamid

- *Ranman 400SC*, 2.75 fl oz every 7 to 10 days. (0 days)

### Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days)

### Mandipropamid

- *Revus*, 8 fl oz. (0 day) Suppression.

### Mono-, dibasic sodium salts of phosphorous acid

- *Fosphite*, 1 to 3 qt. (0 days)

### Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 2.5 to 5 pt every 7 - 14 days. (0 days)
- *Prophyt*, 6 pt. (0 days) See label for instructions on drench application.

**Note:** Most fungicides applied to control downy mildew may have limited efficacy against *Phytophthora* root and fruit rot.

## Radishes

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

Root-knot nematodes can reduce radish yields. Fields with soil or root problems of undetermined cause should be tested for nematodes (see Appendix C). If the root-knot nematode is present at a population density above the economical threshold for radishes, crop rotation or application of a nematicide is recommended. The following nematicide is suitable for control of root-knot nematodes in radish production. Application is only needed before the first crop. The radish life cycle is shorter than that of the northern root-knot nematode and radishes serve as a good trap crop for this nematode.

#### FALL SOIL TREATMENT (BROADCAST):

##### 1,3-D

- *Telone II*, 25 gal/A (muck soil).

Fumigate in the fall when soil temperatures at a 6 inch depth are above 50F. Inject the fumigant to soil depth of 6 inches and lightly seal the soil immediately after application. Use soil fumigants only as directed on the label. In some limited situations soil fumigants can be applied in the spring in Michigan.

Correct soil moisture, temperature and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or by immediate tarping.

### INSECTS

#### SOIL TREATMENT:

##### CABBAGE MAGGOT:

##### Chlorpyrifos

- *Chlorpyrifos 15G* (3.3 oz/1000 row ft.) or *Chlorpyrifos 4E AG* (5.5 pt as pre-plant; 1 fl oz/1000 row ft at planting) (7 days for 15G, 30 days for 4E AG) (RUP)
- *Govern*, 5.5 pt as pre-plant; 1 fl oz/1000 row ft at planting. (30 days) (RUP)
- *Hatchet*, 5.5 pt as pre-plant; 1 fl oz/1000 row ft at planting. (30 days) (RUP)
- *Lorsban 15 G* (3.3 oz/1,000 row ft at planting) or *Lorsban 4 E / Lorsban Advanced* (5.5 pt as pre-plant, 1 fl oz/1,000 row ft at planting) or *Lorsban 75 WG* (3.66 lb as pre-plant, 0.67 oz/1000 row ft at planting) (30 days) (RUP)
- *Nufos 4E*, 0.5 fl oz/1000 row ft. (30 days) (RUP)
- *Saurus*, 3.3 oz/1,000 row ft at planting. (7 days)
- *Vulcan*, 1 fl oz/1,000 row ft at planting. (30 days) (RUP)
- *Warhawk*, 1 fl oz/1,000 row ft at planting. (30 days) (RUP)
- *Whirlwind*, 1 fl oz/1,000 row ft at planting. (30 days) (RUP)

LEAFHOPPERS, APHIDS, FLEA BEETLE: See label for application method.

##### Imidacloprid

- *Admire Pro*, 4.4 to 10.5 fl oz. (21 days)
- *Nuprid 2 F*, 10 to 24 oz. (21 days)

##### Thiamethoxam

- *Platinum* (5 to 6.5 fl oz.) or *Platinum 75 SG* (1.7 to 2.17 oz.) See label for application methods.

## CUTWORM:

Diazinon

- *Diazinon* 50 W (4 to 8 lb.) or *Diazinon* AG 500 (2 to 4 qt.) or *Diazinon* AG600 (51 to 102 fl oz.) (RUP)

## APHIDS, LEAFHOPPER:

*Sivanto*, 7 - 10.5 fl oz/A.

## WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

## FOLIAR TREATMENT:

ARMYWORM, CUTWORM: Apply as needed.

Bifenthrin

- *Bifenture* 10 DF, 12.8 to 16 oz/A. (21 days)
- *Bifenture* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (21 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)

Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (7 days)
- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (7 days)

*Javelin* WG, 0.12 to 1.5 lb. (0 days)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 1 to 2 qt. (7 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (7 days)

FLEA BEETLE: Apply when damage is first seen. Repeat if needed.

*Actara*, 1.5 to 3 oz. (7 days)

*Baythroid* XL, 1.6 to 2.8 fl oz. (0 days) (RUP)

Bifenthrin

- *Bifenture* 10 DF, 12.8 to 16 oz/A. (21 days)
- *Bifenture* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (21 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)

Carbaryl

- *Carbaryl* 4L, 0.5 to 1 qt. (7 days)
- *Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (7 days)

*Diazinon* AG 500, 0.5 to 1 pt. (14 days) (RUP)

Esfenvalerate

- *Adjourm*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (7 days) (RUP)

Imidacloprid

- *Admire* Pro, 1.2 fl oz. (7 days)
- *Nuprid* 1.6 F, 3.5 fl oz. (7 days) Do not exceed 3.5 oz/Acre per season.

*Leverage* 360, 2.4 to 2.8 fl oz. (7 days) (RUP)

*Malathion* 8, 2 pt. (7 days)

*Mustang* Max, 1.76 to 4 oz. (1 day) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 0.5 to 1 qt. (7 days)

*Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (7 days)

Spinosad

- *Blackhawk* (1.7-3.3 oz/A) or *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (3 days)
- *Steed*, 2.5 to 3.5 fl oz. (21 days) (RUP)

CABBAGE "WORM": Use for treating leaves only.

Bacillus thuringiensis

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *DiPel* DF, 0.25 to 1 lb. (0 days)
- *Javelin* WG, 0.12 to 1.5 lb. (0 days)

Bifenthrin

- *Bifenture* 10 DF, 12.8 to 16 oz/A. (21 days)
- *Bifenture* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (21 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)

*Intrepid* 2F, 6 to 16 fl oz. (14 days) 4 to 10 fl oz with PHI of 1 day when harvesting leaves.

*Leverage* 360, 2.4 to 2.8 fl oz. (7 days) (RUP)

*Malathion* 57 EC, 1 to 1.6 pt. (7 days)

*Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 5 to 10 fl oz. (7 days)

APHIDS: Apply as necessary.

*Actara*, 1.5 to 3 oz. (7 days)

*Beleaf* 50 SG, 2 to 2.8 oz. (3 days)

Bifenthrin

- *Bifenture* 10 DF, 12.8 to 16 oz/A. (21 days)
- *Bifenture* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (21 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)

*Diazinon* AG 500, 0.5 to 1 pt. (14 days) (RUP)

Imidacloprid

- *Admire* Pro, 1.2 fl oz. (7 days)
- *Nuprid* 1.6 F, 3.5 fl oz. (7 days) Do not exceed 3.5 oz/Acre per season.

*Leverage* 360, 2.4 to 2.8 fl oz. (7 days) (RUP)

Malathion

- *Malathion* 5 (1.6 pt.) or *Malathion* 5 EC (1.5 to 2 pt.) or *Malathion* 57 EC (1 to 1.6 pt.) or *Malathion* 8 (2 pt.) or *Malathion* 8 Aquamul (1 pt.) (7 days)
- *Pyrethone*, 1 to 12 fl oz. (0 days)
- *Sivanto*, 7 - 10.5 fl oz/A.
- *Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

CUTWORM:

*Baythroid* XL, 1.6 to 2.8 fl oz. (0 days) (RUP)

*DiPel* DF, 0.5 to 1 lb. (0 days)

*Leverage* 360, 2.4 to 2.8 fl oz. (7 days) (RUP)

*Mustang* Max, 1.28 to 4 oz. (1 day) (RUP)

*Steed*, 2.5 to 3.5 fl oz. (21 days) (RUP)

LEAFHOPPER:

*Actara*, 1.5 to 3 oz. (7 days)

*Baythroid* XL, 1.6 to 2.8 fl oz. (0 days) (RUP)

Carbaryl

- *Carbaryl* 4L, 0.5 to 2 qt. (7 days)
- *Sevin* 4 F (0.5 to 2 qt.) or *Sevin* 80 S (0.63 to 2.5 lb.) or *Sevin* XLR Plus (0.5 to 2 qt.) (7 days)

Imidacloprid

- *Admire* Pro, 1.2 fl oz. (7 days)
- *Nuprid* 1.6 F, 3.5 fl oz. (7 days)

*Leverage* 360, 2.4 to 2.8 fl oz. (7 days) (RUP)

*Malathion* 8, 2 pt. (7 days)

## Rhubarb

*Mustang Max*, 1.76 to 4 oz. (1 day) (RUP)  
*Pyrenone*, 1 to 12 fl oz. (0 days)  
*Carbaryl* 4L, 0.5 to 2 qt. (7 days)  
*Sevin* 4 F (0.5 to 2 qt.) or *Sevin* 80 S (0.63 to 2.5 lb.) or *Sevin* XLR Plus (0.5 to 2 qt.) (7 days)  
*Sivanto*, 7 - 10.5 fl oz/A.

*Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

### TARNISHED PLANT BUG:

*Beleaf* 50 SG, 2 to 2.8 oz. (3 days)

#### Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (7 days)
- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (7 days)

*Leverage* 360, 2.4 to 2.8 fl oz. (7 days) (RUP)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 1 to 2 qt. (7 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (7 days)

### ARMYWORM:

#### Bacillus thuringiensis

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *DiPel* DF, 1 to 2 lb. (0 days)

*Coragen*, 3.5 to 5 fl oz. (1 day)

#### Esfenvalerate

- *Adjour*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (7 days) (RUP)

*Intrepid* 2F, 6 to 16 fl oz. (14 days) 4 to 10 fl oz with PHI of 1 day when harvesting leaves.

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Radiant* SC, 6 to 8 fl oz. (3 days) See label for treating and harvesting of leaves.

#### Spinosad

- *Blackhawk* (1.7-3.3 oz/A) or *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (3 days)

*Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

### WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

## MITES

#### Bifenthrin

- *Bifenxure* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Bifenxure* 10 DF, 12.8 to 16 oz/A. (21 days)
- *Brigade* @ 2EC (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (21 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)

## SLUGS

*Deadline* M-Ps 4% (20 to 40 lb) or *Metaldehyde* 3.5 G (30 to 40 lb) Apply between rows. Avoid contact with edible product.

## DISEASES

### SEED TREATMENT:

DAMPING OFF (*Pythium* spp., *Rhizoctonia solani*):

#### Captan

- *Captan* 4 Flowable, 2.2 fl oz/100 lb seed.

#### Fludioxinil

- *Maxim* 4 FS, 0.08 to 0.16 fl oz/100 lb seed (*Rhizoctonia*).

#### Mefenoxam

- *Apron* XL, 0.085 - 0.64 fl oz/100 lb seed (*Pythium*).

#### Metalaxyl

- *Allegiance-FL*, 0.75 fl oz/100 lb seed (*Pythium*).

#### Thiram

- 42-S Thiram, *Thiram* 480DP, *Thiram* 50 WP Dyed, 8 oz/100 lb seed.

### SOIL TREATMENT:

DAMPING OFF (*Pythium* and *Phytophthora* spp.):

Mefenoxam. Apply as a broadcast preplant application or a surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone after planting with 1/2 to 1 in. of sprinkler irrigation.

- *Ridomil* Gold SL (1-2 pt) or *Ultra* Flourish (2 to 4 pt)

### FOLIAR TREATMENT:

ALTERNARIA LEAF SPOT (*Alternaria raphani*):

#### \* Azoxystrobin

- *Quadris*, 6 to 15.5 fl oz. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

#### \* Pyraclostrobin

- *Cabrio*, 8 to 12 oz. (0 days) Do not apply more than one application before alternating with another chemical.

#### Penthiopyrad

- *Fontelis*, 16 - 30 fl oz. (0 days)

#### Trifloxystrobin

- *Flint*, 2 to 4 oz. (7 days) Maximum 8 oz/year.

WHITE RUST (*Albugo candida*): Apply foliar spray 40 to 50 days following Ridomil at-planting application and make 2 to 4 applications on a 14-day schedule depending on disease development.

#### Mefenoxam + Copper Hydroxide

- *Ridomil* Gold Copper, 2 lb, 14-day intervals. (7 days) Apply Ridomil Gold Copper 40-50 days after at planting application of Ridomil Gold SL. Maximum 4 applications. Observe limit of a.i./A per season.

#### Pyraclostrobin

- *Cabrio*, 8 to 16 oz. (0 days) Do not apply more than one application before alternating with another chemical.

SEPTORIA LEAF SPOT (*Septoria lycopersici*):

#### Trifloxystrobin

- *Flint*, 2 to 4 oz. (7 days) Maximum 8 oz/year.

## Rhubarb

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

## INSECTS

### SOIL TREATMENT:

ARMYWORM, CORN EARWORM, DIAMONDBACK MOTH, :

*Verimark*, 5-10 oz/A. (0 days)

LOOPERS, APHIDS, LEAFMINERS:

*Verimark*, 6.75-13.5 oz/A. (0 days)

### AT PLANTING OR SIDE DRESS:

APHIDS: Apply preplant, in furrow or as a post-planting drench.

*Belay* 50 WDG, 4.8 to 6.4 oz.

#### Imidacloprid

- *Admire* Pro, 4.4 to 10.5 fl oz. (45 days)
- *Nuprid* 2 F, 10 to 24 fl oz. (45 days)

#### Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum* 75 SG (1.66 to 3.67 oz.) (30 days) See label for application methods.

Verimark, 6.75-13.5 oz/A. (0 days)  
 APHIDS, LOOPERS:  
*Durivo*, 10 to 13 fl oz. (30 days)  
 CABBAGE LOOPERS:  
*Coragen*, 3.5 to 5 fl oz. (1 day)  
*Verimark*, 6.75-13.5 oz/A. (0 days)

**FOLIAR TREATMENT:**

CUTWORM, LOOPERS:  
*Ambush* 25 W, 6.4 to 12.8 oz. (1 day) (RUP)  
*Belt* SC, 1.5 fl oz. (1 day)  
*Brigade* WSB, 5.3 to 16 oz. (7 days) (RUP)  
*Larvin* 3.2, 16 to 30 oz. (14 days) (RUP)  
*Pyrenone*, 1 to 12 fl oz. (0 days)  
*Vetica*, 12 to 17 fl oz. (7 days)  
 APHIDS:  
Acetamiprid  
 • *Assail* 30 SG (2 to 4 oz.) or *Assail* 70WP (0.8 to 1.7 oz.) (7 days)  
*Actara*, 1.5 to 3 oz. (7 days)  
*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)  
*Beleaf* 50 SG, 2 to 2.8 oz. (0 days)  
Bifenthrin  
 • *Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)  
 • *Brigade* WSB, 5.3 to 16 oz. (7 days) (RUP)  
*Exirel*, 13.5-20.5 oz/A. (1)  
*Fulfill*, 2.75 oz. (0 days) May require 5 to 7 days for aphid mortality.  
*Gladiator*, 19 fl oz. (7 days) (RUP)  
*Movento*, 4 to 5 fl oz. (3 days) Must be tank mixed with adjuvant having spreading and penetrating properties.  
*Mustang* Max, 2.24 to 4 oz. (1 day) (RUP)  
*Pyrenone*, 1 to 12 fl oz. (0 days)  
*Torac*, 17-21 oz/A. (1) Do not make more than 2 applications per crop cycle  
*Voliam* Flexi, 4 to 7 oz. (7 days)

RHUBARB CURCULIO: No materials are currently registered.

**LOOPERS:**

*Agree* WG, 0.5 to 2 lb. (0 days)  
*Avaunt*, 3.5 oz. (3 days)  
*Baythroid* XL, 1.6 to 2.4 fl oz. (0 days) (RUP)  
*Confirm* 2F, 6 to 8 fl oz. (7 days)  
*Coragen*, 3.5 to 5 fl oz. (1 day)  
*Exirel*, 10-17 oz/A. (1)  
*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)  
*Intrepid* 2F, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)  
*Larvin* 3.2, 16 to 30 fl oz. (14 days) (RUP)  
*Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)  
Permethrin  
 • *Perm-UP* 25DF (3.2 to 12.8 oz.) or *Perm-UP* 3.2 EC (2 to 8 fl oz.) (1 day) (RUP)  
 • *Pounce* 25 WP, 3.2 to 12.8 oz. (1 day) (RUP)  
*Proclaim*, 3.2 to 4.8 oz. (7 days) (RUP)  
*Radiant* SC, 5 to 10 fl oz. (1 day)  
Spinosad  
 • *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (1 day)  
*Voliam* Flexi, 4 to 7 oz. (7 days)

**CUTWORM:**

*Baythroid* XL, 0.8 to 1.6 fl oz. (0 days) (RUP)  
*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)  
*Mustang* Max, 2.24 to 4 oz. (1 day) (RUP)  
Permethrin  
 • *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 fl oz.) (1 day) (RUP)  
 • *Pounce* 25 WP, 6.4 to 12.8 oz. (1 day) (RUP)

**SUPPRESSION ONLY**

*Torac*, 21 oz/A. (1) Do not make more than 2 applications per crop cycle

**ARMYWORM:**

*Exirel*, 7-13.5 oz/A. (1)

**SUPPRESSION ONLY**

*Torac*, 21 oz/A. (1) Do not make more than 2 applications per crop cycle

**THRIPS:**

*Exirel*, 13.5-20.5 oz/A. (1)

**CORN EARWORM:**

*Exirel*, 7-13.5 oz/A. (1)

**MITES**Abamectin

- *Agri-Mek* 0.15 EC (8 to 16 fl oz.) or *Agri-Mek* SC (1.75 to 3.5 fl oz.) (7 days) Use with a non-ionic surfactant. (RUP)

Bifenthrin

- *Sniper*, 5.12 to 6.4 fl oz. (7 days) (RUP)

Zeta-Cypermethrin + Avermectin

- *Gladiator*, 19 fl oz. (7 days) (RUP)

**DISEASES****SEED TREATMENT:**

DAMPING OFF (*Pythium* spp., *Rhizoctonia solani*):

Fludioxinil

- *Maxim* 4 FS, 0.08 to 0.16 fl oz/100 lb seed (*Rhizoctonia*).

Mefenoxam

- *Apron* XL, 0.085 - 0.64 fl oz/100 lb seed (*Pythium*).

Metalaxyl

- *Allegiance-FL*, 0.75 fl oz/100 lb seed (*Pythium*).

**PREPLANT INCORPORATED:**

DAMPING OFF (*Pythium* spp.):

Mefenoxam. Apply as a broadcast preplant incorporation or a surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone after planting with 1/2 to 1 in. of sprinkler irrigation.

- *Ridomil* Gold GR, 20 to 40 lb.
- *Ridomil* Gold SL, 1-2 pt.
- *Ridomil* Gold WSP, 1 to 2 lb.
- *Ultra* Flourish, 2 to 4 pt.

**FOLIAR TREATMENT:**

LEAF ROT, BOTRYTIS GRAY MOLD (*Botrytis cinerea*):

\* Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 8 to 11 fl oz. (1 day)

Penthiopyrad

- *Fontelis*, 14 - 24 fl oz. (3 days)

ALTERNARIA LEAF SPOT:

\* Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 4 - 11 fl oz. (1 day)

Azoxystrobin

- *Quadris*, 6.0 to 15.5 fl oz. (0 days)

Fenamidone

- *Reason* 500 SC, 5.5 to 8.2 fl oz. (2 days) No more than 1 application before alternating

Penthiopyrad

- *Fontelis*, 14 - 24 fl oz. (3 days)

Pyraclostrobin

- *Cabrio*, 12 to 16 oz. (0 days)

CERCOSPORA LEAF SPOT (*Cercospora* spp.):

Azoxystrobin

- *Quadris*, 6 to 15.5 fl oz. (0 days)

## Rutabagas

### Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 4 - 11 fl oz. (1 day)

### Penthiopyrad

- *Fontelis*, 14 - 24 fl oz. (3 days)

### Pyraclostrobin

- *Cabrio*, 12 to 16 oz. (0 days)

## Rutabagas

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### INSECTS

#### SOIL TREATMENT:

CABBAGE MAGGOT: Apply in a 4- to 6-inch band around seed at time of planting so plants grow in treated soil.

#### Chlorpyrifos

- *Chlorpyrifos* 15G (4.6 to 9.3 oz/1000 row ft at planting) or *Chlorpyrifos* 4E AG (4.5 pt as pre-plant; 1.6 to 3.3 fl oz/1000 row ft at planting) (7 days for 15G, 30 days for 4E AG) (RUP)
- *Govern*, 4.5 pt as pre-plant; 1.6 to 3.2 fl oz/1000 row ft at planting. (30 days) (RUP)
- *Hatchet*, 4.5 pt as pre-plant; 1.6 to 3.2 fl oz/1000 row ft at planting. (30 days) (RUP)
- *Lorsban* 15 G (4.6 to 9.2 oz /1,000 row ft.) or *Lorsban* 4 E / *Lorsban* Advanced (4.5 pt as pre-plant, 1.6 to 3.3 fl oz/1,000 row ft at planting) or *Lorsban* 75 WG (3 lb as pre-plant, 1.1 to 2.15 oz/1000 row ft at planting) (RUP)
- *Nufos* 4E, 1.6 fl oz/1000 row ft at planting. (30 days) (RUP)
- *Saurus*, 4.6 to 9.2 oz/1000 row ft at planting. (7 days)
- *Vulcan*, 1.6 to 3.3 fl oz/1000 row ft at planting. (RUP)
- *Warhawk*, 1.6 to 3.3 fl oz/1000 row ft at planting. (RUP)
- *Whirlwind*, 1.6 to 3.2 fl oz/1000 row ft at planting. (30 days) (RUP)

#### Diazinon

- *Diazinon* 50 W (4 to 6 lb.) or *Diazinon* AG600 (51 to 102 fl oz.) (RUP)

LEAFHOPPERS, APHIDS, FLEA BEETLE: See label for application methods.

#### Imidacloprid

- *Admire* Pro, 4.4 to 10.5 fl oz. (21 days)
- *Nuprid* 2 F, 10 to 24 fl oz. (21 days) Apply pre-plant or in furrow.

#### Thiamethoxam

- *Platinum* (5 to 12 fl oz.) or *Platinum* 75 SG (1.7 to 4.01 oz.) (30 days) See label for application methods.

APHIDS, LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

#### FOLIAR TREATMENT:

FLEA BEETLE: Apply if necessary.

*Actara*, 1.5 to 3 oz. (7 days)

#### Bifenthrin

- *Bifenture* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (21 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (2.6 to 6.1 oz.) or *Hero* EW (2.8 to 6.7 oz.) (21 days) (RUP)
  - *Steed*, 2.5 to 3.5 fl oz. (21 days) (RUP)
- Bifenture* 10 DF, 12.8 to 16 oz/A. (21 days)

### Carbaryl

- *Carbaryl* 4L, 0.5 to 1 qt. (7 days)
- *Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (7 days)

### Imidacloprid

- *Admire* Pro, 1.2 fl oz. (7 days)
- *Nuprid* 1.6 F, 3.5 fl oz. (7 days) Do not exceed 10.5 oz/Acre per season.

*Mustang* Max, 1.76 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 0.5 to 1 qt. (7 days)

*Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (7 days)

### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (3 days)

CABBAGE "WORM": Apply if damage is severe.

#### \* Bacillus thuringiensis

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *DiPel* DF, 0.25 to 1 lb. (0 days)
- *Javelin* WG, 0.12 to 1.5 lb. (0 days)

### Bifenthrin

- *Bifenture* 10 DF, 12.8 to 16 oz/A. (21 days)
- *Bifenture* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (21 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)

*Intrepid* 2F, 6 to 16 fl oz. (14 days) 4 to 10 fl oz with PHI of 1 day when harvesting leaves.

*Malathion* 57 EC, 1 to 1.6 pt. (7 days)

*Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 5 to 10 fl oz. (7 days)

APHIDS: Apply as needed to prevent population build up.

*Actara*, 1.5 to 3 oz. (7 days)

*Beleaf* 50 SG, 2 to 2.8 oz. (3 days)

### Bifenthrin

- *Bifenture* 10 DF, 12.8 to 16 oz/A. (21 days)
- *Bifenture* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (21 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Tundra* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

### Imidacloprid

- *Admire* Pro, 1.2 fl oz. (7 days)
- *Nuprid* 1.6 F, 3.5 fl oz. (7 days) Do not exceed 10.5 oz/Acre per season.

### Malathion

- *Malathion* 5 (1.6 pt.) or *Malathion* 5 EC (1.5 pt.) or *Malathion* 57 EC (1 to 1.6 pt.) or *Malathion* 8 (1 to 2 pt.) or *Malathion* 8 Aquamul (1 pt.) (3 days for *Malathion* 5 & 8; 7 days for all others)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 7 - 10.5 fl oz/A.

## LEAFHOPPER:

*Actara*, 1.5 to 3 oz. (7 days)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

Carbaryl

- *Carbaryl* 4L, 0.5 to 2 qt. (7 days)
- *Sevin* 4 F (0.5 to 2 qt.) or *Sevin* 80 S (0.63 to 2.5 lb.) or *Sevin* XLR Plus (0.5 to 2 qt.) (7 days)

Imidacloprid

- *Admire* Pro, 1.2 fl oz. (7 days)
- *Nuprid* 1.6 F, 3.5 fl oz. (7 days)

*Mustang* Max, 1.76 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 0.5 to 2 qt. (7 days)

*Sevin* 4 F (0.5 to 2 qt.) or *Sevin* 80 S (0.63 to 2.5 lb.) or *Sevin* XLR Plus (0.5 to 2 qt.) (7 days)

*Sivanto*, 7 - 10.5 fl oz/A.

## ARMYWORM:

*Bacillus thuringiensis*

- *Agree* WG, 0.5 to 2 lb. (0 days)
- *DiPel* DF, 1 to 2 lb. (0 days)
- *Javelin* WG, 0.12 to 1.5 lb. (0 days)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (21 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

*Coragen*, 3.5 to 5 fl oz. (1 day)

*Intrepid* 2F, 6 to 16 fl oz. (14 days) 4 to 10 fl oz with PHI of 1 day when harvesting leaves.

*Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 6 to 8 fl oz. (3 days) See label for treating and harvesting of leaves.

Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (3 days)

## WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

## MITES

Bifenthrin

- *Bifenxure* EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Bifenxure* 10 DF, 12.8 to 16 oz/A. (21 days)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade* WSB (12.8 to 16 oz.) (21 days) (RUP)
- *Fanfare* 2EC, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero EW* (11.2 oz.) (21 days) (RUP)

## DISEASES

## SEED TREATMENT:

DAMPING OFF (*Pythium* and *Phytophthora* spp.):

Fludioxinil

- *Maxim* 4 FS, 0.08 to 0.16 fl oz/100 lb seed (*Rhizoctonia*).

Mefenoxam

- *Apron* XL, 0.085 - 0.64 fl oz/100 lb seed (*Pythium*).

Metalaxyl

- *Allegiance-FL*, 0.75 fl oz/100 lb seed (*Pythium*).

## SOIL TREATMENT:

DAMPING OFF (*Pythium* spp.):

Mefenoxam. Apply as a broadcast preplant incorporation or a surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate

mechanically before planting or water into the seed zone after planting with 1/2 to 1 in. of sprinkler irrigation.

- *Ridomil* Gold SL, 1-2 pt.
- *Ridomil* Gold WSP, 1 to 2 lb.
- *Ultra* Flourish, 2 to 4 pt.

## FOLIAR TREATMENT:

LEAF ROT, BOTRYTIS GRAY MOLD (*Botrytis cinerea*):

Penthiopyrad

- *Fontelis*, 16 - 30 fl oz. (0 days)

ALTERNARIA LEAF SPOT:

Azoxystrobin

- *Quadris*, 6.0 to 15.5 fl oz. (0 days)

Fenamidone

- *Reason* 500 SC, 8.2 fl oz. (14 days) Suppression

Penthiopyrad

- *Fontelis*, 16 - 30 fl oz. (0 days)

Pyraclostrobin

- *Cabrio*, 8 to 12 oz. (0 days) Do not apply more than one application before alternating with another chemical.

## Spinach

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

## INSECTS

## SOIL TREATMENT:

APHIDS:

Imidacloprid

- *Admire* Pro, 4.4 to 10.5 fl oz. (21 days) See label for application methods.

- *Nuprid* 2 F, 10 to 24 fl oz. (21 days)

*Sivanto*, 10.5 - 12 fl oz/A.

*Verimark*, 6.75-13.5 oz/A. (0 days)

CABBAGE LOOPERS:

*Coragen*, 3.5 to 5 fl oz. (1 day) See label for application methods.

*Verimark*, 6.75-13.5 oz/A. (0 days)

APHIDS, FLEA BEETLES, LEAFHOPPERS:

*Belay* 50 WDG, 4.8 to 6.4 oz.

Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum* 75 SG (1.66 to 3.67 oz.) (30 days) See label for application methods.

LEAFHOPPERS:

Imidacloprid

- *Admire* Pro, 4.4 to 10.5 fl oz. (21 days)

- *Nuprid* 2 F, 10 to 24 fl oz. (21 days)

*Sivanto*, 7 - 10.5 fl oz/A.

*Venom*, 5 to 6 oz. (21 days)

ARMYWORM:

*Capture* LFR, 3.4 to 6.8 fl oz. (RUP)

*Coragen*, 3.5 to 5 fl oz. (1 day)

*Verimark*, 5-10 oz/A. (0 days)

FLEA BEETLE, LEAFHOPPERS:

*Scorpion* 35SL, 9 to 10.5 fl oz. (21 days)

APHIDS, ARMYWORM, LOOPERS, FLEA BEETLE, LEAFHOPPERS:

*Durivo*, 10 to 13 fl oz. (30 days) See label for application methods.

LEAFMINERS:

*Coragen*, 5 to 7.5 fl oz. (1 day)

*Verimark*, 6.75-13.5 oz/A. (0 days)

## Spinach

### WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

### FOLIAR TREATMENT:

FLEA BEETLE: May be a problem on young seedlings. Apply as needed.

*Actara*, 1.5 to 3 oz. (7 days)

*Athena*, 7 to 17 fl oz. (40 days) (RUP)

*Baythroid XL*, 2.4 to 3.2 fl oz. (0 days) (RUP)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

#### Bifenthrin

- *Bifenture* 10 DF, 5.3 to 16 oz/A. (7 days)

- *Bifenture* EC, 2.1 to 6.4 fl oz. (40 days) (RUP)

- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (40 days) (RUP)

- *Capture 2 EC*, 2.1 to 6.4 fl oz. (40 days) (RUP)

- *Discipline 2EC*, 2.1 to 6.4 fl oz. (40 days) (RUP)

- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (40 days) (RUP)

- *Sniper*, 2.1 to 6.4 fl oz. (40 days) (RUP)

- *Tundra EC*, 2.1 to 6.4 fl oz. (40 days) (RUP)

#### Bifenthrin + Imidacloprid

- *Brigadier*, 5.1 to 6.14 fl oz. (40 days) (RUP)

- *Swagger*, 10.2 to 12.2 fl oz. (40 days) (RUP)

#### Carbaryl

- *Carbaryl* 4L, 0.5 to 1 qt. (14 days)

- *Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* 80 WSP (0.67 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (14 days)

#### Dinotefuran

- *Scorpion* 35SL (2 to 5.25 fl oz) or *Venom* (2 to 3 oz.) (7 days)

*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)

#### Imidacloprid

- *Admire* Pro, 1.3 fl oz. (7 days)

- *Nuprid* 1.6 F, 3.8 fl oz. (7 days) Do not use if Imidacloprid was used at planting. Do not exceed 19.2 oz/Acre per season.

*Leverage* 360, 3 fl oz. (7 days) (RUP)

*Mustang* Max, 2.24 to 4 oz. (1 day) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 0.5 to 1 qt. (14 days)

*Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* 80 WSP (0.67 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (14 days)

*Torac*, 17-21 oz/A. (1) Do not make more than 2 applications per crop cycle and no more than 4 applications per year. Allow at least 14 days between applications.

*Voliam* Flexi, 4 to 7 oz. (7 days)

### CROWN MAGGOTS (SEVERAL SPECIES ARE INVOLVED):

Chemical control is not presently available for this use.

### LEAFHOPPERS: Apply as necessary.

*Actara*, 1.5 to 3 oz. (7 days)

*Athena*, 7 to 17 fl oz. (40 days) (RUP)

*Baythroid XL*, 0.8 to 1.6 fl oz. (0 days) (RUP)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

#### Carbaryl

- *Carbaryl* 4L, 0.5 to 2 qt. (14 days)

- *Sevin* 4 F (0.5 to 2 qt.) or *Sevin* 80 S (0.63 to 2.5 lb.) or *Sevin* 80 WSP (0.67 to 2.5 lb.) or *Sevin* XLR Plus (0.5 to 2 qt.) (14 days)

#### Dinotefuran

- *Scorpion* 35SL, 2 to 5.25 fl oz. (7 days)

- *Venom*, 1 to 3 oz. (7 days)

*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)

#### Imidacloprid

- *Admire* Pro, 1.3 fl oz. (7 days)

- *Nuprid* 1.6 F, 3.8 fl oz. (7 days) Do not exceed 19.2 oz/Acre per season.

*Leverage* 360, 3 fl oz. (7 days) (RUP)

*Mustang* Max, 2.24 to 4 oz. (1 day) (RUP)

#### Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (1 day) (RUP)

- *Perm-UP* 25DF (3.2 to 12.8 oz.) or *Perm-UP* 3.2 EC (2 to 8 fl oz.) (1 day) (RUP)

- *Pounce* 25 WP, 3.2 to 12.8 oz. (1 day) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 0.5 to 2 qt. (14 days)

*Sevin* 4 F (0.5 to 2 qt.) or *Sevin* 80 S (0.63 to 2.5 lb.) or *Sevin* 80 WSP (0.67 to 2.5 lb.) or *Sevin* XLR Plus (0.5 to 2 qt.) (14 days)

*Sivanto*, 7 - 10.5 fl oz/A.

*Swagger*, 7.6 to 12.2 fl oz. (40 days) (RUP)

*Torac*, 14-21 oz/A. (1) Do not make more than 2 applications per crop cycle and no more than 4 applications per year. Allow at least 14 days between applications.

*Vetiva*, 14 to 17 fl oz. (7 days)

*Voliam* Flexi, 4 to 7 oz. (7 days)

### LOOPERS, ARMYWORM: Apply when insects are small.

\* *Ambush* 25 W, 6.4 to 12.8 oz. (1 day) (RUP)

#### \* Methomyl

- *Lannate* LV (1.5 to 3 pt.) or *Lannate* SP (0.5 to 1 lb.) (7 days) Do not apply to seedlings less than 3 inches in diameter. (RUP)

- *Nudrin* LV (1.5 to 3 pt.) or *Nudrin* SP (0.5 to 1 lb.) (7 days) (RUP)

*Athena*, 7 to 17 fl oz. (40 days) (RUP)

*Avaunt*, 3.5 oz. (3 days)

#### Bacillus thuringiensis

- *Agree* WG, 0.5 to 2 lb. (0 days)

- *Javelin* WG, 0.12 to 1.5 lb. (0 days)

*Belt* SC, 1.5 fl oz. (1 day)

#### Bifenthrin

- *Bifenture* EC, 2.1 to 6.4 fl oz. (40 days) (RUP)

- *Brigade @ 2EC* (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (40 days) (RUP)

- *Capture 2 EC*, 2.1 to 6.4 fl oz. (40 days) (RUP)

- *Discipline 2EC*, 2.1 to 6.4 fl oz. (40 days) (RUP)

- *Fanfare 2EC*, 2.1 to 6.4 fl oz. (40 days) (RUP)

- *Sniper*, 2.1 to 6.4 fl oz. (40 days) (RUP)

- *Tundra EC*, 2.1 to 6.4 fl oz. (40 days) (RUP)

#### Bifenthrin + Imidacloprid

- *Brigadier*, 5.1 to 6.14 fl oz. (40 days) (RUP)

- *Swagger*, 10.2 to 12.2 fl oz. (40 days) (RUP)

*Bifenture* 10 DF, 5.3 to 16 oz/A. (40 days)

*Confirm* 2F, 6 to 8 fl oz. (7 days)

*Coragen*, 3.5 to 5 fl oz. (1 day)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

*Intrepid* 2F, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

*Larvin* 3.2, 16 to 30 fl oz. (14 days) (RUP)

*Leverage* 360, 3 fl oz. (7 days) (RUP)

*Movento*, 4.0 to 5.0 fl oz. (1 day) Minimum of 7 days between applications; do not apply more than 10 fl oz. per season. Must be tank mixed with adjuvant having spreading and penetrating properties.

*Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 5 to 10 fl oz. (1 day)

*Vetiva*, 12 to 17 fl oz. (7 days)

*Voliam* Flexi, 4 to 7 oz. (7 days)

APHIDS: Apply as needed to avoid contamination at harvest.

\* Acetamiprid

- *Assail* 30 SG (2 to 4 oz.) or *Assail* 70WP (0.8 to 1.7 oz.) (7 days)

*Actara*, 1.5 to 3 oz. (7 days)

*Athena*, 7 to 17 fl oz. (40 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

*Beleaf* 50 SG, 2 to 2.8 oz. (0 days)

Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 6.14 fl oz. (40 days) (RUP)

- *Swagger*, 7.6 to 12.2 fl oz. (40 days) (RUP)

*Diazinon* AG 500, 0.5 to 1 pt. (14 days) (RUP)

*Endosulfan* 3 EC, 1 qt. (21 days) Maximum of one application.

(RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

*Fulfill*, 2.75 oz. (0 days) May require 5 to 7 days for aphid mortality.

*Gladiator*, 19 fl oz. (7 days) (RUP)

Imidacloprid

- *Admire* Pro, 1.3 fl oz. (7 days)

- *Nuprid* 1.6 F, 3.8 fl oz. (7 days) Do not use if Imidacloprid was used at planting. Do not exceed 19.2 oz/Acre per season.

*Leverage* 360, 3 fl oz. (7 days) (RUP)

Malathion

- *Malathion* 5 (1.6 pt.) or *Malathion* 5 EC (2 pt.) or *Malathion* 57 EC (1.6 pt.) or *Malathion* 8 (1.5 pt.) or *Malathion* 8 Aquamul (1 pt.) (7 days)

*Movento*, 4 to 5 fl oz. (3 days) Must be tank mixed with adjuvant having spreading and penetrating properties.

*Mustang* Max, 2.24 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 10.5 - 12 fl oz/A.

*Torac*, 17-21 oz/A. (1) Do not make than 2 applications per crop cycle and no more than 4 applications per year. Allow at least 14 days between applications.

*Voliam* Flexi, 4 to 7 oz. (7 days)

LEAF MINERS: Apply when eggs are first seen on undersides of leaves to prevent miners from entering leaves. Treatment after larvae are in the leaf is generally unsuccessful. Early-planted spinach usually is less susceptible to damage than when planted late.

Abamectin

- *Agri-Mek* 0.15 EC (8 to 16 fl oz.) or *Agri-Mek* SC (1.75 to 3.5 fl oz.) (7 days) Use with a non-ionic surfactant. (RUP)

*Athena*, 13.5 to 17 fl oz. (40 days) (RUP)

Bifenthrin

- *Bifenture* EC, 2.1 to 6.4 fl oz. (40 days) (RUP)

- *Brigade* @ 2EC (2.1 to 6.4 fl oz.) or *Brigade* WSB (5.3 to 16 oz.) (40 days) (RUP)

- *Capture* 2 EC, 2.1 to 6.4 fl oz. (40 days) (RUP)

- *Discipline* 2EC, 2.1 to 6.4 fl oz. (40 days) (RUP)

- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (40 days) (RUP)

- *Sniper*, 2.1 to 6.4 fl oz. (40 days) (RUP)

- *Tundra* EC, 2.1 to 6.4 fl oz. (40 days) (RUP)

Bifenthrin + Imidacloprid

- *Brigadier*, 5.1 to 6.14 fl oz. (40 days) (RUP)

- *Swagger*, 10.2 to 12.2 fl oz. (40 days) (RUP)

*Bifenture* 10 DF, 5.3 to 16 oz/A. (40 days)

*Coragen*, 5.0 to 7.5 fl oz. (1 day) Minimum of 3 days between applications; do not apply more than 15.4 fl oz. per season.

*Diazinon* AG 500, 0.5 to 1 pt. (14 days) (RUP)

Dinotefuran

- *Scorpion* 35SL, 2 to 5.25 fl oz.. (7 days)

- *Venom*, 1 to 3 oz. (7 days)

*Exirel*, 13.5-20.5 oz. (1)

*Gladiator*, 19 fl oz. (7 days) (RUP)

Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (1 day) (RUP)

- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 fl oz.) (1 day) (RUP)

- *Pounce* 25 WP, 6.4 to 12.8 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 6 to 10 fl oz. (1 day)

Spinosad

- *Entrust* (2 to 3 oz.) or *Entrust* SC (6 to 10 fl oz.) (1 day)

*Trigard*, 2.66 oz. (7 days)

DIAMONDBACK MOTH:

*Athena*, 13.5 to 17 fl oz. (40 days) (RUP)

Bacillus thuringiensis

- *DiPel* DF (0.25 to 1 lb.) or *DiPel* ES (1 to 2 pt.) (0 days)

- *Javelin* WG, 0.12 to 1.5 lb. (0 days)

- *XenTari*, 0.5 to 1.5 lb. (0 days)

Bacillus thuringiensis

- *Agree* WG, 0.5 to 2 lb. (0 days)

- *Biobit* HP, 0.5 to 1 lb. (0 days)

- *DiPel* DF, 0.25 to 1 lb.. (0 days)

*Baythroid* XL, 2.4 to 3.2 fl oz. (0 days) (RUP)

*Belt* SC, 1.5 fl oz. (1 day)

*Coragen*, 3.5 to 5 fl oz. (1 day)

*Exirel*, 7-13.5 oz/A. (1)

*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)

*Mustang* Max, 2.24 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 5 to 10 fl oz. (1 day)

Spinosad

- *Entrust* (0.5 to 1 oz.) or *Entrust* SC (1.5 to 3 fl oz.) (1 day)

*Swagger*, 10.2 to 12.2 fl oz. (40 days) (RUP)

*Vetiva*, 12 to 17 fl oz. (7 days)

*Voliam* Flexi, 4 to 7 oz. (7 days)

ARMYWORM:

Bacillus thuringiensis

- *Biobit* HP, 0.5 to 2 lb. (0 days)

- *DiPel* DF (1 to 2 lb.) or *DiPel* ES (2 to 4 pt.) (0 days)

- *XenTari*, 0.5 to 2 lb. (0 days)

*Baythroid* XL, 2.4 to 3.2 fl oz. (0 days) (RUP)

Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (14 days)

- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (14 days)

*Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

Permethrin

- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 fl oz.) (1 day) (RUP)

- *Pounce* 25 WP, 6.4 to 12.8 oz. (1 day) (RUP)

*Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)

*Carbaryl* 4L, 1 to 2 qt. (14 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (14 days)

Spinosad

- *Entrust* (1.25 to 2.5 oz.) or *Entrust* SC (4 to 8 fl oz.) (1 day)

SUPPRESSION ONLY

*Torac*, 21 oz/A. (1) Do not make more than 2 applications per crop cycle and no more than 4 applications per year. Allow at least 14 days between applications.

LOOPERS:

Bacillus thuringiensis

- *Biobit* HP, 0.5 to 1 lb. (0 days)



Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 6 - 11 fl oz. (1 day) Suppression only

Mandipropamid

- *Revus*, 8 fl oz. (1 day)

Mono-, dibasic sodium salts of phosphorous acid

- *Fosphite*, 1 to 3 qt. (0 days)

Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 2.5 to 5 pt every 7 - 21 days. (0 days)
- *Prophyt*, 2 to 4 pt. (0 days)

Pyraclostrobin

- *Cabrio*, 12 to 16 oz. (0 days)

**Note:** Fungicides that protect against Anthracnose and *Cercospora* leaf spot provide limited downy mildew protection.

ANTHRACNOSE (*Colletotrichum spinaciae*), CERCOSPORA LEAF SPOT (*Cercospora beticola*): Apply at 7 to 10 day intervals.

\* Azoxystrobin

- *Quadris*, 6 to 15.5 fl oz. (0 days)

Do not apply more than one foliar application of *Quadris* or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

\* Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 4 - 11 fl oz. (1 day)

Copper Ammonium Carbonate

- *Copper Count N*, 1 1/2 qt. (0 days)

Copper Hydroxide

- *Champ* Formula 2 F, 1 1/3 to 2 2/3 pt. (0 days)
- *Kocide* 3000, 0.75 to 1.75 lb. (0 day)

Copper Hydroxide + Copper Oxychloride

- *Badge SC* (1 to 2.25 pt) or *Badge X2* (0.5 to 1.25 lb) (0 days)

Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 1.25 to 2 lb. (0 days)

Penthiopyrad

- *Fontelis*, 14 - 24 fl oz. (3 days) *Cercospora* only.

Pyraclostrobin

- *Cabrio*, 12 to 16 oz. (0 days)

WHITE RUST (*Albugo occidentalis*):

\* Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 4 - 11 fl oz. (1 day)

Acibenzolar-S-methyl

- *Actigard*, 0.5 to 0.75 oz. (7 days) Do not apply to young seedlings

Azoxystrobin

- *Quadris*, 6 to 15.5 fl oz. (0 days)

Do not apply more than one foliar application of *Amistar* and *Quadris* or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

Copper Hydroxide

- *Champ* Formula 2 F, 1 1/3 to 2 2/3 pt, 7- to 10-day intervals. (0 days)
- *Kocide* 3000, 0.75 to 1.25 lb. (0 day)

Copper Hydroxide + Copper Oxychloride

- *Badge SC* (1 to 2.25 pt) or *Badge X2* (0.5 to 1.25 lb) (0 days)

Copper Sulfate

- *Cuprofix* Ultra 40 Disperss, 1.25 to 2 lb. (0 days)

Famoxadone + Cymoxanil

- *Tanos*, 8 to 10 oz. (1 day) Apply as preventive and tank mix

Fenamidone

- *Reason* 500 SC, 5.5 - 8.2 fl oz. (2 days) No more than 1 application before alternating.

Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days)

Fosetyl-Aluminum

- *Aliette* WDG, 2 to 5 lb, 7- to 10-day intervals. (0 days) Do not tank mix with copper fungicides.

Mefenoxam + Copper Hydroxide

- *Ridomil* Gold Copper, 2 lb, 14-day intervals. (21 days) Maximum 2 applications. **Note:** Apply 21 days after *Ridomil* Gold at planting or after each repeated cutting.

## Squash

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

Squash are hosts for root-knot and lesion nematodes. These nematodes can reduce squash yields but yield losses in Michigan have not been documented. If you suspect nematodes are reducing squash yields collect root and soil samples for analysis as described in Appendix C. If the numbers of nematodes recovered from those samples exceed damage thresholds; control options will be suggested. *Vydate* 2L is labeled for use in squash.

### PREPLANT NEMATOCIDE TREATMENT:

Fluensulfone

- *Nimitz* 480EC, 3.5 - 5.0 pints/A. apply broadcast and incorporate either mechanically or with water to a depth of 6-8 inches at least 7 days prior to transplanting or planting. Do not apply if heavy rainfall is expected within 48 hours of application. This material can be applied in bands or by drip but apparently is most effective if applied broadcast and incorporated. Do not apply to extremely cold soils (<40 F) as nematodes have to be active for the product to be effective. Product has not been evaluated in Michigan.

### INSECTS

#### SEED TREATMENT:

## CUCUMBER BEETLE:

- *Cruiser* 5 FS, . See label for rates and application methods.

#### SOIL TREATMENT:

## APHIDS, FLEA BEETLE, LEAFHOPPER, THRIPS:

- *Durivo*, 10 to 13 fl oz. (30 days)

Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum* 75 SG (1.66 to 3.67 oz.) (30 days) See label for application methods.

## THRIPS, LEAFHOPPER, SQUASH BUG:

- *Venom*, 5 to 6 oz. (21 days) See label for application methods.

## CUTWORM, FLEA BEETLE LARVAE:

- *Capture* LFR, 3.4 to 6.8 fl oz. (RUP)

## APHIDS, CUCUMBER BEETLES, LEAFHOPPERS, THRIPS:

- *Belay* 50 WDG, 4.8 to 6.4 oz.

Imidacloprid

- *Admire* Pro, 7 to 10.5 fl oz. (21 days)
- *Nuprid* 2 F, 16 to 24 fl oz. (21 days)
- *Scorpion* 35SL, 9 to 10.5 fl oz. (21 days)

## GRUBS:

- *Bifenture* 10 DF, 8 to 16 oz/A.

## WIREWORMS:

- *Bifenture* 10 DF, 8 to 16 oz/A.

## MAGGOTS:

- *Bifenture* 10 DF, 8 to 16 oz/A.

## ARMYWORM:

- *Verimark*, 6.75-13.5 oz/A. (1)

## Squash

### APHIDS and THRIPS:

*Verimark*, 10-13.5 oz/A. (1)

### LEAFHOPPERS:

*Sivanto*, 21 - 28 fl oz/A.

*Sivanto*, 21 - 28 fl oz/A.

### APHIDS:

*Sivanto*, 21 - 28 fl oz/A.

### WHITEFLIES:

*Sivanto*, 21 - 28 fl oz/A.

**FOLIAR TREATMENT:** Summer and winter squash plants may be sensitive to certain insecticide formulations. Make certain a problem exists before treatment. Read and observe restrictions on the label. To avoid killing bees, do not treat plants during bloom.

**CUTWORM, ARMYWORM:** Apply if >1% of plants are injured.

#### \* Bifenthrin

- *Bifenture* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.6 to 6.4 fl oz.) or *Brigade* WSB (8 to 16 oz.) (3 days) (RUP)
- *Capture 2* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

#### Bacillus thuringiensis

- *Javelin* WG, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

*Belt* SC, 1.5 fl oz. (1 day)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

*Endigo* ZC, 4 to 4.5 fl oz. (1 day) (RUP)

#### Methomyl

- *Lannate* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)
- *Nudrin* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Vetica*, 12 to 17 fl oz. (7 days)

**STRIPED and SPOTTED CUCUMBER BEETLE:** Apply to hard squash if numbers exceed 0.1 to 1/plant to prevent bacterial wilt disease.

#### Acetamiprid

- *Assail 30* SG (2.5 to 5.3 oz.) or *Assail 70WP* (1.1 to 2.3 oz.) (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Baythroid* XL, 2.4 to 2.8 fl oz. (0 days) (RUP)

*Belay 50* WDG, 1.6 to 2.1 oz. (7 days)

#### Bifenthrin

- *Bifenture* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.6 to 6.4 fl oz.) or *Brigade* WSB (8 to 16 oz.) (3 days) (RUP)
- *Capture 2* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)

#### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

*Bifenture 10* DF, 8 to 16 oz/A. (3 days)

#### Carbaryl

- *Carbaryl* 4L, 1 qt. (3 days)
- *Sevin* 4 F (1 qt.) or *Sevin* 80 S (1.25 lb.) or *Sevin* XLR Plus (1 qt.) (3 days)

*Danitol* 2.4 EC, 10.66 to 16 fl oz. (7 days) (RUP)

*Dibrom* 8 Emulsive, 1 to 2 pt. (1 day) Use on summer squash only. (RUP)

#### Dinotefuran

- *Scorpion* 35SL, 2 to 7 fl oz. (1 day)
- *Venom*, 3 to 4 oz. (1 day)

*Endigo* ZC, 4 to 4.5 fl oz. (1 day) (RUP)

#### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

*Kryocide*, 8 to 16 lb. (7 days for summer squash; 14 days for winter squash)

#### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

#### Malathion

- *Malathion* 5 (2.75 pt for summer squash; 1.5 pt for winter squash) or *Malathion* 5 EC (3 pt.) or *Malathion* 8 (1.75 pt.) or *Malathion* 8 Aquamul (1.75 pt for summer squash; 1 pt for winter squash) (1 day)

#### Methomyl

- *Lannate* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) Use on summer squash only. (RUP)
- *Nudrin* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

*Mustang* Max, 2.8 to 4 oz. (1 day) (RUP)

#### Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (0 days) (RUP)
- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (0 days) (RUP)
- *Pounce* 25 WP, 6.4 to 12.8 oz. (0 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Rimon* 0.83EC, 9 to 12 fl oz. (1 day)

*Carbaryl* 4L, 1 qt. (3 days)

*Sevin* 4 F (1 qt.) or *Sevin* 80 S (1.25 lb.) or *Sevin* XLR Plus (1 qt.) (3 days)

**FLEA BEETLE:** Apply if needed.

*Actara*, 1.5 to 3 oz. (0 days)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

#### Carbaryl

- *Carbaryl* 4L, 1 qt. (3 days)
- *Sevin* 4 F (1 qt.) or *Sevin* 80 S (1.25 lb.) or *Sevin* XLR Plus (1 qt.) (3 days)

#### Dinotefuran

- *Scorpion* 35SL, 2 to 7 fl oz. (1 day)
- *Venom*, 3 to 4 oz. (1 day)

*Endigo* ZC, 4 to 4.5 fl oz. (1 day) (RUP)

*Endosulfan* 3 EC, 0.66 to 1.33 qt. (4 days for summer squash; 11 days for winter squash) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

*Kryocide*, 8 to 16 lb. (7 days for summer squash; 14 days for winter squash)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

Methomyl

- *Lannate LV* (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate SP* (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) Use on summer squash only. (RUP)
- *Nudrin LV* (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin SP* (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Carbaryl 4L*, 1 qt. (3 days)

*Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

*Voliam Flexi*, 4 to 7 oz. (1 day)

LEAFHOPPERS: Apply if necessary.

Acetamiprid

- *Assail 30 SG* (2.5 to 4 oz.) or *Assail 70WP* (1.1 to 1.7 oz.) (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Baythroid XL*, 0.8 to 1.6 fl oz. (0 days) (RUP)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

Bifenthrin

- *Bifenture 10 DF*, 8 to 16 oz/A. (3 days)
- *Bifenture EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.6 to 6.4 fl oz.) or *Brigade WSB* (8 to 16 oz.) (3 days) (RUP)
- *Capture 2 EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

Carbaryl

- *Carbaryl 4L*, 1 qt. (3 days)
- *Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

Dinotefuran

- *Scorpion 35SL*, 2 to 7 fl oz. (1 day)
- *Venom*, 1 to 4 oz. (1 day)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Malathion 8*, 1.75 pt. (1 day)

*Mustang Max*, 2.8 to 4 oz. (1 day) (RUP)

Permethrin

- *Perm-UP 25DF* (6.4 to 12.8 oz.) or *Perm-UP 3.2 EC* (4 to 8 oz.) (0 days) (RUP)
- *Pounce 25 WP*, 6.4 to 12.8 oz. (0 days) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Carbaryl 4L*, 1 qt. (3 days)

*Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

*Sivanto*, 21 - 28 fl oz/A.

*Vetiva*, 14 to 17 fl oz. (7 days)

SQUASH BUG: Apply if egg masses exceed 1/plant. Large nymphs and adults are difficult to control.

\* Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

Acetamiprid

- *Assail 30 SG* (5.3 oz.) or *Assail 70WP* (2.3 oz.) (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

Bifenthrin

- *Bifenture EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.6 to 6.4 fl oz.) or *Brigade WSB* (8 to 16 oz.) (3 days) (RUP)
- *Capture 2 EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare 2EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

*Bifenture 10 DF*, 8 to 16 oz/A. (3 days)

Carbaryl

- *Carbaryl 4L*, 1 qt. (3 days)
- *Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

Dinotefuran

- *Scorpion 35SL*, 2 to 7 fl oz. (1 day)
- *Venom*, 3 to 4 oz. (1 day)

*Endigo ZC*, 4 to 4.5 fl oz. (1 day) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Mustang Max*, 2.8 to 4 oz. (1 day) (RUP)

Permethrin

- *Ambush 25 W*, 12.8 oz. (0 days) (RUP)
- *Perm-UP 25DF* (12.8 oz.) or *Perm-UP 3.2 EC* (8 oz.) (0 days) (RUP)
- *Pounce 25 WP*, 12.8 oz. (0 days) (RUP)

*Pyrethone*, 1 to 12 fl oz. (0 days)

*Rimon 0.83EC*, 12 fl oz. (1 day)

*Carbaryl 4L*, 1 qt. (3 days)

*Sevin 4 F* (1 qt.) or *Sevin 80 S* (1.25 lb.) or *Sevin XLR Plus* (1 qt.) (3 days)

SQUASH VINE BORER: Apply to base of plants when moths are active, or when the first tunnels appear, usually starting when plants start to vine. Repeat in 5 to 7 days.

Acetamiprid

- *Assail 30 SG* (5.3 oz.) or *Assail 70WP* (2.3 oz.) (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Belt SC*, 1.5 fl oz. (1 day)

Bifenthrin

- *Bifenture EC*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade @ 2EC* (2.6 to 6.4 fl oz.) or *Brigade WSB* (8 to 16 oz.) (3 days) (RUP)

## Squash

- *Capture* 2 EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (3 days) (RUP)

*Bifenture* 10 DF, 8 to 16 oz/A. (3 days)

*Endigo* ZC, 4 to 4.5 fl oz. (1 day) (RUP)

### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (3 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

### Malathion

- *Malathion* 5 (2.75 pt for summer squash; 1.5 pt for winter squash) or *Malathion* 5 EC (3 pt.) or *Malathion* 8 (1.75 pt.) (1 day)

*Mustang* Max, 2.8 to 4 oz. (1 day) (RUP)

### Permethrin

- *Ambush* 25 W, 6.4 to 12.8 oz. (0 days) (RUP)
- *Perm-UP* 25DF (6.4 to 12.8 oz.) or *Perm-UP* 3.2 EC (4 to 8 oz.) (0 days) (RUP)
- *Pounce* 25 WP, 6.4 to 12.8 oz. (0 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Vetica*, 12 to 17 fl oz. (7 days)

APHIDS: Apply if numbers are high.

### Acetamiprid

- *Assail* 30 SG (2.5 to 4 oz.) or *Assail* 70WP (1.1 to 1.7 oz.) (0 days)

*Actara*, 1.5 to 3 oz. (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

*Beleaf* 50 SG, 2 to 2.8 oz. (0 days)

### Bifenthrin

- *Bifenture* EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Brigade* @ 2EC (2.6 to 6.4 fl oz.) or *Brigade* WSB (8 to 16 oz.) (3 days) (RUP)
- *Capture* 2 EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Discipline* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare* 2EC, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 2.6 to 6.4 fl oz. (3 days) (RUP)
- *Tundra* EC, 2.1 to 6.4 fl oz. (3 days) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (3 days) (RUP)

*Bifenture* 10 DF, 8 to 16 oz/A. (3 days)

*Dibrom* 8 Emulsive, 1 to 2 pt. (1 day) Use on summer squash only. (RUP)

*Endigo* ZC, 4.5 fl oz. (1 day) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

*Fulfill*, 2.75 oz. (7 days) May require 5 to 7 days for aphid mortality.

*Gladiator*, 19 fl oz. (7 days) (RUP)

### Lambda-cyhalothrin

- *Lambda-Cy*, 3.84 fl oz. (1 day) (RUP)
- *Warrior* II with Zeon Technology (1.92 fl oz.) or *Warrior* with Zeon Technology (3.84 fl oz.) (1 day) (RUP)

### Malathion

- *Malathion* 5 (1.5 pt.) or *Malathion* 5 EC (2 pt.) or *Malathion* 57 EC (1.5 to 2.8 pt for summer squash; 1.5 to 1.6 pt for winter squash) or *Malathion* 8 (1.75 pt.) or *Malathion* 8 Aquamul (1.75 pt for summer squash; 1 pt for winter squash) (1 day)

### Methomyl

- *Lannate* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Lannate* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

- *Nudrin* LV (1.5 to 3 pt. (1.5 pt., 1 day; over 1.5 pt., 3 days)) or *Nudrin* SP (0.5 to 1 lb. (0.5 lb., 1 day; over 0.5 lb., 3 days)) (RUP)

### Permethrin

- *Perm-UP* 25DF (12.8 oz.) or *Perm-UP* 3.2 EC (8 oz.) (0 days) (RUP)

- *Pounce* 25 WP, 12.8 oz. (0 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 21 - 28 fl oz/A.

*Voliam* Flexi, 4 to 7 oz. (1 day)

*Vydate* L, 2 to 4 pt. (1 day) (RUP)

THRIPS: Apply when damage is seen. Repeat as needed.

*Athena*, 13.5 to 17 fl oz. (7 days) (RUP)

*Dibrom* 8 Emulsive, 1 to 2 pt. (1 day) Summer squash only. (RUP)

### Dinotefuran

- *Scorpion* 35SL, 2 to 7 fl oz. (1 day)

- *Venom*, 1 to 4 oz. (1 day)

*Endigo* ZC, 4 to 4.5 fl oz. (1 day) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

*Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)

### Malathion

- *Malathion* 8 (1.75 pt.) or *Malathion* 8 Aquamul (1.75 pt for summer squash; 1 pt for winter squash) (1 day)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 6 to 10 fl oz. (3 days)

*Rimon* 0.83EC, 12 fl oz. (1 day)

### Spinosad

- *Entrust* (2 to 2.5 oz.) or *Entrust* SC (6 to 8 fl oz.) (3 days)

*Vydate* L, 2 to 4 pt. (1 day) (RUP)

ARMYWORM:

*Avaunt*, 3.5 to 6 oz. (3 days)

### Bacillus thuringiensis

- *Agree* WG, 0.5 to 2 lb. (0 days)

- *Biobit* HP, 0.5 to 2 lb. (0 days)

- *DiPel* DF, 1 to 2 lb. (0 days)

*Baythroid* XL, 1.6 to 2.4 fl oz. (0 days) (RUP)

*Bifenture* 10 DF, 8 to 16 oz/A. (3 days)

*Coragen*, 3.5 to 5 fl oz. (1 day)

*Danitol* 2.4 EC, 10.66 to 16 fl oz. (7 days) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

*Gladiator*, 19 fl oz. (7 days) (RUP)

*Intrepid* 2F, 4 to 10 fl oz. (3 days)

*Radiant* SC, 5 to 10 fl oz. (3 days)

*Rimon* 0.83EC, 9 to 12 fl oz. (1 day)

### Spinosad

- *Entrust* (1.25 to 2.5 oz.) or *Entrust* SC (4 to 8 fl oz.) (3 days)

CUTWORM:

*Baythroid* XL, 0.8 to 1.6 fl oz. (0 days) (RUP)

*Empower*, 3.5 to 8.7 lb. (3 days) (RUP)

### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (3 days) (RUP)

- *Asana* XL, 5.8 to 9.6 fl oz. (3 days) (RUP)

- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (3 days) (RUP)

*Gladiator*, 6 to 19 fl oz. (7 days) (RUP)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (1 day) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (1 day) (RUP)

*Mustang Max*, 1.28 to 4 oz. (1 day) (RUP)

Permethrin

- *Ambush 25 W*, 6.4 to 12.8 oz. (0 days) (RUP)
- *Perm-UP 25DF* (6.4 to 12.8 oz.) or *Perm-UP 3.2 EC* (4 to 8 oz.) (0 days) (RUP)
- *Pounce 25 WP*, 6.4 to 12.8 oz. (0 days) (RUP)

## MELONWORM, PICKLEWORM:

*Exirel*, 7-13.5 oz/A. (1)

## WHITEFLIES:

*Sivanto*, 21 - 28 fl oz/A.

**MITES**

Apply when needed. Usually a problem only in hot, dry weather.

Abamectin

- *Agri-Mek 0.15 EC* (8 to 16 fl oz.) or *Agri-Mek SC* (1.75 to 3.5 fl oz.) (7 days) Use with a non-ionic surfactant. (RUP)

Bifenazate

- *Acramite 50WS*, 0.75 to 1 lb. (3 days)

Bifenthrin

- *Bifenture EC*, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Bifenture 10 DF*, 12.8 to 16 oz/A. (3 days)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade WSB* (12.8 to 16 oz.) (3 days) (RUP)
- *Capture 2 EC*, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Discipline 2EC*, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Fanfare 2EC*, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (3 days) (RUP)
- *Tundra EC*, 5.12 to 6.4 fl oz. (3 days) (RUP)

Bifenthrin + Avermectin

- *Athena*, 13.5 to 17 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero EW* (11.2 oz.) (3 days) (RUP)

Etoxazole

- *Zeal*, 2 to 3 oz. (7 days)

Fenpropathrin

- *Danitol 2.4 EC*, 10 2/3 fl oz. (7 days) (RUP)

Malathion

- *Malathion 5* (1.5 pt.) or *Malathion 5 EC* (2 pt.) or *Malathion 8* (1.75 pt.) or *Malathion 8 Aquamul* (1.75 pt for summer squash; 1 pt for winter squash) (1 day)

Naled

- *Dibrom 8 Emulsive*, 1 to 2 pt. (1 day) (RUP)

Spiromesifen

- *Oberon 2 SC*, 7 to 8.5 fl oz. (7 days)

Zeta-Cypermethrin + Avermectin

- *Gladiator*, 19 fl oz. (7 days) (RUP)

**SLUGS**

*Deadline M-Ps 4%* (20 to 40 lb) or *Metaldehyde 3.5 G* (30 to 40 lb) Apply between rows. Avoid contact to edible product.

**DISEASES****SEED TREATMENT:**

DAMPING OFF (*Pythium* spp., *Rhizoctonia solani*):

Captan

- *Captan 4 Flowable*, 2 fl oz/100 lb seed.

Fludioxinil

- *Maxim 4 FS*, 0.08 to 0.16 fl oz/100 lb seed (*Rhizoctonia*).

Thiram

- 42-S Thiram, *Thiram 480DP*, *Thiram 50 WP Dyed*, 4 1/2 oz/100 lb seed.

**PRE-PLANT FUMIGATION:**

PHYTOPHTHORA: Apply to production fields before planting. **Note:** Most fumigants applied to the soil for control of disease organisms will also control soil insects, nematodes and weed seeds.

Soil sterilization by fumigation is best achieved by proper application of material. Correct soil moisture, temperature, and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or immediate tarping.

1,3 Dichloropropene/chloropicrin

- *Telone C35*, 13-35 gal. (RUP)

Metam Potassium

- *Sectagon-K54*, 30-60 gal. Do not plant for 14 to 30 days after treatment (the wetter the soil, the longer the waiting period). (RUP)

Metam Sodium

- *Sectagon 42*, 37.5-75 gal. (RUP)

**GREENHOUSE PREPLANT INCORPORATION:**

DAMPING OFF (*Pythium* spp.), ROOT ROT (*Rhizoctonia* spp.):

Gliocladium virens GL-21

- *SoilGard 12 G*, 1 to 1.5 lb per cubic yard. Biological control product that needs to be applied before disease development. Control may be limited under heavy disease pressure.

**PREPLANT INCORPORATED:**

DAMPING OFF and COTTONY LEAK (*Pythium* spp.):

Mefenoxam. Apply as a broadcast preplant incorporation or a surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone after planting with 1/2 to 1 in. of sprinkler irrigation.

- *Ridomil Gold SL*, 1-2 pt.
- *Ridomil Gold WSP*, 1 to 2 lb.
- *Ultra Flourish*, 2 to 4 pt.

**DRIP APPLICATION:**

DAMPING OFF (*Pseudoperonospora cubensis*), PHYTOPHTHORA BLIGHT (*Phytophthora capsici*):

\* Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days)

Ametoctradin + Dimethomorph

- *Zapro*, 14 fl oz. (0 days)

**FOLIAR TREATMENT:**

POWDERY MILDEW (*Sphaerotheca fuliginea* or *Erysiphe cichoracearum*): Treat at disease appearance.

\* Azoxystrobin + Difenoconazole

- *Quadris Top*, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

\* Cyflufenamid

- *Torino*, 3.4 oz. (0 day)

\* Kresoxim-methyl

- *Sovran*, 3.2 to 4.8 oz. (0 days)

\* Myclobutanil

- *Rally 40 WSP*, 2.5 to 5 oz, 7 to 10 day schedule. (0 days) Do not apply more than 1.5 lb per acre per crop.

\* Penthiopyrad

- *Fontelis*, 12 - 16 fl oz. (1 day)

## Squash

### \* Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days) Do not apply more than one application before alternating with another chemical.

### \* Pyraclostrobin/Boscalid

- *Pristine*, 12.5 to 18.5 oz. (0 days)

### \* Quinoxifen

- *Quintec*, 4 to 6 fl oz. (3 days) Winter squash only.

### \* Thiophanate-Methyl

- *Cercobin* 4.1F, 10.9 fl oz. (1 day)
- *Topsin* 4.5 FL, 10 fl oz. (1 day)
- *Topsin M* 70 WP, *Topsin M* WSB, 0.5 lb. (1 day)

### \* Trifloxystrobin

- *Flint*, 1 1/2 to 2 oz, 7- to 14-day intervals. (0 days) Maximum 1 consecutive application, 4 applications/year and 16 oz/season.

### Azoxystrobin

- *Quadris*, 11.0 to 15.5 fl oz. (1 day)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

### Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 3.2 pt see label for interval. (1 day)

### *Bacillus amyloliquefaciens*

- *Serifel*, 4 - 16 fl oz. (0 day)

### *Bacillus subtilis*

- *Serenade* ASO, 2 - 6 qt. (0 days)
- *Serenade* Max, 1 - 3 lb every 7 to 10 days. (0 days)

### Boscalid

- *Endura*, 6.5 oz. (0 days) Suppression only

### Chlorothalonil

- *Bravo* Ultrex, *Equus* DF, 1.8 to 2.7 lb. (0 days) *Sphaerotheca* only
- *Bravo* Weather Stik, *Echo* 720, *Equus* 720 SST, 2 to 3 pt, 7-day intervals. (0 days) *Sphaerotheca* only
- *Echo* 90 DF, 1.625 to 2.5 lb. (0 days) *Sphaerotheca* only

### Copper Ammonium Carbonate

- *Copper* Count N, 1.5 to 2 qt. (0 days)

### Copper Hydroxide

- *Champ* DP Dry Prill, 1 1/3 lb. (0 days)
- *Champ* Formula 2 F, 1 1/3 pt. (0 days)
- *Kocide* 2000, 1 1/2 lb. (0 days)
- *Kocide* 3000, 0.5-1.25 lb. (0 day)
- *Nu-Cop* 3 L, 1 1/3 to 2 2/3 pt. (0 days)
- *Nu-Cop* 50 DF, 1 1/2 to 2 lb. (0 days)
- *Nu-Cop* HB, 1 lb. (0 days)

### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 2.5 pt. (0 days)
- *Badge* X2, 0.5 to 1.25 lb. (0 days)

### Copper Sulfate

- *Basic* Copper 53, 2 lb. (0 days)
- *Cuprofix* Ultra 40 Disperss, 1 to 2 lb. (0 days)

### Difenoconazole + Cyprodinil

- *Inspire* Super, 16 to 20 fl oz. (7 days)

### Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 4 - 5.5 fl oz. (0 days)

### Metrafenone

- *Vivando*, 15.4 fl oz. (0 day)

### Neem Oil

- *Trilogy*, 2 pt. (0 days)

### Sulfur

- *Kumulus* DF, *Micro* Sulf, *Microthiol* Disperss, *Thiolux*, 5 to 10 lb. (0 days)

### Tebuconazole

- *Orius* 3.6F, Tebuzol 3.6, 4-6 fl oz. (7 days) 12 hr REI.

### Triflumizole

- *Procure* 480 SC, 4 to 8 fl oz every 7-14 days. (0 days)

SCAB (*Cladosporium cucumerinum*): Treat every 7 to 10 days after plants are 2 to 3 inches tall.

### Chlorothalonil

- *Bravo* Ultrex, *Equus* DF, 1.8 to 2.7 lb. (0 days)
- *Bravo* Weather Stik, *Echo* 720, *Equus* 720 SST, 2 to 3 pt. (0 days)

### Mancozeb

- *Koverall*, 2 - 3 lb. (5 days)
- *Manzate* Max, 1.6 to 2.4 qt. (5 days)
- *Manzate* Pro-Stick, 2 to 3 lb. (5 days)

### Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days)

### Neem Oil

- *Trilogy*, 2 pt. (0 days)

### Potassium phosphite/chlorothalonil

- *Catamaran*, 6 pt. (1 day)

ALTERNARIA LEAF SPOT (*Alternaria cucumerina*): Treat every 7 to 10 days when conditions favor disease.

### \* Azoxystrobin

- *Quadris*, 11.0 to 15.5 fl oz. (1 day)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

### \* Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 3.2 pt see label for interval. (1 day)

### \* Azoxystrobin + Difenoconazole

- *Quadris* Top, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

### \* Chlorothalonil

- *Bravo* Ultrex, *Equus* DF, 1.8 to 2.7 lb. (0 days)
- *Bravo* Weather Stik, *Echo* 720, *Equus* 720 SST, 2 to 3 pt. (0 days)
- *Echo* 90 DF, 1.625 to 2.5 lb. (0 days)

### \* Difenoconazole + Cyprodinil

- *Inspire* Super, 16 to 20 fl oz. (7 days)

### \* Fluxapyroxad + Pyraclostrobin

- *Merivon* Xemium Brand Fungicide, 4 - 5.5 fl oz. (0 days)

### \* Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days) Do not apply more than one application before alternating with another chemical.

### \* Pyraclostrobin/Boscalid

- *Pristine*, 12.5 to 18.5 oz. (0 days)

### *Bacillus amyloliquefaciens*

- *Serifel*, 4 - 16 fl oz. (0 day)

### Boscalid

- *Endura*, 6.5 oz. (0 days)

### Copper Ammonium Carbonate

- *Copper* Count N, 1.5 to 2 qt. (0 days)

### Copper Hydroxide

- *Champ* DP Dry Prill, 1 1/3 lb. (0 days)
- *Champ* Formula 2 F, 1 1/3 pt. (0 days)
- *Kocide* 2000, 1 1/2 lb. (0 days)
- *Kocide* 3000, 0.5-1.25 lb. (0 day)
- *Nu-Cop* 3 L, 1 1/3 to 2 2/3 pt. (0 days)
- *Nu-Cop* 50 DF, 1 1/2 to 2 lb. (0 days)
- *Nu-Cop* HB, 1 lb. (0 days)

### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1 to 2.5 pt. (0 days)

- *Badge X2*, 0.5 to 1.25 lb. (0 days)

#### Copper Sulfate

- *Basic Copper 53*, 2 lb. (0 days)
- *Cuprofix Ultra 40 Disperss*, 1 to 2 lb. (0 days)

#### Famoxadone + Cymoxanil

- *Tanos*, 8 oz. (3 days)

#### Mancozeb

- *Koverall*, 2 - 3 lb. (5 days)
- *Manzate Max*, 1.6 to 2.4 qt. (5 days)
- *Manzate Pro-Stick*, 2 to 3 lb. (5 days)

#### Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days)

#### Mancozeb + Zoxamide

- *Gavel 75 DF*, 1.5 - 2.0 lb. (5 days)

#### Neem Oil

- *Trilogy*, 2 pt. (0 days)

#### Penthiopyrad

- *Fontelis*, 12 - 16 fl oz. (1 day)

#### Potassium phosphite/chlorothalonil

- *Catamaran*, 6 pt. (1 day)

#### Zoxamide + chlorothalonil

- *Zing!*, 36 fl oz. (0 days)

ANTHRACNOSE (*Colletotrichum lagenarium*): Treat every 7 to 14 days after disease appears.

#### \* Azoxystrobin

- *Quadris*, 11.0 to 15.5 fl oz. (1 day)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

#### \* Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 3.2 pt see label for interval. (1 day)

#### \* Azoxystrobin + Difenconazole

- *Quadris Top*, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

#### \* Chlorothalonil

- *Bravo Ultrex*, *Equus DF*, 1.4 to 1.8 lb. (0 days)
- *Bravo Weather Stik*, *Echo 720*, *Equus 720 SST*, 1.5 to 2 pt. (0 days)
- *Echo 90 DF*, 1.25 to 1.625 lb. (0 days)

#### \* Mancozeb

- *Dithane DF Rainshield*, *Manzate Pro-Stick*, 2 to 3 lb. (5 days)
- *Koverall*, 2 - 3 lb. (5 days)
- *Manzate Max*, 1.6 to 2.4 qt. (5 days)
- *Penncozeb 75 DF*, 2 to 3 lb. (5 days) Summer squash only

#### \* Pyraclostrobin

- *Cabrio*, 12-16 oz. (0 days) Do not apply more than one application before alternating with another chemical.

#### \* Pyraclostrobin/Boscalid

- *Pristine*, 18.5 oz. (0 days)

#### \* Thiophanate-Methyl

- *Cercobin 4.1F*, 10.9 fl oz. (1 day)
- *Topsin 4.5 FL*, 10 fl oz. (1 day)
- *Topsin M 70 WP*, *Topsin M WSB*, 0.5 lb. (0 days)

#### Bacillus amyloliquefaciens

- *Serifel*, 4 - 16 fl oz. (0 day)

#### Copper Ammonium Carbonate

- *Copper Count N*, 1.5 to 2 qt. (0 days)

#### Copper Hydroxide

- *Champ DP Dry Prill*, 1 1/3 lb. (0 days)
- *Champ Formula 2 F*, 1 1/3 pt. (0 days)
- *Kocide 2000*, 1 1/2 lb. (0 days)

- *Kocide 3000*, 0.5-1.25 lb. (0 day)
- *Nu-Cop 3 L*, 1 1/3 to 2 2/3 pt. (0 days)
- *Nu-Cop 50 DF*, 1 1/2 to 2 lb. (0 days)
- *Nu-Cop HB*, 1 lb. (0 days)

#### Copper Hydroxide + Copper Oxychloride

- *Badge SC*, 1 to 2.5 pt. (0 days)
- *Badge X2*, 0.5 to 1.25 lb. (0 days)

#### Copper Oxychloride + Copper Sulfate

- *C-O-C-S WDG*, 1 to 2 lb. (0 days)

#### Copper Sulfate

- *Basic Copper 53*, *Basicop*, 2 lb. (0 days)
- *Cuprofix Ultra 40 Disperss*, 1 to 2 lb. (0 days)

#### Difenoconazole + Cyprodinil

- *Inspire Super*, 16 to 20 fl oz. (7 days)

#### Famoxadone + Cymoxanil

- *Tanos*, 8 oz. (3 days)

#### Mancozeb + Copper Hydroxide

- *ManKocide*, 2-3 lb. (5 days)

#### Mefenoxam + Chlorothalonil

- *Ridomil Gold Bravo*, 2.5 to 3.25 pt. (7 days) Maximum 4 applications. Do not apply to mature or senescent plants.

#### Neem Oil

- *Trilogy*, 2 pt. (0 days)

#### Potassium phosphite/chlorothalonil

- *Catamaran*, 4 pt. (1 day)

#### Zoxamide + chlorothalonil

- *Zing!*, 36 fl oz. (0 days)

ANGULAR LEAF SPOT (*Pseudomonas lachrymans*): Spray every 7 days, starting before the first fruit forms and continue to protect fruit at all stages of development.

#### Copper Ammonium Carbonate

- *Copper Count N*, 1.5 to 2 qt. (0 days)

#### Copper Hydroxide

- *Nu-Cop HB*, 1 lb. (0 days)

#### Copper Hydroxide

- *Champ DP Dry Prill*, 1 1/3 lb. (0 days)
- *Champ Formula 2 F*, 1 1/3 pt. (0 days)
- *Kocide 2000*, 1 1/2 lb. (0 days)
- *Kocide 3000*, 0.5-1.25 lb. (0 day)
- *Nu-Cop 3 L*, 1 1/3 to 2 2/3 pt. (0 days)
- *Nu-Cop 50 DF*, 1 1/2 to 2 lb. (0 days)

#### Copper Hydroxide + Copper Oxychloride

- *Badge SC*, 1 to 2.5 pt. (0 days)
- *Badge X2*, 0.5 to 1.25 lb. (0 days)

#### Copper Sulfate

- *Basic Copper 53*, *Basicop*, 2 lb. (0 days)
- *Cuprofix Ultra 40 Disperss*, 1 to 2 lb. (0 days)

#### Neem Oil

- *Trilogy*, 2 pt.

GUMMY STEM BLIGHT (*Didymella bryoniae* also called *Mycosphaerella melonis*):

#### \* Azoxystrobin

- *Quadris*, 11.0 to 15.5 fl oz. (1 day)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

#### \* Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 3.2 pt see label for interval. (1 day)

#### \* Azoxystrobin + Difenconazole

- *Quadris Top*, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.

## Squash

- \* Chlorothalonil
  - *Bravo Ultrex, Equus DF*, 1.8 to 2.7 lb. (0 days)
  - *Bravo Weather Stik, Echo 720, Equus 720 SST*, 2 to 3 pt. (0 days)
  - *Echo 90 DF*, 1.625 to 2.5 lb. (0 days)
- \* Pyraclostrobin
  - *Cabrio*, 12-16 oz. (0 days) Do not apply more than one application before alternating with another chemical.
- \* Pyraclostrobin/Boscalid
  - *Pristine*, 12.5 to 18.5 oz. (0 days)
- \* Thiophanate-Methyl
  - *Cercobin 4.1F*, 10.9 fl oz. (1 day)
  - *Topsin 4.5 FL*, 10 fl oz. (1 day)
  - *Topsin M 70 WP, Topsin M WSB*, 0.5 lb. (1 day)
- Bacillus amyloliquefaciens
  - *Serifel*, 4 - 16 fl oz. (0 day)
- Boscalid
  - *Endura*, 6.5 oz. (0 days)
- Copper Ammonium Carbonate
  - *Copper Count N*, 1.5 to 2 qt. (0 days)
- Copper Hydroxide
  - *Champ DP Dry Prill*, 1 1/3 lb. (0 days)
  - *Champ Formula 2 F*, 1 1/3 pt. (0 days)
  - *Kocide 2000*, 1 1/2 lb. (0 days)
  - *Kocide 3000*, 0.5-1.25 lb. (0 day)
  - *Nu-Cop 3 L*, 1 1/3 to 2 2/3 pt. (0 days)
  - *Nu-Cop 50 DF*, 1 1/2 to 2 lb. (0 days)
  - *Nu-Cop HB*, 1 lb. (0 days)
- Copper Hydroxide + Copper Oxychloride
  - *Badge SC*, 1 to 2.5 pt. (0 days)
  - *Badge X2*, 0.5 to 1.25 lb. (0 days)
- Copper Sulfate
  - *Basic Copper 53*, 2 lb. (0 days)
  - *Cuprofix Ultra 40 Disperss*, 1 to 2 lb. (0 days)
- Difenoconazole + Cyprodinil
  - *Inspire Super*, 16 to 20 fl oz. (7 days)
- Kresoxim-methyl
  - *Sovran*, 4.8 oz. (0 days)
- Mancozeb
  - *Koverall*, 2 - 3 lb. (5 days)
  - *Manzate Max*, 1.6 to 2.4 qt. (5 days)
  - *Manzate Pro-Stick*, 2 to 3 lb. (5 days)
- Mancozeb + Copper Hydroxide
  - *ManKocide*, 2-3 lb. (5 days)
- Mefenoxam + Chlorothalonil
  - *Ridomil Gold Bravo*, 2.5 to 3.25 pt. (7 days)
- Penthiopyrad
  - *Fontelis*, 12 - 16 fl oz. (1 day)
- Potassium phosphite/chlorothalonil
  - *Catamaran*, 6 pt. (1 day)
- Potassium phosphite/chlorothalonil
  - *Catamaran*, 6 pt. (1 day)
- Tebuconazole
  - *Orius 3.6F, Tebuzol 3.6*, 8 fl oz. (7 days) Suppression only.
- DOWNY MILDEW (*Pseudoperonospora cubensis*):
  - \* Ametoctradin + Dimethomorph
    - *Zapro*, 14 fl oz. (0 days)
  - \* Chlorothalonil
    - *Bravo Ultrex, Equus DF*, 1.4 to 1.8 lb. (0 days)
    - *Bravo Weather Stik, Echo 720, Equus 720 SST*, 1.5 to 2 pt. (0 days)
  - *Echo 90 DF*, 1.25 to 1.625 lb. (0 days)
  - \* Cyazofamid
    - *Ranman 400SC*, 2.1 to 2.75 fl oz every 7 to 10 days. (0 days)
  - \* Cymoxanil
    - *Curzate 60 DF*, 3.2 to 5 oz. (3 days)
  - \* Famoxadone + Cymoxanil
    - *Tanos*, 8 oz. (3 days)
  - \* Mancozeb
    - *Dithane DF Rainshield, Manzate Pro-Stick, Penncozeb 75 DF*, 2 to 3 lb. (5 days) Summer squash only
    - *Manzate Max*, 1.6 to 2.4 qt. (5 days)
  - \* Mancozeb + Zoxamide
    - *Gavel 75 DF*, 1.5 - 2.0 lb. (5 days)
  - \* Propamocarb
    - *Previcur Flex*, 1.2 pt every 7 - 14 days. (2 days)
  - Azoxystrobin
    - *Quadris*, 11.0 to 15.5 fl oz. (1 day)
  - Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.
  - Azoxystrobin + Chlorothalonil
    - *Quadris Opti*, 3.2 pt see label for interval. (1 day)
  - Azoxystrobin + Difenoconazole
    - *Quadris Top*, 12 to 14 fl oz. (1 day) One application before alternating with another chemical.
  - Bacillus amyloliquefaciens
    - *Serifel*, 4 - 16 fl oz. (0 day)
  - Copper Hydroxide + Copper Oxychloride
    - *Badge SC*, 1 to 2.5 pt. (0 days)
    - *Badge X2*, 0.5 to 1.25 lb. (0 days)
  - Fenamidonone
    - *Reason 500 SC*, 5.5 fl oz every 5 to 10 days. (14 days)
  - Fluopicolide
    - *Presidio*, 3-4 fl oz. (2 days)
  - Fluxapyroxad + Pyraclostrobin
    - *Merivon Xemium Brand Fungicide*, 5.5 fl oz. (0 days) Suppression only
  - Fosetyl-Aluminum
    - *Aliette WDG*, 2 to 5 lb, 7- to 14-day intervals. (0 days) Do not tank mix with copper fungicides.
  - Mancozeb + Copper Hydroxide
    - *ManKocide*, 2-3 lb. (5 days)
  - Mandipropamid
    - *Revus*, 8 fl oz. (0 day) Suppression
  - Mefenoxam + Chlorothalonil
    - *Ridomil Gold Bravo*, 2 lb. (7 days) Do not apply to mature or senescent plants.
  - Mefenoxam + Copper Hydroxide
    - *Ridomil Gold Copper*, 2 to 2 1/2 lb. (5 days) Maximum 4 applications.
  - Mefenoxam + Mancozeb. Summer squash.
    - *Ridomil Gold MZ*, 2 1/2 lb. (5 days) Maximum 4 applications.
  - Mono-, dibasic sodium salts of phosphorous acid
    - *Fosphite*, 1 to 3 qt per 100 gal (ground) or 10 gal (aerial) of water. (0 days)
  - Mono-, dibasic sodium, potassium and ammonium phosphites
    - *Phostrol*, 2.5 to 5 pt every 7 - 14 days. (0 days)
    - *Prophyt*, 2 to 4 pt. (0 days)
  - Neem Oil
    - *Trilogy*, 2 pt. (0 days)
  - Potassium phosphite/chlorothalonil
    - *Catamaran*, 4 pt. (1 day)

Pyraclostrobin

- *Cabrio*, 8-12 oz. (0 days) Do not apply more than one application before alternating with another chemical.

Pyraclostrobin/Boscalid

- *Pristine*, 12.5 to 18.5 oz. (0 days)

Trifloxystrobin

- *Flint*, 4 oz (suppression), 7- to 14-day intervals. (0 days) Maximum 2 consecutive applications, 4 applications/year and 16 oz/season. Alternate with Ridomil Gold Bravo.

Zoxamide + chlorothalonil

- *Zing!*, 36 fl oz. (0 days)

**Note:** Most fungicides that protect against *Alternaria*, anthracnose and gummy stem blight may also provide limited downy mildew protection.

PHYTOPHTHORA CROWN and FRUIT ROT (*Phytophthora* spp.):

\* Famoxadone + Cymoxanil

- *Tanos*, 8 - 10 oz every 5 - 7 days. (3 days)

\* Mancozeb + Zoxamide

- *Gavel* 75 DF, 1.5 - 2.0 lb. (5 days)

Ametoctradin + Dimethomorph

- *Zapro*, 14 fl oz. (0 days)

Cyazofamid

- *Ranman* 400SC, 2.75 fl oz every 7 to 10 days.

Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days)

Fosetyl-Aluminum

- *Aliette* WDG, 2 to 5 lb, 7- to 14-day intervals. (0 days) Do not tank mix with copper fungicides.

Mandipropamid

- *Revus*, 8 fl oz. (0 day) Suppression

Mono-, dibasic sodium salts of phosphorous acid

- *Fosphite*, 1 to 3 qt per 100 gal (ground) or 10 gal (aerial) of water. (0 days)

Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 2.5 to 5 pt every 7 - 14 days. (0 days)
- *Prophyt*, 6 pt. (0 days)

**Note:** Most fungicides applied to control downy mildew may have limited efficacy against *Phytophthora* crown and fruit rot.

## Sweet Potatoes

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

### NEMATODES

Root-lesion, root-knot and other nematodes are associated with sweet potato. If you believe you have a nematode problem associated with sweet potato production, a sample should be tested (see Appendix C). If plant-parasitic nematodes are present in population densities above estimated damage thresholds for sweet potatoes, management recommendations will be provided at that time. Vydate L, Mocap 6EC and Mocap 15G are labeled for use on sweet potatoes for nematode control.

### INSECTS

#### SOIL TREATMENT:

APHIDS, FLEA BEETLE, LEAFHOPPER:

Imidacloprid

- *Admire* Pro, 4.4 to 10.5 fl oz. (3 days leaves, 125 days corms)

- *Nuprid* 2 F, 10 to 24 fl oz. (3 days leaves, 125 days corms)
- *Platinum*, 5 to 8 fl oz. (30 days) See label for application methods.

FLEA BEETLE LARVAE:

Bifenthrin

- *Bifenture* EC, . (RUP)
- *Brigade @ 2EC*, . (RUP)
- *Capture* LFR, . (RUP)
- *Sniper*, . (RUP)
- *Tundra* EC, . (RUP)

See label for application methods.

Chlorpyrifos

- *Chlorpyrifos* 15G (13.5 lb.) or *Chlorpyrifos* 4E AG (4 pt.) (125 days) (RUP)
- *Govern*, 4 pt. (125 days) (RUP)
- *Hatchet*, 4 pt. (125 days) (RUP)
- *Lorsban* 15 G (13.5 lb.) or *Lorsban* 4 E / *Lorsban* Advanced (4 pt.) or *Lorsban* 75 WG (2.67 lb.) (125 days) See label for application methods. (RUP)
- *Nufos* 4E, 4 pt. (125 days) (RUP)
- *Saurus*, 13.5 lb. (125 days)
- *Vulcan*, 4 pt. (125 days) (RUP)
- *Warhawk*, 4 pt. (125 days) (RUP)
- *Whirlwind*, 4 pt. (125 days) (RUP)

Ethoprop

- *Mocap* 15 G (1.6 to 2.1 lb/1000 row ft.) or *Mocap* 6EC (5.1 to 6.9 fl oz/1000 row ft.) (225 days) (RUP)

#### SOIL TREATMENT AT PLANTING:

APHIDS, LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

COLORADO POTATO BEETLE, POTATO PSYLID, WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

#### FURROW TREATMENT:

APHIDS, LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

COLORADO POTATO BEETLE, POTATO PSYLID, WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

#### FOLIAR TREATMENT:

FLEA BEETLE: Apply when damage is first seen.

Acetamiprid

- *Assail* 30 SG (1.5 to 2.5 oz.) or *Assail* 70WP (0.6 to 1.1 oz.) (7 days)

*Actara*, 1.5 to 3 oz. (14 days) Do not exceed 6 oz/acre per season.

*Baythroid* XL, 1.6 to 2.8 fl oz. (0 days) (RUP)

Bifenthrin

- *Bifenture* EC, 2.1 to 6.4 oz. (21 days) (RUP)
- *Fanfare* 2EC, 2.1 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 2.1 to 6.4 fl oz. (21 days) (RUP)

*Brigadier*, 5.1 to 7.7 fl oz. (21 days) (RUP)

Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (7 days)
- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (7 days)

*Endigo* ZC, 3.5 to 4.5 fl oz. (14 days) (RUP)

*Gladiator*, 8 to 19 fl oz. (14 days) (RUP)

Imidacloprid

- *Admire* Pro, 1.2 fl oz. (7 days)
- *Nuprid* 1.6 F, 3.5 fl oz. (7 days) Do not exceed 10.5 oz/Acre per season.

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)

## Sweet Potatoes

- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)
- Leverage 360*, 2.4 to 2.8 fl oz. (7 days) (RUP)  
*Mustang Max*, 1.76 to 4 oz. (1 day) (RUP)  
*Pyrenone*, 1 to 12 fl oz. (0 days)  
*Carbaryl 4L*, 1 to 2 qt. (7 days)  
*Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (7 days)  
*Steed*, 2.5 to 3.5 fl oz. (21 days) (RUP)  
*Voliam Flexi*, 4 oz. (14 days)

ARMYWORM, CUTWORM: Apply when feeding damage is first seen.

- Javelin WG*, 0.12 to 1.5 lb. (0 days)  
*Pyrenone*, 1 to 12 fl oz. (0 days)  
*Rimon 0.83EC*, 9 to 12 fl oz. (14 days)

LEAFHOPPER: Treat as necessary.

### Acetamiprid

- *Assail 30 SG* (1.5 to 4 oz.) or *Assail 70WP* (0.6 to 1.7 oz.) (7 days)

*Actara*, 1.5 to 3 oz. (14 days) Do not exceed 6 oz per season.

- Baythroid XL*, 0.8 to 1.6 fl oz. (0 days) (RUP)  
*Brigadier*, 3.8 to 7.7 fl oz. (21 days) (RUP)  
*Endigo ZC*, 3.5 to 4.5 fl oz. (14 days) (RUP)  
*Gladiator*, 8 to 19 fl oz. (14 days) (RUP)

### Imidacloprid

- *Admire Pro*, 1.2 fl oz. (7 days)
- *Nuprid 1.6 F*, 3.5 fl oz. (7 days) Do not exceed 10.5 oz/Acre per season.

### Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (7 days) (RUP)
- *Warrior II* with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (7 days) (RUP)

*Leverage 360*, 2.4 to 2.8 fl oz. (7 days) (RUP)

### Malathion

- *Malathion 5*, or *Malathion 5 EC* (1.5 to 2 pt.) or *Malathion 57 EC* (1.5 to 2.5 pt.) or *Malathion 8* (1 to 1.75 pt.) or *Malathion 8 Aquamul* (1 to 1.56 pt.) (3 days for Malathion 5 EC & 8; 0 days for all others)

*Mustang Max*, 1.76 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 7 - 10.5 fl oz/A.

*Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

*Voliam Flexi*, 4 oz. (14 days)

APHIDS:

### \* Acetamiprid

- *Assail 30 SG* (2.5 to 4 oz.) or *Assail 70WP* (1 to 1.7 oz.) (7 days)
- \* *Fulfill*, 2.75 to 5.5 oz. (14 days) May require 5 to 7 days for aphid mortality.

*Actara*, 3 oz. (14 days) Do not exceed 6 oz/acre per season.

*Beleaf 50 SG*, 2 to 2.8 oz. (7 days)

*Brigadier*, 3.8 to 7.7 fl oz. (21 days) (RUP)

*Endigo ZC*, 4.5 fl oz. (14 days) (RUP)

*Gladiator*, 19 fl oz. (14 days) (RUP)

### Imidacloprid

- *Admire Pro*, 1.2 fl oz. (7 days)
- *Nuprid 1.6 F*, 3.5 fl oz. (7 days) Do not exceed 10.5 oz/Acre per season.

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)

*Leverage 360*, 2.4 to 2.8 fl oz. (7 days) (RUP)

*Malathion 57 EC*, 2 pt. (3 days)

*Movento*, 4 to 5 fl oz. (7 days) Must be tank mixed with adjuvant having spreading and penetrating properties.

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 7 - 10.5 fl oz/A.

*Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

*Voliam Flexi*, 4 oz. (14 days)

CUTWORM:

*Baythroid XL*, 0.8 to 1.6 fl oz. (0 days) (RUP)

*Endigo ZC*, 3.5 to 4.5 fl oz. (14 days) (RUP)

*Gladiator*, 8 to 19 fl oz. (14 days) (RUP)

### Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (7 days) (RUP)
- *Warrior II* with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (7 days) (RUP)

*Leverage 360*, 2.4 to 2.8 fl oz. (7 days) (RUP)

*Mustang Max*, 1.28 to 4 oz. (1 day) (RUP)

*Steed*, 2.5 to 3.5 fl oz. (21 days) (RUP)

TARNISHED PLANT BUG:

*Baythroid XL*, 1.6 to 2.8 fl oz. (0 days) (RUP)

*Beleaf 50 SG*, 2 to 2.8 oz. (7 days)

*Endigo ZC*, 4 to 4.5 fl oz. (14 days) (RUP)

*Gladiator*, 19 fl oz. (14 days) (RUP)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)

*Leverage 360*, 2.4 to 2.8 fl oz. (7 days) (RUP)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

ARMYWORM:

### Carbaryl

- *Carbaryl 4L*, 2 qt. (7 days)

- *Sevin 4 F* (2 qt.) or *Sevin 80 S* (2.5 lb.) or *Sevin XLR Plus* (2 qt.) (7 days)

*Coragen*, 3.5 to 5 fl oz. (1 day)

*Endigo ZC*, 4 to 4.5 fl oz. (14 days) (RUP)

*Gladiator*, 19 fl oz. (14 days) (RUP)

*Intrepid 2F*, 6 to 10 fl oz. (7 days) 4 to 10 fl oz with PHI of 1 day when harvesting leaves.

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (7 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (7 days) (RUP)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Radiant SC*, 6 to 8 fl oz. (7 days) See label for treating and harvesting of leaves.

*Rimon 0.83EC*, 6 to 12 fl oz. (14 days)

*Carbaryl 4L*, 2 qt. (7 days)

*Sevin 4 F* (2 qt.) or *Sevin 80 S* (2.5 lb.) or *Sevin XLR Plus* (2 qt.) (7 days)

### Spinosad

- *Blackhawk* (2.25-3.5 oz/A) or *Entrust* (1.5 to 3 oz.) or *Entrust SC* (4.5 to 10 fl oz.) (7 days)

*Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

*Voliam Flexi*, 4 oz. (14 days)

THRIPS:

*Blackhawk*, 2.25-3.5 oz/A. (3 days) Add adjuvant

COLORADO POTATO BEETLE, POTATO PSYLLID, WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

**MITES**Abamectin

- *Agri-Mek* 0.15 EC (8 to 16 fl oz.) or *Agri-Mek* SC (1.75 to 3.5 fl oz.) (14 days) Use with a non-ionic surfactant. (RUP)

Bifenazate

- *Acramite* 4SC, 16 to 24 fl oz. (14 days)

Bifenthrin

- *Bifenture* EC, 2.1 to 6.4 fl oz. (21 days) (RUP)
- *Brigade @* 2EC, 5.12 to 6.4 fl oz. (21 days) (RUP)

Spiromesifen

- *Oberon* 2 SC, 8 to 16 fl oz. (7 days)

Zeta-Cypermethrin + Avermectin

- *Gladiator*, 19 fl oz. (14 days) (RUP)

**DISEASES****SEED (ROOT) TREATMENT:**

BLACK ROT, SCURF (*Ceratomyxa simbricata*, *Monilochaetes infusans*): Dip roots and sprouts in one of the following suspensions. Plant immediately.

Thiabendazole

- *Mertect* 340, 53 1/2 oz per 50 gal of water (8 fl oz per 7 1/2 gal) dip for 1 to 2 minutes. Do not use treated roots for food or feed.

PYTHIUM DAMPING OFF:

Mefenoxam

- *Apron* XL, 0.085 - 0.64 fl oz/100 lb seed. (0 days)

**PREPLANT INCORPORATED:**

DAMPING OFF (*Pythium* and *Phytophthora* spp.):

Mefenoxam. Apply as a preplant incorporation or a surface application. For banded applications use a 7" band. **Note:** If natural rainfalls not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone after planting with 1/2 to 1" of sprinkler irrigation.

- *Ridomil* Gold SL, 1-2 pt.
- *Ridomil* Gold WSP, 1 to 2 lb.

Pyrimethanil

- *Scala*, 7 fl oz every 7 - 14 days. (7 days) Maximum 35 fl oz/season.

Fenamidone

- *Reason* 500 SC, 5.5 - 8.2 fl oz every 5 to 10 days. (7 days) **Note:** It is recommended that a protectant partner such as an EDBC (mancozeb or metiram) or chlorothalonil product is added in tank mixture to any strobilurin product. Strobilurins should also be used in rotation with a fungicide with a different mode of action.

**FOLIAR TREATMENT:**

WHITE RUST (*Albugo tragoponsis*):

Azoxystrobin

- *Quadris*, 6 to 15.5 fl oz. (14 days) Do not make more than one application before rotating with a non-Group 11 fungicide with a different mode of action

Fenamidone

- *Reason* 500 SC, 5.5 - 8.2 fl oz. (14 days) Do not make more than one application before rotating with a fungicide with a different resistance management group

Pyraclostrobin

- *Cabrio*, 8 to 16 oz. (0 days) Do not make more than one application before rotating with a non-Group 11 fungicide with a different mode of action

ALTERNARIA BLIGHT (*Alternaria* spp.):

Azoxystrobin

- *Quadris*, 6 to 15.5 fl oz. (0 days) Do not make more than one application before rotating with a non-Group 11 fungicide with a different mode of action

Boscalid

- *Endura*, 2.5 to 4.5 oz. (10 days) Do not make more than two applications before rotating with a fungicide with a different resistance management group for at least one applications
- *Switch* 62.5 WG, 11 to 14 oz. (7 days) Do not make more than two applications before rotating with a fungicide with a different resistance management group for two applications

Cyprodinil + Fludioxonil

- *Endura*, 2.5 to 4.5 oz. (10 days) Do not make more than two applications before rotating with a fungicide with a different resistance management group for at least one applications
- *Switch* 62.5 WG, 11 to 14 oz. (7 days) Do not make more than two applications before rotating with a fungicide with a different resistance management group for two applications

Fenamidone

- *Reason* 500 SC, 5.5 - 8.2 fl oz. (14 days) Do not make more than one application before rotating with a fungicide with a different resistance management group

Pyraclostrobin

- *Cabrio*, 8 to 12 oz. (0 days) Do not make more than one application before rotating with a non-Group 11 fungicide with a different mode of action

Pyrimethanil

- *Scala*, 7 fl oz. (7 days)

**Tomatoes**

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

**NEMATODES**

Root-knot and root-lesion nematodes can reduce tomato yields. Fields with soil or root problems of undetermined cause should be tested for nematodes (see Appendix C). If the plant-parasitic nematodes are present in population densities above the economic threshold for tomatoes, crop rotation or application of a nematicide is recommended. The following nematicides are suitable for control of root-knot and root-lesion nematodes in tomato production.

1,3-D

- *Telone* II, 9-18 gal/A (mineral soil).

Fumigate in the fall when soil temperatures at a 6-inch depth are above 50F. Inject the fumigant to a soil depth of 6 to 8 inches and lightly seal the soil immediately after application. Use soil fumigants only as directed on the label. In some limited situations soil fumigants can be applied in the spring in Michigan.

Correct soil moisture, temperature and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or by immediate tarping.

**PREPLANT NEMATICIDE TREATMENT:**Fluensulfone

- *Nimitz* 480EC, 3.5 - 5.0 pints/A. apply broadcast and incorporate either mechanically or with water to a depth of 6-8 inches at least 7 days prior to transplanting or planting. Do not apply if heavy rainfall is expected within 48 hours of application. This material can be applied in bands or by drip but apparently is most effective if applied broadcast and incorporated. Do not apply to extremely cold soils (<40 F) as nematodes have to be active for the product to be effective. Product has not been evaluated in Michigan.

## Tomatoes

### INSECTS

#### SOIL TREATMENT:

LEAFHOPPER, THRIPS, FLEA BEETLE, WHITEFLIES, APHIDS,  
COLORADO POTATO BEETLE: Additional generic brands available.

##### Imidacloprid

- *Admire Pro*, 7 to 10.5 fl oz. (21 days)
- *Nuprid 2 F*, 16 to 24 fl oz. (21 days)

##### Thiamethoxam

- *Platinum* (5 to 11 fl oz.) or *Platinum 75 SG* (1.66 to 3.67 oz.) (30 days) See label for application methods.

#### CUTWORM:

*Brigadier*, 3.4 to 6.8 fl oz. See label for application methods. (RUP)

##### Diazinon

- *Diazinon 50 W* (4 to 8 lb.) or *Diazinon AG 500* (2 to 4 qt.) or *Diazinon AG600* (51 to 102 fl oz.) Broadcast just before planting and immediately incorporate into soil. (RUP)

#### WIREWORM:

*Athena*, 8.5 to 17 fl oz. (RUP)

*Bifenture 10 DF*, 8 to 12.8 oz/A. (1 day)

*Brigade WSB*, 8 to 12.8 oz. Apply in furrow with seed or transplant. (RUP)

*Brigadier*, 3.4 to 6.8 fl oz. See label for application methods. (RUP)

##### Diazinon

- *Diazinon 50 W* (6 to 8 lb.) or *Diazinon AG 500* (3 to 4 qt.) or *Diazinon AG600* (76.5 to 102 fl oz.) Broadcast just before planting and immediately incorporate into soil. (RUP)

COLORADO POTATO BEETLE, FLEA BEETLE, LEAFHOPPERS,  
THRIPS, WHITEFLIES:

##### Dinotefuran

- *Scorpion 35SL* (9 to 10.5 fl oz.) or *Venom* (5 to 6 oz.) (21 days)

APHIDS, ARMYWORM, COLORADO POTATO BEETLE, FLEA  
BEETLE, HORNWORMS, LEAFHOPPERS, THRIPS, WHITEFLIES:  
ARMYWORM, LOOPERS, TOMATO FRUITWORM:

*Coragen*, 3.5 to 5 fl oz. (1 day)

CUTWORM, ARMYWORM, FLEA BEETLE LARVAE, WIREWORM:

*Capture LFR*, 3.4 to 6.8 fl oz. See label for application methods. (RUP)

ARMYWORM:

*Verimark*, 5-10 oz/A. (1)

FLEA BEETLE, LEAFMINERS, LOOPERS, APHIDS, WHITEFLY,  
THRIPS:

*Verimark*, 6.75-13.5 oz/A. (1)

LEAFHOPPERS, APHIDS, PSYLID, WHITEFLIES:

*Sivanto*, 21 - 28 fl oz/A.

#### SOIL INJECTION:

ARMYWORM, COLORADO POTATO BEETLE, HORNWORM,  
TOMATO FRUITWORM:

*Verimark*, 5-10 oz/A. (1)

FLEA BEETLE, LEAFMINERS, LOOPERS, APHIDS, WHITEFLY,  
THRIPS:

*Verimark*, 6.75-10 oz/A. (1)

EUROPEAN CORN BORER:

*Verimark*, . (1)

#### FOLIAR TREATMENT:

CUTWORM, ARMYWORM: Apply if there is more than 1 cutworm per  
100 plants on transplants or if defoliation is >10% on larger plants.

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Baythroid XL*, 2.1 to 2.8 fl oz. (0 days) (RUP)

*Belt SC*, 1.5 fl oz. (1 day)

##### Bifenthrin

- *Bifenture EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)

- *Brigade @ 2EC* (2.1 to 5.2 fl oz.) or *Brigade WSB* (5.3 to 12.8 oz.) (1 day) (RUP)

- *Capture 2 EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)

- *Discipline 2EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)

- *Fanfare 2EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)

- *Sniper*, 2.1 to 5.12 fl oz. (1 day) (RUP)

- *Tundra EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)

##### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 9.85 fl oz. (1 day) (RUP)

- *Swagger*, 10.2 to 19.7 fl oz. (1 day) (RUP)

##### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (1 day) (RUP)

*Bifenture 10 DF*, 5.3 to 12.8 oz/A. (1 day)

*Confirm 2F*, 6 to 8 fl oz. (early-season); 8 to 16 fl oz. (mid- to late-season). (7 days)

*Danitol 2.4 EC*, 10.67 fl oz. (3 days) (RUP)

*Endigo ZC*, 4 to 4.5 fl oz. (5 days) (RUP)

##### Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (1 day) (RUP)

- *Asana XL*, 5.8 to 9.6 fl oz. (1 day) (RUP)

- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (1 day) (RUP)

*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)

*Intrepid 2F*, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

*Javelin WG*, 0.12 to 1.5 lb. (0 days)

*Leverage 360*, 3.8 to 4.1 fl oz. (0 days) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

##### Permethrin

- *Ambush 25 W*, 3.2 to 12.8 oz. (0 days) (RUP)

- *Perm-UP 25DF* (3.2 to 12.8 oz.) or *Perm-UP 3.2 EC* (2 to 8 oz.) (0 days) (RUP)

- *Pounce 25 WP*, 3.2 to 12.8 oz. (0 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Vetica*, 12 to 17 fl oz. (1 day)

FLEA BEETLE: Apply if necessary.

*Actara*, 2 to 3 oz. (0 days) Do not apply if a neoniticinoid was used at planting.

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Baythroid XL*, 2.8 fl oz. (0 days) (RUP)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

##### Bifenthrin

- *Bifenture EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)

- *Brigade @ 2EC* (2.1 to 5.2 fl oz.) or *Brigade WSB* (5.3 to 12.8 oz.) (1 day) (RUP)

- *Capture 2 EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)

- *Discipline 2EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)

- *Fanfare 2EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)

- *Sniper*, 2.1 to 5.12 fl oz. (1 day) (RUP)

- *Tundra EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)

##### Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 9.85 fl oz. (1 day) (RUP)

- *Swagger*, 10.2 to 19.7 fl oz. (1 day) (RUP)

##### Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (1 day) (RUP)

- *Steed*, 3.5 to 4.7 fl oz. (1 day) (RUP)

*Bifenture 10 DF*, 5.3 to 12.8 oz/A. (1 day)

##### Carbaryl

- *Carbaryl 4L*, 0.5 to 1 qt. (3 days)

- *Sevin 4 F* (0.5 to 1 qt.) or *Sevin 80 S* (0.63 to 1.25 lb.) or *Sevin 80 WSP* (0.67 to 1.25 lb.) or *Sevin XLR Plus* (0.5 to 1 qt.) (3 days)

Dinotefuran

- *Scorpion* 35SL, 2 to 7 fl oz. (1 day)
- *Venom*, 1 to 4 oz. (1 day)

Do not use if neonicotinoids were used at planting.

*Endigo ZC*, 4 to 4.5 fl oz. (5 days) (RUP)

*Endosulfan* 3 EC, 0.66 to 1.33 qt. (4 days) (RUP)

Esfenvalerate

- *Adjour*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (1 day) (RUP)

*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)

*Kryocide*, 8 to 16 lb. (14 days)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (5 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (5 days) (RUP)

*Leverage* 360, 3.8 to 4.1 fl oz. (0 days) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (5 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl* 4L, 0.5 to 1 qt. (3 days)

*Sevin* 4 F (0.5 to 1 qt.) or *Sevin* 80 S (0.63 to 1.25 lb.) or *Sevin* 80

WSP (0.67 to 1.25 lb.) or *Sevin* XLR Plus (0.5 to 1 qt.) (3 days)

*Voliam Flexi*, 4 to 7 oz. (1 day)

COLORADO POTATO BEETLE: Apply to entire field or field borders if needed to protect new transplants or if defoliation on larger plants is greater than 10%.

Abamectin

- *Agri-Mek* 0.15 EC (8 to 16 fl oz.) or *Agri-Mek* SC (1.75 to 3.5 fl oz.) (7 days) Use with a non-ionic surfactant. (RUP)

Acetamiprid

- *Assail* 30 SG (1.5 to 2.5 oz.) or *Assail* 70WP (0.6 to 1.1 oz.) (7 days)

*Actara*, 2 to 3 oz. (0 days) Do not apply if a neonicotinoid was used at planting.

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Baythroid XL*, 1.6 to 2.8 fl oz. (0 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

Bifenthrin + Imidacloprid

- *Brigadier*, 3.8 to 9.85 fl oz. (1 day) (RUP)
- *Swagger*, 10.2 to 19.7 fl oz. (1 day) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero* EW (4.5 to 11.2 oz.) (1 day) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (1 day) (RUP)

Carbaryl

- *Carbaryl* 4L, 1 to 2 qt. (3 days)
- *Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (3 days)

*Coragen*, 3.5 to 5 fl oz. (1 day) Minimum of 5 days between applications; do not apply more than 15.4 fl oz. per season.

Dinotefuran

- *Scorpion* 35SL, 2 to 7 fl oz. (1 day)
- *Venom*, 1 to 4 oz. (1 day)

Do not use if neonicotinoids were used at planting.

*Endigo ZC*, 4 to 4.5 fl oz. (5 days) (RUP)

*Endosulfan* 3 EC, 0.66 to 1.33 qt. (4 days) (RUP)

Esfenvalerate

- *Adjour*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (1 day) (RUP)

*Gladiator*, 19 fl oz. (7 days) (RUP)

Imidacloprid. Additional generic brands available.

- *Admire* Pro, 1.3 to 2.2 fl oz. (0 days)
- *Nuprid* 1.6 F, 3.8 to 6.2 fl oz. (0 days)

Do not use if neonicotinoids were used at planting. Do not apply more than 19.2 oz/acre per season.

*Kryocide*, 8 to 16 lb. (14 days)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (5 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (5 days) (RUP)

*Leverage* 360, 3.8 to 4.1 fl oz. (0 days) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

Permethrin

- *Ambush* 25 W, 3.2 to 12.8 oz. (0 days) (RUP)
- *Perm-UP* 25DF (3.2 to 12.8 oz.) or *Perm-UP* 3.2 EC (2 to 8 oz.) (0 days) (RUP)

• *Pounce* 25 WP, 3.2 to 12.8 oz. (0 days) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (5 days) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 5 to 10 fl oz. (1 day)

*Rimon* 0.83EC, 9 to 12 fl oz. (1 day)

*Carbaryl* 4L, 1 to 2 qt. (3 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80

WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (3 days)

*Sivanto*, 10.5 - 14 fl oz/A.

Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (1 day)

*Voliam Flexi*, 4 to 7 oz. (1 day)

*Vydate* L, 2 to 4 pt. (3 days) (RUP)

APHIDS: Apply as needed. May be a problem on transplants.

Acetamiprid

- *Assail* 30 SG (2 to 4 oz.) or *Assail* 70WP (0.8 to 1.7 oz.) (7 days)

*Actara*, 2 to 3 oz. (0 days) Do not apply if a neonicotinoid was used at planting.

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Baythroid XL*, 1.6 to 2.8 fl oz. (0 days) (RUP)

*Belay* 50 WDG, 1.6 to 2.1 oz. (7 days)

*Beleaf* 50 SG, 2 to 2.8 oz. (0 days)

Bifenthrin

- *Bifenture* EC, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Brigade @* 2EC (2.1 to 5.2 fl oz.) or *Brigade* WSB (5.3 to 12.8 oz.) (1 day) (RUP)

• *Capture* 2 EC, 2.1 to 5.2 fl oz. (1 day) (RUP)

• *Discipline* 2EC, 2.1 to 5.2 fl oz. (1 day) (RUP)

• *Fanfare* 2EC, 2.1 to 5.2 fl oz. (1 day) (RUP)

• *Sniper*, 2.1 to 5.12 fl oz. (1 day) (RUP)

• *Tundra* EC, 2.1 to 5.2 fl oz. (1 day) (RUP)

Bifenthrin + Imidacloprid

• *Brigadier*, 5.1 to 9.85 fl oz. (1 day) (RUP)

• *Swagger*, 7.6 to 19.7 fl oz. (1 day) (RUP)

*Bifenture* 10 DF, 5.3 to 12.8 oz/A. (1 day)

*Diazinon* AG 500, 0.5 pt. (1 day) (RUP)

Dimethoate

- *Dimethoate* 4 EC, *Dimethoate* 400, *Dimethoate* 4E, 0.5 to 1 pt. (7 days)

*Endigo ZC*, 4 to 4.5 fl oz. (5 days) (RUP)

*Endosulfan* 3 EC, 0.66 to 1.33 qt. (4 days) (RUP)

Esfenvalerate

- *Adjour*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (1 day) (RUP)

*Exirel*, 13.5-20.5 oz/A. (1)

## Tomatoes

*Fulfill*, 2.75 oz. (7 days) May require 5 to 7 days for aphid mortality.

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

Imidacloprid. Additional generic brands available.

- *Admire Pro*, 1.3 to 2.2 fl oz. (0 days)
- *Nuprid 1.6 F*, 3.8 to 6.2 fl oz. (0 days)

Do not use if neonicotinoids were used at planting. Do not apply more than 19.2 oz/acre per season.

*Leverage 360*, 3.8 to 4.1 fl oz. (0 days) (RUP)

Malathion

- *Malathion 5* (1 pt.) or *Malathion 5 EC* (1.5 pt.) or *Malathion 57 EC* (1 to 2.5 pt.) or *Malathion 8* (1.5 pt.) or *Malathion 8 Aquamul* (1 to 1.56 pt.) (3 days for Malathion 5 EC, 1 day for others)

Methomyl

- *Lannate LV* (1.5 to 3 pt.) or *Lannate SP* (0.5 to 1 lb.) (1 day) (RUP)
- *Nudrin LV* (1.5 to 3 pt.) or *Nudrin SP* (0.5 to 1 lb.) (1 day) (RUP)

*Movento*, 4 to 5 fl oz. (1 day) Must be tank mixed with adjuvant having spreading and penetrating properties.

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 7 - 12 fl oz/A.

*Voliam Flexi*, 4 to 7 oz. (1 day)

*Vydate L*, 2 to 4 pt. (3 days) (RUP)

LEAFHOPPERS: Occasionally a problem early in the season. Apply as needed.

*Actara*, 2 to 3 oz. (0 days)

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Baythroid XL*, 1.6 to 2.8 fl oz. (0 days) (RUP)

*Belay 50 WDG*, 1.6 to 2.1 oz. (7 days)

Bifenthrin

- *Bifenture EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Brigade @ 2EC* (2.1 to 5.2 fl oz.) or *Brigade WSB* (5.3 to 12.8 oz.) (1 day) (RUP)
- *Capture 2 EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Discipline 2EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Fanfare 2EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Sniper*, 2.1 to 5.12 fl oz. (1 day) (RUP)
- *Tundra EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)

Bifenthrin + Imidacloprid

- *Brigadier*, 5.1 to 9.85 fl oz. (1 day) (RUP)
- *Swagger*, 7.6 to 19.7 fl oz. (1 day) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (1 day) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (1 day) (RUP)

*Bifenture 10 DF*, 5.3 to 12.8 oz/A. (1 day)

Carbaryl

- *Carbaryl 4L*, 0.5 to 1 qt. (3 days)
- *Sevin 4 F* (0.5 to 1 qt.) or *Sevin 80 S* (0.63 to 1.25 lb.) or *Sevin 80 WSP* (0.67 to 1.25 lb.) or *Sevin XLR Plus* (0.5 to 1 qt.) (3 days)

Dimethoate

- *Dimethoate 4 EC*, *Dimethoate 400*, *Dimethoate 4E*, 0.5 to 1 pt. (7 days)

Dinotefuran

- *Scorpion 35SL*, 2 to 7 fl oz. (1 day)
- *Venom*, 1 to 4 oz. (1 day)

Do not use if neonicotinoids were used at planting.

*Endigo ZC*, 4 to 4.5 fl oz. (5 days) (RUP)

*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)

Imidacloprid. Additional generic brands available.

- *Admire Pro*, 1.3 to 2.2 fl oz. (0 days)

- *Nuprid 1.6 F*, 3.8 to 6.2 fl oz. (0 days)

Do not use if neonicotinoids were used at planting. Do not apply more than 19.2 oz/acre per season.

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (5 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (5 days) (RUP)

*Leverage 360*, 3.8 to 4.1 fl oz. (0 days) (RUP)

*Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl 4L*, 0.5 to 1 qt. (3 days)

*Sevin 4 F* (0.5 to 1 qt.) or *Sevin 80 S* (0.63 to 1.25 lb.) or *Sevin 80 WSP* (0.67 to 1.25 lb.) or *Sevin XLR Plus* (0.5 to 1 qt.) (3 days)

*Sivanto*, 7 - 10.5 fl oz/A.

*Vetiva*, 14 to 17 fl oz. (1 day)

*Voliam Flexi*, 4 to 7 oz. (1 day)

HORNWORMS: Apply if numbers exceed 1/plant.

*Athena*, 7 to 17 fl oz. (7 days) (RUP)

*Avaunt*, 2.5 to 3.5 oz. (3 days)

Bacillus thuringiensis

- *Agree WG*, 0.5 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF* (0.25 to 1 lb.) or *DiPel ES* (1 to 2 pt.) (0 days)
- *Javelin WG*, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid XL*, 1.6 to 2.8 fl oz. (0 days) (RUP)

*Belt SC*, 1.5 fl oz. (1 day)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (1 day) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (1 day) (RUP)

Carbaryl

- *Carbaryl 4L*, 1 to 2 qt. (3 days)
- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

*Confirm 2F*, 6 to 8 fl oz. (early-season); 8 to 16 fl oz. (mid- to late-season). (7 days)

*Coragen*, 2 to 5 fl oz. (1 day) Minimum of 5 days between applications; do not apply more than 15.4 fl oz. per season.

*Danitol 2.4 EC*, 10.67 fl oz. (3 days) (RUP)

*Endigo ZC*, 4 to 4.5 fl oz. (5 days) (RUP)

*Endosulfan 3 EC*, 0.66 to 1.33 qt. (4 days) (RUP)

Esfenvalerate

- *Adjourn*, 2.9 to 5.8 fl oz. (1 day) (RUP)
- *Asana XL*, 2.9 to 5.8 fl oz. (1 day) (RUP)
- *S-FenvaloStar*, 2.9 to 5.8 fl oz. (1 day) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)

*Intrepid 2F*, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)

*Kryocide*, 8 to 16 lb. (14 days)

Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (5 days) (RUP)
- *Warrior II* with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (5 days) (RUP)

*Leverage 360*, 3.8 to 4.1 fl oz. (0 days) (RUP)

Methomyl

- *Lannate LV* (1.5 to 3 pt.) or *Lannate SP* (0.5 to 1 lb.) (1 day) (RUP)
  - *Nudrin LV* (1.5 to 3 pt.) or *Nudrin SP* (0.5 to 1 lb.) (1 day) (RUP)
- Mustang Max*, 2.24 to 4 oz. (1 day) (RUP)

Permethrin

- *Ambush 25 W*, 3.2 to 12.8 oz. (0 days) (RUP)

- *Perm-UP 25DF* (3.2 to 12.8 oz.) or *Perm-UP 3.2 EC* (2 to 8 oz.) (0 days) (RUP)
- *Pounce 25 WP*, 3.2 to 12.8 oz. (0 days) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (5 days) (RUP)  
*Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)  
*Pyrenone*, 1 to 12 fl oz. (0 days)  
*Radiant SC*, 5 to 10 fl oz. (1 day)  
*Rimon 0.83EC*, 9 to 12 fl oz. (1 day)  
*Carbaryl 4L*, 1 to 2 qt. (3 days)  
*Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

**Spinosad**

- *Entrust* (1 to 2 oz.) or *Entrust SC* (3 to 6 fl oz.) (1 day)

*Vetica*, 12 to 17 fl oz. (1 day)  
*Voliam Flexi*, 4 to 7 oz. (1 day)

CABBAGE LOOPERS: Apply to prevent larvae from pupating on ripe fruit or if defoliation is greater than 10%.

*Athena*, 7 to 17 fl oz. (7 days) (RUP)  
*Avaunt*, 2.5 to 3.5 oz. (3 days)

***Bacillus thuringiensis***

- *Agree WG*, 0.5 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF* (0.5 to 1 lb.) or *DiPel ES* (1 to 2 pt.) (0 days)
- *Javelin WG*, 0.12 to 1.5 lb. (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid XL*, 2.1 to 2.8 fl oz. (0 days) (RUP)  
*Belt SC*, 1.5 fl oz. (1 day)

**Bifenthrin**

- *Bifenture EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Brigade @ 2EC* (2.1 to 5.2 fl oz.) or *Brigade WSB* (5.3 to 12.8 oz.) (1 day) (RUP)
- *Capture 2 EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Discipline 2EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Fanfare 2EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Sniper*, 2.1 to 5.12 fl oz. (1 day) (RUP)
- *Tundra EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)

**Bifenthrin + Imidacloprid**

- *Brigadier*, 3.8 to 9.85 fl oz. (1 day) (RUP)
- *Swagger*, 10.2 to 19.7 fl oz. (1 day) (RUP)

**Bifenthrin + Zeta-Cypermethrin**

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (1 day) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (1 day) (RUP)

*Bifenture 10 DF*, 5.3 to 12.8 oz/A. (1 day)  
*Confirm 2F*, 6 to 8 fl oz. (early-season); 8 to 16 fl oz. (mid- to late-season). (7 days)  
*Coragen*, 3.5 to 5 fl oz. (1 day) Minimum of 5 days between applications; do not apply more than 15.4 fl oz. per season.  
*Endigo ZC*, 4 to 4.5 fl oz. (5 days) (RUP)  
*Endosulfan 3 EC*, 1 to 1.33 qt. (4 days) (RUP)

**Esfenvalerate**

- *Adjourn*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (1 day) (RUP)

*Exirel*, 10-17 oz/A. (1)  
*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)  
*Intrepid 2F*, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)  
*Kryocide*, 8 to 16 lb. (14 days)

**Lambda-cyhalothrin**

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (5 days) (RUP)
- *Warrior II* with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (5 days) (RUP)

*Leverage 360*, 3.8 to 4.1 fl oz. (0 days) (RUP)

**Methomyl**

- *Lannate LV* (1.5 to 3 pt.) or *Lannate SP* (0.5 to 1 lb.) (1 day) (RUP)
- *Nudrin LV* (1.5 to 3 pt.) or *Nudrin SP* (0.5 to 1 lb.) (1 day) (RUP)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

**Permethrin**

- *Ambush 25 W*, 3.2 to 12.8 oz. (0 days) (RUP)
- *Perm-UP 25DF* (3.2 to 12.8 oz.) or *Perm-UP 3.2 EC* (2 to 8 oz.) (0 days) (RUP)
- *Pounce 25 WP*, 3.2 to 12.8 oz. (0 days) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (5 days) (RUP)  
*Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)  
*Pyrenone*, 1 to 12 fl oz. (0 days)  
*Radiant SC*, 5 to 10 fl oz. (1 day)  
*Rimon 0.83EC*, 9 to 12 fl oz. (1 day)

**Spinosad**

- *Entrust* (1 to 2 oz.) or *Entrust SC* (3 to 6 fl oz.) (1 day)

*Vetica*, 12 to 17 fl oz. (1 day)  
*Voliam Flexi*, 4 to 7 oz. (1 day)

TOMATO FRUITWORM: Occasionally a problem after fruit begins to form. Apply if damage is observed.

*Avaunt*, 3.5 oz. (3 days)

***Bacillus thuringiensis***

- *Agree WG*, 0.5 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 1 lb. (0 days)
- *DiPel DF* (0.5 to 1 lb.) or *DiPel ES* (1 to 4 pt.) (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

*Baythroid XL*, 1.6 to 2.8 fl oz. (0 days) (RUP)  
*Belt SC*, 1.5 fl oz. (1 day)

**Bifenthrin + Zeta-Cypermethrin**

- *Hero* (4 to 10.3 oz.) or *Hero EW* (4.5 to 11.2 oz.) (1 day) (RUP)
- *Steed*, 3.5 to 4.7 fl oz. (1 day) (RUP)

**Carbaryl**

- *Carbaryl 4L*, 1 to 2 qt. (3 days)
- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

*Coragen*, 3.5 to 5 fl oz. (1 day)  
*Danitol 2.4 EC*, 10.67 fl oz. (3 days) (RUP)  
*Endigo ZC*, 4 to 4.5 fl oz. (5 days) (RUP)  
*Endosulfan 3 EC*, 1.33 qt. (4 days) (RUP)

**Esfenvalerate**

- *Adjourn*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (1 day) (RUP)

*Exirel*, 7-13.5 oz/A. (1)  
*Gladiator*, 10 to 19 fl oz. (7 days) (RUP)  
*Intrepid 2F*, 4 to 8 fl oz (early-season applications to young, small crops) or 8 to 10 fl oz (mid- to late-season applications). (1 day)  
*Kryocide*, 8 to 16 lb. (14 days)

**Lambda-cyhalothrin**

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (5 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (5 days) (RUP)

*Leverage 360*, 3.8 to 4.1 fl oz. (0 days) (RUP)

**Malathion**

- *Malathion 57 EC* (1 to 2.5 pt.) or *Malathion 8 Aquamul* (1.56 pt.) (1 day)

**Methomyl**

- *Lannate LV* (1.5 to 3 pt.) or *Lannate SP* (0.5 to 1 lb.) (1 day) (RUP)
- *Nudrin LV* (1.5 to 3 pt.) or *Nudrin SP* (0.5 to 1 lb.) (1 day) (RUP)

## Tomatoes

Mustang Max, 2.24 to 4 oz. (1 day) (RUP)

### Permethrin

- *Ambush* 25 W, 3.2 to 12.8 oz. (0 days) (RUP)
- *Perm-UP* 25DF (3.2 to 12.8 oz.) or *Perm-UP* 3.2 EC (2 to 8 oz.) (0 days) (RUP)
- *Pounce* 25 WP, 3.2 to 12.8 oz. (0 days) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (5 days) (RUP)

*Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)

*Pyrethrin*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 5 to 10 fl oz. (1 day)

*Rimon* 0.83EC, 9 to 12 fl oz. (1 day)

*Carbaryl* 4L, 1 to 2 qt. (3 days)

*Sevin* 4 F (1 to 2 qt.) or *Sevin* 80 S (1.25 to 2.5 lb.) or *Sevin* 80 WSP (1.25 to 2.5 lb.) or *Sevin* XLR Plus (1 to 2 qt.) (3 days)

### Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust* SC (3 to 6 fl oz.) (1 day)

*Vetiva*, 12 to 17 fl oz. (1 day)

*Voliam* Flexi, 4 to 7 oz. (1 day)

FRUIT FLIES: May be a problem on certain varieties during harvest season. Eggs are laid in cracks of ripening fruit. Apply as needed.

*Diazinon* AG 500, 0.5 to 1.5 pt. (1 day) (RUP)

### Malathion

- *Malathion* 5, *Malathion* 5 EC, or *Malathion* 57 EC (2.5 pt.) or *Malathion* 8 (2 pt.) or *Malathion* 8 Aquamul (1.56 pt.) (3 days for *Malathion* 5 EC, 1 day for others)

*Pyrethrin*, 1 to 12 fl oz. (0 days)

THRIPS:

### Acetamiprid

- *Assail* 30 SG (4 oz.) or *Assail* 70WP (1.7 oz.) (7 days)

*Agri-Mek* 0.15 EC, 8 to 16 fl oz. (7 days) (RUP)

*Athena*, 13.5 to 17 fl oz. (7 days) (RUP)

*Baythroid* XL, 2.1 to 2.8 fl oz. (0 days) (RUP)

### Bifenthrin

- *Bifenture* EC, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Brigade @* 2EC (2.1 to 5.2 fl oz.) or *Brigade* WSB (5.3 to 12.8 oz.) (1 day) (RUP)
- *Capture* 2 EC, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Discipline* 2EC, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Fanfare* 2EC, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Sniper*, 2.1 to 5.12 fl oz. (1 day) (RUP)
- *Tundra* EC, 2.1 to 5.2 fl oz. (1 day) (RUP)

### Bifenthrin + Imidacloprid

- *Brigadier*, 5.1 to 9.85 fl oz. (1 day) (RUP)
- *Swagger*, 7.6 to 19.7 fl oz. (1 day) (RUP)

*Bifenture* 10 DF, 5.3 to 12.8 oz/A. (1 day)

### Dinotefuran

- *Scorpion* 35SL, 2 to 7 fl oz. (1 day)
- *Venom*, 1 to 4 oz. (1 day) Do not use if neonicotinoids were used at planting.

Do not use if neonicotinoids were used at planting.

*Exirel*, 13.5-20.5 oz/A. (1) foliar feeding only

*Hero*, 10.3 oz. (7 days) (RUP)

### Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (5 days) (RUP)
- *Proaxis*, 2.56 to 3.84 fl oz. (5 days) (RUP)
- *Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (5 days) (RUP)

*Leverage* 360, 3.8 to 4.1 fl oz. (0 days) (RUP)

*Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

*Lambda-Cy*, 2.56 to 3.84 fl oz. (5 days) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (5 days) (RUP)

*Warrior* II with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (5 days) (RUP)

*Pyrethrin*, 1 to 12 fl oz. (0 days)

*Radiant* SC, 6 to 10 fl oz. (1 day)

*Rimon* 0.83EC, 12 fl oz. (1 day)

### Spinosad

- *Entrust* (1.25 to 2.5 oz.) or *Entrust* SC (4 to 8 fl oz.) (1 day)

WHITEFLIES:

### Acetamiprid

- *Assail* 30 SG (2.5 to 4 oz.) or *Assail* 70WP (1.1 to 1.7 oz.) (7 days)

*Actara*, 3 to 5.5 oz. (0 days) Do not apply if a neonicotinoid was used at planting.

*Athena*, 13.5 to 17 fl oz. (7 days) (RUP)

### Bifenthrin

- *Bifenture* EC, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Brigade @* 2EC (2.1 to 5.2 fl oz.) or *Brigade* WSB (5.3 to 12.8 oz.) (1 day) (RUP)
- *Capture* 2 EC, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Discipline* 2EC, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Fanfare* 2EC, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Sniper*, 2.1 to 5.12 fl oz. (1 day) (RUP)
- *Tundra* EC, 2.1 to 5.2 fl oz. (1 day) (RUP)

### Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero* EW (11.2 oz.) (1 day) (RUP)
- *Brigadier*, 5.1 to 9.85 fl oz. (1 day) (RUP)

### Dinotefuran

- *Scorpion* 35SL, 2 to 7 fl oz. (1 day)
- *Venom*, 1 to 4 oz. (1 day)

Do not use if neonicotinoids were used at planting.

*Endosulfan* 3 EC, 1.33 qt. (4 days) (RUP)

### Esfenvalerate

- *Adjourm*, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *Asana* XL, 5.8 to 9.6 fl oz. (1 day) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (1 day) (RUP)

*Gladiator*, 14 to 19 fl oz. (7 days) (RUP)

### Imidacloprid. Additional generic brands available.

- *Admire* Pro, 1.3 to 2.2 fl oz. (0 days)
- *Nuprid* 1.6 F, 3.8 to 6.2 fl oz. (0 days)

Do not use if a neonicotinoid was used at planting. Do not apply more than 19.2 oz per season

*Leverage* 360, 4.1 fl oz. (0 days) (RUP)

*Movovento*, 4 to 5 fl oz. (1 day) Must be tank mixed with adjuvant having spreading and penetrating properties.

*Mustang* Max, 3.2 to 4 oz. (1 day) (RUP)

*Oberon* 2 SC, 7 to 8.5 fl oz. (7 days)

*Portal*, 2.0 pt. (1 day)

*Pyrethrin*, 1 to 12 fl oz. (0 days)

*Rimon* 0.83EC, 12 fl oz. (1 day)

*Vetiva*, 14 to 17 fl oz. (1 day)

*Voliam* Flexi, 4 to 7 oz. (1 day)

CUTWORM:

### Bacillus thuringiensis

- *Biobit* HP, 0.5 to 1 lb. (0 days)
- *DiPel* DF (0.5 to 1 lb.) or *DiPel* ES (1 to 2 pt.) (0 days)
- *XenTari*, 0.5 to 1.5 lb. (0 days)

### Carbaryl

- *Carbaryl* 4L, 2 qt. (3 days)
- *Sevin* 4 F (2 qt.) or *Sevin* 80 S (2.5 lb.) or *Sevin* 80 WSP (2.5 lb.) or *Sevin* XLR Plus (2 qt.) (3 days)

### Lambda-cyhalothrin

- *Lambda-Cy*, 1.92 to 3.2 fl oz. (5 days) (RUP)

- *Warrior II* with Zeon Technology (0.96 to 1.6 fl oz.) or *Warrior* with Zeon Technology (1.92 to 3.2 fl oz.) (5 days) (RUP)

Methomyl

- *Lannate LV* (1.5 pt.) or *Lannate SP* (0.5 lb.) (1 day) (RUP)
- *Nudrin LV* (1.5 pt.) or *Nudrin SP* (0.5 lb.) (1 day) (RUP)

*Proaxis*, 1.92 to 3.2 fl oz. (5 days) (RUP)

*Carbaryl 4L*, 2 qt. (3 days)

*Sevin 4 F* (2 qt.) or *Sevin 80 S* (2.5 lb.) or *Sevin 80 WSP* (2.5 lb.) or *Sevin XLR Plus* (2 qt.) (3 days)

*Steed*, 3.5 to 4.7 fl oz. (1 day) (RUP)

## ARMYWORM:

*Avaunt*, 3.5 oz. (3 days)

Bacillus thuringiensis

- *Agree WG*, 0.5 to 2 lb. (0 days)
- *Biobit HP*, 0.5 to 2 lb. (0 days)
- *DiPel DF* (1 to 2 lb.) or *DiPel ES* (2 to 4 pt.) (0 days)
- *XenTari*, 0.5 to 2 lb. (0 days)

Carbaryl

- *Carbaryl 4L*, 1 to 2 qt. (3 days)
- *Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

*Coragen*, 3.5 to 5 fl oz. (1 day) Minimum of 5 days between applications; do not apply more than 15.4 fl oz. per season.

*Danitol 2.4 EC*, 10.67 fl oz. (3 days) (RUP)

*Diazinon AG 500*, 0.75 to 1 pt. (1 day) (RUP)

*Endosulfan 3 EC*, 1.33 qt. (4 days) (RUP)

*Exirel*, 7-13.5 oz/A. (1)

Lambda-cyhalothrin

- *Lambda-Cy*, 2.56 to 3.84 fl oz. (5 days) (RUP)
- *Warrior II* with Zeon Technology (1.28 to 1.92 fl oz.) or *Warrior* with Zeon Technology (2.56 to 3.84 fl oz.) (5 days) (RUP)

Malathion

- *Malathion 57 EC* (1 to 2.5 pt.) or *Malathion 8 Aquamul* (1.56 pt.) (1 day)

Methomyl

- *Lannate LV* (1.5 to 3 pt.) or *Lannate SP* (0.5 to 1 lb.) (1 day) (RUP)
- *Nudrin LV* (1.5 to 3 pt.) or *Nudrin SP* (0.5 to 1 lb.) (1 day) (RUP)

*Proaxis*, 2.56 to 3.84 fl oz. (5 days) (RUP)

*Proclaim*, 2.4 to 4.8 oz. (7 days) (RUP)

*Radiant SC*, 5 to 10 fl oz. (1 day)

*Rimon 0.83EC*, 9 to 12 fl oz. (1 day)

*Carbaryl 4L*, 1 to 2 qt. (3 days)

*Sevin 4 F* (1 to 2 qt.) or *Sevin 80 S* (1.25 to 2.5 lb.) or *Sevin 80 WSP* (1.25 to 2.5 lb.) or *Sevin XLR Plus* (1 to 2 qt.) (3 days)

Spinosad

- *Entrust* (1.25 to 2.5 oz.) or *Entrust SC* (4 to 8 fl oz.) (1 day)
- *Voliam Flexi*, 4 to 7 oz. (1 day)

## SWEET POTATO WHITEFLY, SILVER LEAF WHITEFLY:

Acetamiprid

- *Assail 30 SG*, 2.5 to 4 oz. (7 days)
- *Assail 70WP*, 1.1 to 1.7 oz. (7 days)

## PSYLID, WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

## CHEMIGATION TREATMENT:

ARMYWORM, COLORADO POTATO BEETLE, HORNWORM, TOMATO FRUITWORM:

*Verimark*, 5-10 oz/A. (1)

FLEA BEETLE, LEAFMINERS, LOOPERS, APHIDS, WHITEFLY, THRIPS:

*Verimark*, 6.75-10 oz/A. (1)

## EUROPEAN CORN BORER:

*Verimark*, 10 oz/A. (1)

**MITES** Usually two-spotted. May be a problem in hot, dry weather.Abamectin

- *Agri-Mek* 0.15 EC (8 to 16 fl oz.) or *Agri-Mek SC* (1.75 to 3.5 fl oz.) (7 days) Use with a non-ionic surfactant. (RUP)

Bifenazate

- *Acramite 50WS*, 0.75 to 1 lb. (3 days)

Bifenthrin

- *Bifenture EC*, 5.12 to 6.4 fl oz. (1 day) (RUP)
- *Bifenture 10 DF*, 12.8 to 16 oz/A. (1 day)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade WSB* (12.8 to 16 oz.) (1 day) (RUP)
- *Capture 2 EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Discipline 2EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)
- *Fanfare 2EC*, 5.12 to 6.4 fl oz. (1 day) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (1 day) (RUP)
- *Tundra EC*, 2.1 to 5.2 fl oz. (1 day) (RUP)

Bifenthrin + Avermectin

- *Athena*, 13.5 to 17 fl oz. (7 days) (RUP)

Bifenthrin + Zeta-Cypermethrin

- *Hero* (10.3 oz.) or *Hero EW* (11.2 oz.) (1 day) (RUP)

Fenpropathrin

- *Danitol 2.4 EC*, 10 2/3 fl oz. (3 days) (RUP)

Fenpyroximate

- *Portal*, 2 pt. (1 day)

Malathion

- *Malathion 5*, *Malathion 5 EC*, or *Malathion 8* (1.5 pt.) or *Malathion 8 Aquamul* (1 to 1.56 pt.) (3 days for *Malathion 5 EC*, 1 day for others)

Spiromesifen

- *Oberon 2 SC*, 7 to 8.5 fl oz. (7 days)

Zeta-Cypermethrin + Avermectin

- *Gladiator*, 19 fl oz. (7 days) (RUP)

**SLUGS**

*Deadline M-Ps 4%* (20 to 40 lb) or *Metaldehyde 3.5 G* (30 to 40 lb) Apply between rows. Avoid contact to edible product.

**DISEASES****SEED TREATMENT:**

DAMPING OFF, PRE-EMERGENCE (*Pythium* spp., *Rhizoctonia solani*, *Phytophthora* spp.):

Thiram

- *42-S Thiram*, *Thiram 480DP*, *Thiram 50 WP Dyed*, 6 oz/100 lb seed. Apply to seed before planting.

**PREPLANT SOIL FUMIGATION:**

FUSARIUM WILT (*Fusarium oxysporum*), VERTICILLIUM WILT (*Verticillium albo-atrum*): Apply to production fields in the spring before planting. **Note:** Most fumigants applied in the soil for control of disease organisms will also control soil insects, nematodes and weed seeds.

Soil sterilization by fumigation is best achieved by proper application of material. Correct soil moisture, temperature, and soil structure is needed for effective control of soil-borne pests. Special care is needed to seal fumigants in target zone for required time periods. This can be achieved by soil packing or immediate tarping.

1,3 Dichloropropene/chloropicrin

- *Telone C35*, 13-35 gal. (RUP)

Metam Potassium

- *Sectagon-K54*, 30-60 gal. (RUP)

Metam Sodium

- *Sectagon 42*, 37.5-75 gal. (RUP)

## Tomatoes

### GREENHOUSE PREPLANT INCORPORATION:

DAMPING OFF (*Pythium* spp.), ROOT ROT (*Rhizoctonia* spp.):

#### Gliocladium virens GL-21

- *SoilGard* 12 G, 1 to 1.5 lb per cubic yard. Biological control product that needs to be applied before disease development. Control may be limited under heavy disease pressure.

### PREPLANT INCORPORATED:

DAMPING OFF (*Pythium* spp.):

Mefenoxam. Apply as a broadcast preplant incorporation or a surface application. For banded applications use a 7 in. band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone after planting with 1/2 to 1 in. of sprinkler irrigation.

- *Ridomil* Gold GR, 20 lb.
- *Ridomil* Gold SL, 1 pt. (7 days)
- *Ultra Flourish*, 2 to 4 pt.

ROOT and FRUIT ROT (*Pythium* spp., *Phytophthora* spp.):

Mefenoxam. Apply *Ridomil* 4 to 6 weeks after planting as a surface application or a soil surface spray under vines followed by 1/2 to 1 in. of water or injected based on a 7 in. band. A second application before the last irrigation may be made up to 4 weeks before harvest.

- *Ridomil* Gold GR, 20 lb (4 weeks). (4 weeks) A third application at 10 lb can be made 4 weeks before harvest.
- *Ridomil* Gold SL, 1 pt. (7 days)
- *Ultra Flourish*, 2 to 4 pt (4 weeks). (4 weeks) **Note:** Observe limit of active ingredient/crop on label.

### GREENHOUSE TREATMENT:

BACTERIAL CANKER (*Clavibacter michiganensis* subsp.

*michiganensis*), BACTERIAL SPOT (*Xanthomonas vesicatoria*),

BACTERIAL SPECK (*Pseudomonas tomat*): Apply every 7 to 10 days after disease appearance.

#### Acibenzolar-S-methyl

- *Actigard*, 1/3 to 3/4 oz per 100 gal of water. (14 days) Do not apply more than 6 oz of Actigard per acre per season.

#### Copper Ammonium Carbonate

- *Copper* Count N, 4 tablespoons (speck) or 4 to 8 tablespoons (spot) per 1000 sq ft.

#### Copper Hydroxide

- *Champ* DP Dry Prill, *Champ* Formula 2 F, 1 1/2 to 2 1/4 tablespoons per 1000 sq ft (speck and spot).
- *Kocide* 3000, 0.5-1.5 tbl / 1000 ft. (0 day)

#### Copper Hydroxide + Copper Oxychloride

- *Badge* X2, 0.75 to 1.75 lb. (0 days)

#### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1.8 pt. (0 days)

#### Mancozeb

- *Dithane* DF Rainshield, *Dithane* M-45, 1 1/2 to 3 lb. (5 days) Tank mix 1/2 to full rate of Dithane with a full rate of fixed copper fungicide, and apply at intervals recommended by the copper fungicide label (speck and spot).
- *Dithane* F-45 Rainshield, 1.2 to 2.4 qt. Tank mix 1/2 to full rate of Dithane with a full rate of fixed copper fungicide, and apply at intervals recommended by the copper fungicide label (speck and spot)

**Note:** Most fungicides that protect against bacterial speck and/or spot may provide protection against bacterial canker.

### DRIP APPLICATION:

LATE BLIGHT (*Phytophthora infestans*), PHYTOPHTHORA BLIGHT (*Phytophthora capsici*):

#### \* Ametoctradin + Dimethomorph

- *Presidio*, 3-4 fl oz. (2 days)
- *Zapro*, 14 fl oz. (4 days)

#### \* Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days)
- *Zapro*, 14 fl oz. (4 days)

### FOLIAR TREATMENT:

DAMPING OFF (*Pythium* spp.):

#### Fosetyl-Aluminum

- *Aliette* WDG, 2.5 to 5 lb, 7- to 14-day intervals. (14 days) **Note:** Do not tank mix with copper products.

WHITE MOLD (*Sclerotinia sclerotiorum*):

#### \* Mancozeb

- *Dithane* DF Rainshield, *Dithane* M-45, *Dithane* WSP, 1 1/2 to 3 lb. (5 days)
- *Dithane* F-45 Rainshield, 1 1/5 to 2 2/5 qt. (5 days)
- *Manzate* Pro-Stick, 1 1/2 to 3 lb, 7- to 10-day intervals. (5 days)
- *Penncozeb* 75 DF, 3/4 to 3 lb (*Cladosporium*). (5 days)

#### Fluxapyroxad + Pyraclostrobin

- *Priaxor* Xemium Brand Fungicide, 4 - 8 fl oz suppression. (0 days) Suppression only.

#### Pyraclostrobin

- *Cabrio*, 12-16 oz (suppression). (0 days)

BACTERIAL CANKER (*Clavibacter michiganensis* subsp.

*michiganensis*), BACTERIAL SPOT (*Xanthomonas vesicatoria*),

BACTERIAL SPECK (*Pseudomonas tomat*):

#### Bacillus subtilis

- *Serenade*, 2 to 6 qt. (0 days) Biological control product that needs to be applied before disease development. Control will be limited under heavy disease pressure.
- *Serenade* Max, 1 - 3 lb every 7 to 10 days. (0 days)

#### Copper Ammonium Carbonate

- *Copper* Count N, 1 1/2 to 2 1/2 qt (processing), 1 1/2 to 3 qt (fresh market) (speck, spot). (0 days)

#### Copper Hydroxide

- *Champ* DP Dry Prill, 1 1/3 lb 10 to 30 day intervals (speck) or 1 1/3 to 2 2/3 lb (spot), 7-to 10-day intervals. (0 days)
- *Champ* Formula 2 F, 1 1/3 pt. (0 days)
- *Champ* WG, 1.06 lb (spot) or 2 lb (speck). (0 days)
- *Kocide* 3000, 0.75 to 1.75 lb. (0 day)
- *Nu-Cop* 3 L, 1 1/3 pt (processing), 1 1/3 to 4 pt (fresh market). (0 days)
- *Nu-Cop* 50 DF, 1 lb (processing), 3.2 lb (fresh market). (0 days)
- *Nu-Cop* HB, 1 lb (processing), 1 to 3.2 lb (fresh market). (0 days)

#### Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1.8 pt. (0 days)

#### Copper Oxychloride + Copper Sulfate

- C-O-C-S WDG, 1 lb (processing), 1 to 3.1 lb (fresh market) (spot). (0 days)

#### Copper Sulfate

- *Basic* Copper 53, 0.75 to 1 lb (processing), 3 lb (fresh market) (speck, spot). (0 days) May be used through irrigation equipment.
- *Cuprofix* Ultra 40 Dispers, 0.75 to 3 lb (fresh market), 0.75 to 1.33 lb (processing). (0 days)

#### Famoxadone + Cymoxanil

- *Tanos*, 8 oz. (3 days)

#### Mancozeb

- *Koverall*, 1.5 - 3 lb. (5 days)

#### Mancozeb + Copper Hydroxide

- *ManKocide*, 1.7 lb (processing), 1 to 3 lb (fresh market) (speck, spot). (5 days)

#### Quinoxifen

- *Quintec*, 6 fl oz. Suppression only

**Note:** Fungicides that protect against bacterial speck and/or spot may provide protection against bacterial canker.

EARLY BLIGHT (*Alternaria solani*):\* Azoxystrobin

- *Quadris*, 5 to 6.2 fl oz. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

\* Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 1.3 to 1.6 pt every 7 - 21 days. (0 days)

\* Azoxystrobin + Difenconazole

- *Quadris Top*, 8 fl oz. (1 day) No more than two consecutive applications before alternating with another fungicide with a different mode of action.

\* Boscalid

- *Endura*, 2.5 to 3.5 oz. (0 days)

\* Chlorothalonil

- *Bravo Ultrex*, 1.3 to 1.8 lb (foliage) or 1.8 to 2.6 lb (fruit). (0 days)
- *Bravo Weather Stik*, *Equus 720 SST*, 1 3/8 to 2 pt (foliage) or 2 to 2.75 pt (fruit). (0 days)
- *Echo 90 DF*, 1 1/8 to 1 5/8 lb (foliage) or 1 5/8 to 2 1/2 lb (fruit). (0 days)
- *Equus DF*, 1.3 to 1.8 lb (foliage) or 1.8 to 2.6 lb (fruit). (0 days)

\* Difenconazole + Cyprodinil

- *Inspire Super*, 16 to 20 fl oz. (0 days)

\* Mancozeb

- *Dithane DF Rainshield*, *Dithane M-45*, *Dithane WSP*, 1 1/2 to 3 lb. (5 days)
- *Dithane F-45 Rainshield*, 1 1/5 to 2 2/5 qt. (5 days)
- *Koverall*, 0.75 - 1.5 lb. (5 days)
- *Manzate 80 WP* (1 1/2 to 3 lb) or *Manzate Pro-Stick* (0.75 to 1.5 lb) (5 days)
- *Manzate Max*, 0.6 to 2.4 qt. (5 days)
- *Penncozeb 75 DF*, 0.75 to 3 lb. (5 days)

\* Pyraclostrobin

- *Cabrio*, 8-12 oz. (0 days) Do not apply more than one application before alternating with another chemical.

\* Trifloxystrobin

- *Flint*, *Gem 500*, 2 to 3 oz. (3 days)

\* Ziram

- *Ziram 76 DF*, 3 to 4 lb, 7- to 14-day intervals. (7 days) Do not use on cherry tomatoes.

*Bacillus amyloliquefaciens*

- *Serifel*, 4 - 16 fl oz. (0 day)

*Bacillus subtilis*

- *Serenade*, 2 to 6 qt. (0 days) Biological control product that needs to be applied before disease development. Control will be limited under heavy disease pressure.

*Bacillus subtilis*

- *Serenade Max*, 1 - 3 lb. (0 days)

Chlorothalonil

- *Echo 720*, 1 3/8 to 2 pt (foliage) or 2 to 3 pt (fruit).

Copper Ammonium Carbonate

- *Copper Count N*, 1 1/2 to 2 1/2 qt (processing), 1 1/2 to 3 qt (fresh market) (speck, spot). (0 days)

Copper Hydroxide

- *Champ DP Dry Prill*, 1 1/3 to 2 lb (fresh market), 1.4 lb (processing). (0 days)
- *Champ Formula 2 F*, 1 1/3 pt. (0 days)
- *Champ WG*, 1.06 lb. (0 days)
- *Kocide 3000*, 0.75 to 1.75 lb. (0 day)
- *Nu-Cop 3 L*, 1 1/3 pt (processing), 1 1/3 to 4 pt (fresh market). (0 days)
- *Nu-Cop 50 DF*, 1 lb (processing), 3.2 lb (fresh market). (0 days)

- *Nu-Cop HB*, 1 lb (processing), 1 to 3.2 lb (fresh market). (0 days)

Copper Hydroxide + Copper Oxchloride

- *Badge SC*, 1.8 pt. (0 days)
- *Badge X2*, 0.75 to 1.75 lb. (0 days)

Copper Oxchloride + Copper Sulfate

- *C-O-C-S WDG*, 1 lb (processing), 1 to 3.1 lb (fresh market). (0 days)

Copper Sulfate

- *Basic Copper 53*, 0.75 to 1 lb (processing), 3 lb (fresh market) (speck, spot). (0 days)
- *Cuprofix Ultra 40 Disperss*, 0.75 to 3 lb (fresh market), 0.75 to 1.33 lb (processing). (0 days)

Famoxadone + Cymoxanil

- *Tanos*, 6 to 8 oz. (3 days)

Fenamidone

- *Reason 500 SC*, 5.5 - 8.2 fl oz. (14 days) No more than 1 application before alternating.

Fluxapyroxad + Pyraclostrobin

- *Priaxor Xemium Brand Fungicide*, 4 - 8 fl oz. (0 days)

Mancozeb + Copper Hydroxide

- *ManKocide*, 1.7 lb (processing), 1 to 3 lb (fresh market). (5 days)

Mancozeb + Zoxamide

- *Gavel 75 DF*, 1.5 - 2.0 lb. (5 days)

Mandipropamid + Difenconazole

- *Revus Top*, 5.5-7 fl oz. (1 day)

Mefenoxam + Chlorothalonil

- *Ridomil Gold Bravo*, 2.5 pt. (5 days)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Penthiopyrad

- *Fontelis*, 16 - 24 fl oz. (0 days)

Potassium Bicarbonate

- *Armcarb 100*, 2.5 to 5 lb. (0 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 4.5 to 5.5 pt (foliage) or 7 pt (fruit). (0 days)

Propamocarb

- *Previcur Flex*, 0.7 to 1.5 pt every 7 to 10 days. (5 days) Use a tank mix partner (see label).

Pyrimethanil

- *Scala*, 7 fl oz. (1 day)

Zoxamide + chlorothalonil

- *Zing!*, 36 fl oz. (5 days)

LATE BLIGHT (*Phytophthora infestans*):\* Ametoctradin + Dimethomorph

- *Zampro*, 14 fl. oz. (4 days)

\* Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 1.3 to 1.6 pt every 7 - 21 days. (0 days)

\* Chlorothalonil

- *Bravo Ultrex*, 1.3 to 1.8 lb (foliage) or 1.8 to 2.6 lb (fruit). (0 days)
- *Bravo Weather Stik*, *Equus 720 SST*, 1 3/8 to 2 pt (foliage) or 2 to 2.75 pt (fruit). (0 days)
- *Echo 720*, 1 3/8 to 2 pt (foliage) or 2 to 3 pt (fruit). (0 days)
- *Echo 90 DF*, 1 1/8 to 1 5/8 lb (foliage) or 1 5/8 to 2 1/2 lb (fruit). (0 days)
- *Equus DF*, 1.3 to 1.8 lb (foliage) or 1.8 to 2.6 lb (fruit).

\* Cyazofamid

- *Ranman 400SC*, 2.1 to 2.75 fl oz every 7 to 10 days. (0 days)

\* Cymoxanil

- *Curzate 60 DF*, 3.2 to 5 oz every 5 - 7 days. (3 days) Use only in combination with a labeled rate of a protectant fungicide.

\* Dimethomorph

- *Forum*, 6 fl oz. (4 days)

## Tomatoes

### \* Fenamidone

- Reason 500 SC, 5.5 to 8.2 fl oz every 5 to 10 days. (14 days) No more than 1 application before alternating.

### \* Fluxapyroxad + Pyraclostrobin

- Priaxor Xemium Brand Fungicide, 8 fl oz. (0 days) Suppression only.

### \* Mancozeb + Zoxamide

- Gavel 75 DF, 1.5-2.0 lb. (5 days)

### \* Mandipropamid

- Revus, 5.5 to 8 fl oz. (1 day) No more than 2 consecutive applications.

### \* Mefenoxam + Chlorothalonil

- Ridomil Gold Bravo, 2.5 pt. (5 days) Maximum 3 applications.

### \* Mefenoxam + Copper Hydroxide

- Ridomil Gold Copper, 1.35 lb (processing), 2 lb (fresh market). (14 days) Maximum 3 applications.

### \* Mefenoxam + Mancozeb

- Ridomil Gold MZ, 2.5 lb, 14-day intervals. (5 days) Maximum 3 applications.

### \* Pyraclostrobin

- Cabrio, 8-16 oz. (0 days) Do not apply more than one application before alternating with another chemical.

### Azoxystrobin

- Quadris, 5 to 6.2 fl oz. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action

### *Bacillus amyloliquefaciens*

- Serifel, 4 - 16 fl oz. (0 day)

### *Bacillus subtilis*

- Serenade, 4 to 8 lb. (0 days) Provides suppression. Biological control product that needs to be applied before disease development. Control may be limited under heavy disease pressure.
- Serenade Max, 1 - 3 lb. (0 days)

### Copper Ammonium Carbonate

- Copper Count N, 1 1/2 to 2 1/2 qt (processing), 1 1/2 to 3 qt (fresh market) (speck, spot). (0 days)

### Copper Hydroxide

- Champ DP Dry Prill, 1 1/3 to 2 lb (fresh market), 1.4 lb (processing). (0 days)
- Champ Formula 2 F, 1 1/3 pt. (0 days)
- Champ WG, 1.06 lb. (0 days)
- Kocide 3000, 0.75 to 1.75 lb. (0 day)
- Nu-Cop 3 L, 1 1/3 pt (processing), 1 1/3 to 4 pt (fresh market). (0 days)
- Nu-Cop 50 DF, 1 lb (processing), 3.2 lb (fresh market).
- Nu-Cop HB, 1 lb (processing), 1 to 3.2 lb (fresh market). (0 days)

### Copper Hydroxide + Copper Oxychloride

- Badge SC, 1.8 pt. (0 days)
- Badge X2, 0.75 to 1.75 lb. (0 days)

### Copper Oxychloride + Copper Sulfate

- C-O-C-S WDG, 1 lb (processing), 1 to 3.1 lb (fresh market). (0 days)

### Copper Sulfate

- Basic Copper 53, 0.75 to 1 lb (processing), 3 lb (fresh market) (speck, spot). (0 days)
- Cuprofix Ultra 40 Disperss, 0.75 to 3 lb (fresh market), 0.75 to 1.33 lb (processing). (0 days)

### Famoxadone + Cymoxanil

- Tanos, 8 oz. (3 days)

### Fluopicolide

- Presidio, 3-4 fl oz. (2 days)

### Mancozeb

- Dithane DF Rainshield, Dithane M-45, Dithane WSP, 1 1/2 to 3 lb. (5 days)
- Dithane F-45 Rainshield, 1 1/5 to 2 2/5 qt. (5 days)
- Koverall, 0.75 - 1.5 lb. (5 days)
- Manzate Max, 0.6 to 2.4 qt. (5 days)
- Manzate Pro-Stick, 0.75 to 1.5 lb. (5 days)
- Penncozeb 75 DF, 0.75 to 3 lb. (5 days)

### Mancozeb + Copper Hydroxide

- ManKocide, 1.7 lb (processing), 1 to 3 lb (fresh market) (speck, spot). (5 days)

### Mandipropamid + Difenconazole

- Revus Top, 5.5-7 fl oz. (1 day)

### Mono-, dibasic sodium salts of phosphorous acid

- Fosphite, 1 to 3 qt per 100 gal (ground) or 10 gal (aerial) of water. (0 days)

### Neem Oil

- Trilogy, 2 pt. (0 days)

### Potassium phosphite/chlorothalonil

- Catamaran, 4.5 to 5.5 pt (foliage) or 7 pt (fruit). (0 days)

### Propamocarb

- Previcur Flex, 0.7 to 1.5 pt every 7 to 10 days. (5 days) Use a tank mix partner (see label).

### Trifloxystrobin

- Flint, 4 oz. (3 days) Tank mix only with protectant. 12 hr REI.
- Gem 500, 3.8 fl oz. (3 days) Tank mix only with protectant.

### Zoxamide + chlorothalonil

- Zing!, 36 fl oz. (5 days)

**Note:** Most fungicides that protect against early blight also provide limited late blight protection.

### SEPTORIA LEAF SPOT (*Septoria lycopersici*):

#### \* Azoxystrobin

- Quadris, 5 to 6.2 fl oz.

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

#### \* Azoxystrobin + Chlorothalonil

- Quadris Opti, 1.6 pt every 7 - 21 days. (0 days)

#### \* Chlorothalonil

- Bravo Ultrex, 1.3 to 1.8 lb. (0 days)
- Bravo Weather Stik, Equus 720 SST, 1 3/8 to 2 pt. (0 days)
- Echo 720, 1 3/8 to 2 pt (foliage) or 2 to 3 pt (fruit). (0 days)
- Echo 90 DF, 1 1/8 to 1 5/8 lb. (0 days)
- Equus DF, 1.3 to 1.8 lb. (0 days)

#### \* Fluxapyroxad + Pyraclostrobin

- Priaxor Xemium Brand Fungicide, 4 - 8 fl oz. (0 days)

#### \* Mancozeb

- Dithane DF Rainshield, Dithane M-45, Dithane WSP, 1 1/2 to 3 lb. (5 days)
- Dithane F-45 Rainshield, 1 1/5 to 2 2/5 qt. (5 days)
- Manzate Max, 0.6 to 2.4 qt. (5 days)
- Manzate Pro-Stick, 0.75 to 1.5 lb. (5 days)
- Penncozeb 75 DF, 0.75 to 3 lb. (5 days)

#### \* Pyraclostrobin

- Cabrio, 8-12 oz. (0 days) Do not apply more than one application before alternating with another chemical.

#### \* Trifloxystrobin

- Flint, 3 to 4 oz suppression. (3 days)
- Gem 500, 3 to 3.8 fl oz suppression. (3 days)

\* Ziram

- *Ziram* 76 DF, 3 to 4 lb, 7- to 14-day intervals. (7 days) Do not use on cherry tomatoes.

Azoxystrobin + Difenconazole

- *Quadris* Top, 8 fl oz. (0 days) No more than two consecutive applications before alternating with another fungicide with a different mode of action.

Copper Hydroxide

- *Champ* DP Dry Prill, 1 1/3 to 2 2/3 lb (fresh market), 1.4 lb (processing). (0 days)
- *Champ* Formula 2 F, 1 1/3 pt. (0 days)
- *Champ* WG, 1.06 lb. (0 days)
- *Kocide* 3000, 0.75 to 1.75 lb. (0 day)
- *Nu-Cop* 3 L, 1 1/3 pt (processing), 1 1/3 to 4 pt (fresh market). (0 days)
- *Nu-Cop* 50 DF, 1 lb (processing), 3.2 lb (fresh market).
- *Nu-Cop* HB, 1 lb (processing), 1 to 3.2 lb (fresh market). (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1.8 pt. (0 days)
- *Badge* X2, 0.75 to 1.75 lb. (0 days)

Copper Oxychloride + Copper Sulfate

- C-O-C-S WDG, 1 lb (processing), 1 to 3.1 lb (fresh market). (0 days)

Copper Sulfate

- *Basic* Copper 53, 0.75 to 1 lb (processing), 3 lb (fresh market) (speck, spot). (0 days)
- *Cuprofix* Ultra 40 Disperss, 0.75 to 3 lb (fresh market), 0.75 to 1.33 lb (processing). (0 days)

Difenoconazole + Cyprodinil

- *Inspire* Super, 16 to 20 fl oz. (0 days)

Famoxadone + Cymoxanil

- *Tanos*, 8 oz. (3 days)

Fenamidon

- *Reason* 500 SC, 5.5 to 8.2 fl oz every 5 to 10 days. (14 days) Suppression. No more than 1 application before alternating.

Mancozeb + Copper Hydroxide

- *ManKocide*, 1.7 lb (processing), 1 to 3 lb (fresh market). (5 days)

Mancozeb + Zoxamide

- *Gavel* 75 DF, 1.5 - 2.0 lb. (5 days)

Mandipropamid + Difenconazole

- *Revus* Top, 5.5-7 fl oz. (1 day)

Mefenoxam + Chlorothalonil

- *Ridomil* Gold Bravo, 2.5 pt. (5 days)

Penthiopyrad

- *Fontelis*, 16 - 24 fl oz. (0 days)

Potassium Bicarbonate

- *Armcarb* 100, 2.5 to 5 lb. (0 days)

Potassium phosphite/chlorothalonil

- *Catamaran*, 4.5 to 5.5 pt. (0 days)

Zoxamide + chlorothalonil

- *Zing!*, 36 fl oz. (5 days)

ANTHRACNOSE (*Colletotrichum coccodes*):\* Azoxystrobin

- *Quadris*, 5 to 6.2 fl oz. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

\* Azoxystrobin + Difenconazole

- *Quadris* Top, 8 fl oz. (0 days) No more than two consecutive applications before alternating with another fungicide with a different mode of action.

\* Chlorothalonil

- *Bravo* Ultrex, 1.8 to 2.6 lb. (0 days)
- *Bravo* Weather Stik, *Equus* 720 SST, 2 to 2.75 pt. (0 days)
- *Echo* 720, 2 to 3 pt. (0 days)
- *Echo* 90 DF, 1 5/8 to 2 1/2 lb. (0 days)
- *Equus* DF, 1.8 to 2.6 lb. (0 days)

\* Mancozeb

- *Dithane* DF Rainshield, *Dithane* M-45, *Dithane* WSP, 1 1/2 to 3 lb. (5 days)
- *Dithane* F-45 Rainshield, 1 1/5 to 2 2/5 qt. (5 days)
- *Manzate* Max, 0.6 to 2.4 qt. (5 days)
- *Manzate* Pro-Stick, 0.75 to 1.5 lb. (5 days)
- *Penncozeb* 75 DF, 0.75 to 3 lb. (5 days)

\* Pyraclostrobin

- *Cabrio*, 8-12 oz. (0 days) Do not apply more than one application before alternating with another chemical.

\* Ziram

- *Ziram* 76 DF, 3 to 4 lb, 7- to 14-day intervals. (7 days) Do not use on cherry tomatoes.

Azoxystrobin + Chlorothalonil

- *Quadris* Opti, 1.6 pt every 7 - 21 days. (0 days)

Bacillus amyloliquefaciens

- *Serifel*, 4 - 16 fl oz. (0 day)

Copper Hydroxide

- *Champ* DP Dry Prill, 1 1/3 to 2 2/3 lb (fresh market), 1.4 lb (processing). (0 days)
- *Champ* Formula 2 F, 1 1/3 pt. (0 days)
- *Champ* WG, 1.06 lb. (0 days)
- *Kocide* 3000, 0.75 to 1.75 lb. (0 day)
- *Nu-Cop* 3 L, 1 1/3 pt (processing), 1 1/3 to 4 pt (fresh market). (0 days)
- *Nu-Cop* 50 DF, 1 lb (processing), 3.2 lb (fresh market). (0 days)
- *Nu-Cop* HB, 1 lb (processing), 1 to 3.2 lb (fresh market). (0 days)

Copper Hydroxide + Copper Oxychloride

- *Badge* SC, 1.8 pt. (0 days)
- *Badge* X2, 0.75 to 1.75 lb. (0 days)

Copper Sulfate

- *Basic* Copper 53, 0.75 to 1 lb (processing), 3 lb (fresh market) (speck, spot). (0 days)
- *Cuprofix* Ultra 40 Disperss, 0.75 to 3 lb (fresh market), 0.75 to 1.33 lb (processing). (0 days)

Difenoconazole + Cyprodinil

- *Inspire* Super, 16 to 20 fl oz. (0 days)

Famoxadone + Cymoxanil

- *Tanos*, 8 oz. (3 days)

Fluxapyroxad + Pyraclostrobin

- *Priaxor* Xenium Brand Fungicide, 4 - 8 fl oz. (0 days)

Mancozeb + Copper Hydroxide

- *ManKocide*, 1.7 lb (processing), 1 to 3 lb (fresh market). (5 days)

Mancozeb + Zoxamide

- *Gavel* 75 DF, 1.5 - 2.0 lb. (5 days)

Mandipropamid + Difenconazole

- *Revus* Top, 5.5-7 fl oz. (1 day)

Mefenoxam + Chlorothalonil

- *Ridomil* Gold Bravo, 2.5 to 3.25 pt. (5 days)

Neem Oil

- *Trilogy*, 2 pt. (0 days)

Penthiopyrad

- *Fontelis*, 24 fl oz. (0 days) Suppression only.

Potassium Bicarbonate

- *Armcarb* 100, 2.5 to 5 lb. (0 days)

## Turnips

### Potassium phosphite/chlorothalonil

- *Catamaran*, 7 pt. (0 days)

### Trifloxystrobin

- *Flint*, 3 to 4 oz suppression. (3 days)
- *Gem 500*, 3 to 3.8 fl oz suppression. (3 days)

### BUCKEYE FRUIT ROT (*Phytophthora parasitica*):

#### \* Mefenoxam + Chlorothalonil

- *Ridomil Gold Bravo*, 2.5 to 3.25 pt. (5 days) 3 applications maximum.

#### \* Mefenoxam + Copper Hydroxide

- *Ridomil Gold Copper*, 1.35 lb (processing), 2 lb (fresh market). (14 days) Maximum 3 applications.

### Azoxystrobin

- *Quadris*, 5 to 6.2 fl oz. (0 days)

Do not apply more than one foliar application of Amistar and Quadris or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

### Azoxystrobin + Chlorothalonil

- *Quadris Opti*, 1.6 pt every 7 - 21 days. (0 days)

### Fluopicolide

- *Presidio*, 3-4 fl oz. (2 days)

### Mancozeb + Zoxamide

- *Gavel 75 DF*, 1.5 - 2.0 lb. (5 days)

### LEAF MOLD (*Cladosporium fulvum*):

#### \* Azoxystrobin + Difenconazole

- *Quadris Top*, 8 fl oz. (1 day) One application before alternating with another chemical.

### Copper Hydroxide + Copper Oxychloride

- *Badge SC*, 1.8 pt. (0 days)
- *Badge X2*, 0.75 to 1.75 lb. (0 days)

### Difenconazole + Cyprodinil

- *Inspire Super*, 16 to 20 fl oz. (0 days)

### Mancozeb

- *Koverall*, 0.75 - 1.5 lb. (5 days)
- *Manzate Max*, 0.6 to 2.4 qt. (5 days)
- *Manzate Pro-Stick*, 0.75 to 1.5 lb. (5 days)

### GRAY MOLD (*Botrytis cinerea*):

#### Bacillus amyloliquefaciens

- *Serifel*, 4 - 16 fl oz. (0 day)

### Boscalid

- *Endura*, 9 to 12.5 oz. (0 days)

### Fluxapyroxad + Pyraclostrobin

- *Priaxor Xemium Brand Fungicide*, 4 - 8 fl oz. (0 days) Suppression only

### Penthiopyrad

- *Fontelis*, 12 - 16 fl oz. (0 days)

### Pyrimethanil

- *Scala*, 7 fl oz. (1 day) 12 hr REI.

### ROOT ROT (*Phytophthora* spp.):

#### Ametoctradin + Dimethomorph

- *Zapro*, 14 fl oz. (4 days)

### Fosetyl-Aluminum

- *Aliette WDG*, 2.5 to 5 lb. (14 days) Do not tank mix with copper products

### Mono-, dibasic sodium, potassium and ammonium phosphites

- *Phostrol*, 2.5 to 5 pt every 7 - 14 days. (0 days)

## Turnips

Amount of chemical formulation to apply per acre (unless otherwise directed). Apply no closer to harvest than number of days given in parentheses. (RUP) = Restricted Use Pesticide.

## INSECTS

### SOIL TREATMENT:

#### CABBAGE MAGGOT:

##### Chlorpyrifos

- *Chlorpyrifos 15G* (4.6 to 9.3 oz/1000 row ft at planting) or *Chlorpyrifos 4E AG* (4.5 pt as pre-plant; 1.6 to 2.75 fl oz/1000 row ft at planting) (30 days) (RUP)
- *Govern*, 4.5 pt as pre-plant; 1.6 to 2.75 fl oz/1000 row ft at planting. (30 days) (RUP)
- *Hatchet*, 4.5 pt as pre-plant; 1.6 to 2.75 fl oz/1000 row ft at planting. (30 days) (RUP)
- *Lorsban 15 G* (4.6 to 9.2 oz /1,000 row ft.) or *Lorsban 4 E / Lorsban Advanced* (4.5 pt as pre-plant, 1.6 to 2.75 fl oz/1,000 row ft at planting) or *Lorsban 75 WG* (3 lb as pre-plant, 1.1 to 1.8 oz/1000 row ft at planting) (30 days) Apply in a 4-inch band over row at time of seeding. (RUP)
- *Nufos 4E*, 1.6 to 2.75 fl oz/1,000 row ft. (30 days) (RUP)
- *Saurus*, 4.6 to 9.2 oz/1000 row ft at planting. (30 days)
- *Vulcan*, 1.6 to 2.75 fl oz/1,000 row ft. (30 days) (RUP)
- *Warhawk*, 1.6 to 2.75 fl oz/1,000 row ft. (30 days) (RUP)
- *Whirlwind*, 1.6 to 2.75 fl oz/1,000 row ft. (30 days) (RUP)

APHIDS, FLEA BEETLE: See label for application methods.

##### Imidacloprid

- *Admire Pro*, 4.4 to 10.5 fl oz. (21 days) See label for application methods.
- *Nuprid 2 F*, 10 to 24 fl oz. (21 days) Apply preplant, in furrow, or as a post-planting drench.

##### Thiamethoxam

- *Platinum* (5 to 12 fl oz.) or *Platinum 75 SG* (1.7 to 4.01 oz.) (30 days) See label for application methods.

APHIDS, LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

### FOLIAR TREATMENT:

FLEA BEETLE: Apply if foliar injury is observed to prevent larval injury to roots.

*Actara*, 1.5 to 3 oz. (7 days)

*Baythroid XL*, 1.6 to 2.8 fl oz. (0 days) (RUP)

##### Bifenthrin

- *Bifenture EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)
  - *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade WSB* (12.8 to 16 oz.) (21 days) (RUP)
  - *Fanfare 2EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)
  - *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)
  - *Tundra EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- Bifenture 10 DF*, 12.8 to 16 oz/A. (21 days)

##### Carbaryl

- *Carbaryl 4L*, 0.5 to 1 qt. (7 days)
- *Sevin 4 F*, *Sevin XLR Plus*, 0.5 to 1 qt.. (7 days)

##### Esfenvalerate

- *Adjourm*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (7 days) (RUP)

Imidacloprid

- *Admire Pro*, 1.2 fl oz. (7 days)
- *Nuprid 1.6 F*, 3.5 fl oz. (7 days) Do not exceed 10.5 oz/Acre per season.

*Malathion 8 Aquamul*, 1.25 pt. (1 day)

*Mustang Max*, 1.76 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Carbaryl 4L*, 0.5 to 1 qt. (7 days)

*Sevin 4 F*, *Sevin XLR Plus*, 0.5 to 1 qt.. (7 days)

Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust SC* (3 to 6 fl oz.) (3 days)

*Steed*, 2.5 to 3.5 fl oz. (21 days) (RUP)

CABBAGE "WORM": Apply if needed.

*Bacillus thuringiensis*

- *Agree WG*, 0.5 to 2 lb. (0 days)
- *DiPel DF*, 0.25 to 1 lb. (0 days)
- *Javelin WG*, 0.12 to 1.5 lb. (0 days)
- *XenTari*, . (0 days)

Bifenthrin

- *Bifenture EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade WSB* (12.8 to 16 oz.) (21 days) (RUP)
- *Fanfare 2EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Tundra EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)

*Bifenture 10 DF*, 12.8 to 16 oz/A. (21 days)

*Confirm 2F*, 6 to 8 fl oz. (7 days)

Esfenvalerate

- *Adjourn*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *Asana XL*, 5.8 to 9.6 fl oz. (7 days) (RUP)
- *S-FenvaloStar*, 5.8 to 9.6 fl oz. (7 days) (RUP)

*Intrepid 2F*, 6 to 16 fl oz. (14 days) 4 to 10 fl oz with PHI of 1 day when harvesting leaves.

Malathion

- *Malathion 5 EC*, or *Malathion 57 EC* (1 to 2 pt.) or *Malathion 8 Aquamul* (1.25 pt.) (7 days for *Malathion 5 EC*, 1 day for others)

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Perm-UP 3.2 EC*, 2 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant SC*, 5 to 10 fl oz. (7 days)

APHIDS: Apply as needed to prevent population buildup.

*Actara*, 1.5 to 3 oz. (7 days)

*Beleaf 50 SG*, 2 to 2.8 oz. (3 days)

Bifenthrin

- *Bifenture EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade WSB* (12.8 to 16 oz.) (21 days) (RUP)
- *Fanfare 2EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Tundra EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)

*Bifenture 10 DF*, 12.8 to 16 oz/A. (21 days)

Dimethoate

- *Dimethoate 4 EC*, *Dimethoate 400*, *Dimethoate 4E*, 0.5 pt.. (14 days)

Imidacloprid

- *Admire Pro*, 1.2 fl oz. (7 days)
- *Nuprid 1.6 F*, 3.5 fl oz. (7 days) Do not exceed 10.5 oz/Acre per season.

Malathion

- *Malathion 5* (1.5 to 2 pt.) or *Malathion 5 EC* (1 to 2 pt.) or *Malathion 57 EC* (1 to 2 pt.) or *Malathion 8 Aquamul* (1.25 pt.) (7 days for *Malathion 5* & *5 EC*, 1 day for others)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Sivanto*, 7 - 10.5 fl oz/A.

*Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

## ARMYWORM:

*Bacillus thuringiensis*

- *Agree WG*, 0.5 to 2 lb. (0 days)
- *DiPel DF*, 1 to 2 lb. (0 days)
- *Javelin WG*, 0.12 to 1.5 lb. (0 days)

*Coragen*, 3.5 to 5 fl oz. (1 day)

*Intrepid 2F*, 6 to 16 fl oz. (14 days) 4 to 10 fl oz with PHI of 1 day when harvesting leaves.

*Mustang Max*, 3.2 to 4 oz. (1 day) (RUP)

*Pyrenone*, 1 to 12 fl oz. (0 days)

*Radiant SC*, 6 to 8 fl oz. (3 days) See label for treating and harvesting of leaves.

Spinosad

- *Entrust* (1 to 2 oz.) or *Entrust SC* (3 to 6 fl oz.) (3 days)

*Steed*, 3.5 to 4.7 fl oz. (21 days) (RUP)

## LEAFHOPPERS:

*Sivanto*, 7 - 10.5 fl oz/A.

## WHITEFLIES:

*Sivanto*, 10.5 - 14 fl oz/A.

## MITES

Bifenthrin

- *Bifenture EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Bifenture 10 DF*, 12.8 to 16 oz/A. (21 days)
- *Brigade @ 2EC* (5.12 to 6.4 fl oz.) or *Brigade WSB* (12.8 to 16 oz.) (21 days) (RUP)
- *Fanfare 2EC*, 5.12 to 6.4 fl oz. (21 days) (RUP)
- *Sniper*, 5.12 to 6.4 fl oz. (21 days) (RUP)

## DISEASES

## SEED TREATMENT:

DAMPING OFF (*Pythium* spp., *Rhizoctonia solani*): Apply treatment as dust or slurry.

Captan

- *Captan 4 Flowable*, 3 fl oz.

Fludioxinil

- *Maxim 4 FS*, 0.08 to 0.16 fl oz/100 lb seed (*Rhizoctonia*). Commercial seed treatment plants only.

Mefenoxam

- *Apron XL*, 0.085 - 0.64 fl oz/100 lb seed (*Pythium*). (0 days)

Thiram

- 42-S Thiram (8 oz/100 lb seed) or *Thiram 480DP* or *Thiram 50 WP Dyed* (8 oz/100 lb seed)

## PREPLANT INCORPORATED:

DAMPING OFF (*Pythium* and *Phytophthora* spp.):

Mefenoxam. Apply as a broadcast preplant incorporation or a surface application. For banded applications use a 7" band. **Note:** If natural rainfall is not expected before seeds germinate, incorporate mechanically before planting or water into the seed zone after planting with 1/2 to 1" of sprinkler irrigation.

- *Ridomil Gold SL*, 1-2 pt.

## FOLIAR TREATMENT:

DAMPING OFF (*Peronospora parasitica*):

Mono-, dibasic sodium salts of phosphorous acid

- *Fosphite*, 1 to 3 qt. (7 days) Maximum 12 oz/year. 12 hr REI.

CERCOSPORA LEAF SPOT (*Cercospora* spp.):

Penthiopyrad

- *Fontelis*, 16 - 30 fl oz. (0 days)

## Turnips

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### Tebuconazole

- *Orius* 3.6F, Tebuzol 3.6, 4-7.2 fl oz. (7 days) Maximum 28.8 fl oz/acre/season. 12 hr REI.

### Trifloxystrobin

- *Flint* (2 to 3 oz) or *Gem* 500 (1.9 to 2.9 fl oz) (7 days) Maximum 12 oz/season. 12 hr REI.

### POWDERY MILDEW:

#### \* Penthiopyrad

- *Fontelis*, 16 - 30 fl oz. (0 days)

### Trifloxystrobin

- *Flint* (2 to 3 oz) or *Gem* 500 (1.9 to 2.9 fl oz) (7 days) Maximum 12 oz/year. 12 hr REI.

### ALTERNARIA BLIGHT (*Alternaria* spp.):

#### \* Trifloxystrobin

- *Flint* (2 to 3 oz) or *Gem* 500 (1.9 to 2.9 fl oz) (7 days)

### Azoxystrobin

- *Quadris*, 6.2 - 15.4 fl oz. (0 days) Do not apply more than one foliar application of *Quadris* or other strobilurin fungicide before alternating with a fungicide that has a different mode of action.

### Penthiopyrad

- *Fontelis*, 16 - 30 fl oz. (0 days)

### Pyraclostrobin

- *Cabrio*, 8 to 12 oz. (0 days)

### WHITE RUST:

#### Azoxystrobin

- *Cabrio*, 8-16 oz. (0 days)
- *Quadris*, 6 to 15.5 fl oz. (0 days) Do not apply more than one application of *Quadris* or Group 11 fungicides before alternation with a fungicide that is not Group 11.

#### Pyraclostrobin

- *Cabrio*, 8-16 oz. (0 days)
- *Quadris*, 6 to 15.5 fl oz. (0 days) Do not apply more than one application of *Quadris* or Group 11 fungicides before alternation with a fungicide that is not Group 11.

# APPENDIX A

## Seedbed Preparation

### SEEDBED PREPARATION

Clean soil is necessary for good seedbed production. Organisms that cause damage to vegetable seedlings may be present in any soil or growing mixture. Soils may be sterilized by a number of chemical or physical techniques, such as steam or dry heat.

**Warnings:** All the listed fumigants may be used both in the seedbeds and to treat soils in which vegetables are grown to maturity, with the following exceptions: 1) METHYL BROMIDE and FORMALDEHYDE can be used only for seedbeds. 2) None of the materials can be used where living plants are growing. Carefully read the directions in the table below, and especially those of manufacturers, to avoid danger and to obtain successful results.

### SEED TREATMENT

Dust method—place the seed and suggested wettable powders in a closed container and agitate vigorously for several minutes or until seed is coated with dust. For best results, use a container with twice the capacity of the seed treated.

Slurry method—to suggested wettable powders, add enough water to make a sloppy paste or slurry. Treat by stirring or swirling seed in the slurry until thoroughly coated. Dry the seed before planting. Slurries are preferred to dusts because they adhere to the seed better and are less irritating to use.

### CHEMICALS SUGGESTED FOR SEEDBED STERILIZATION

**All soil fumigants were re-registered in 2011, resulting in new labels. Buffer zones and fumigation management plans are required. Additional information about the requirements can be obtained at [epa.gov/fumiganttoolbox](http://epa.gov/fumiganttoolbox). Michigan's soil fumigant distributors can provide e-templates for the management plans.**

CHLOROPICRIN  
(E.G. CHLOR-O-PIC, PICFUME)

**Warnings:** Fumes are very irritating to eyes and are poisonous to growing plants. Wear full coverage protective clothing and a MSHA/ NIOSH-approved respirator with the proper carbon filter.

#### Rate and Method of Application

Inject 1.6 to 2.3 cc of material 6 inches deep and at 8-inch intervals using a hand operated fumigation gun. Treat only when soil temperature 6 inches deep is above

65°F. Pack treated soil and apply water seal (wet to a depth of several inches) or cover with plastic for 48 hours. Cultivate to speed aeration and avoid planting for 2 weeks, or until odor of fumigant is no longer detectable.

### FORMALDEHYDE

**NOTE:** Not effective for nematodes. Especially suited for cabbage and cauliflower.

**Warnings:** Fumes are irritating to eyes and nasal passages and poisonous to growing plants. Avoid prolonged contact with skin. Wash off with soap and water. Wear goggles, rubber footwear and rubber gloves when handling. Wear full coverage protective clothing and a MSHA/NIOSH-approved respirator with the proper carbon filter. Ventilate when treating a confined area. Rate of Method of Application

Mix 1 pt (37% to 40% strength) with 5 gallons of water and apply with a sprinkling can at the rate of 1/2 gal/sq ft of soil surface. Treat only if soil temperature 6 inches deep is above 60°F. Cover treated soil with a plastic cover. Leave undisturbed for 48 hours, then cultivate one or more times. Avoid planting for 2 weeks or until odor of fumigant is no longer detectable. Do not use near living plants. As a disinfectant for equipment and storage interiors or greenhouses, spray surfaces with a mixture of 1 pt (37% to 40% strength) in 5 gallons of water. Cover equipment with plastic and keep storage or greenhouse closed for 24 to 48 hours after treatment, then air out well before planting.

1,3-D (DICHLOROPROPENE; TELONE II)

**Warnings:** Fumes are irritating to eyes and nasal passages. Prolonged inhalation is dangerous; poisonous to growing plants. Avoid contact with skin. Wash off with soap and water. Wear goggles, rubber footwear and rubber gloves when handling. Wear full coverage protective clothing and a MSHA/NIOSH-approved respirator with the proper carbon filter.

#### Rate and Method of Application

Apply as a preplant broadcast treatment at least 14 to 21 days prior to planting. Late summer or early autumn is usually best for applying fumigants in Michigan. Inject at 8 inches deep with chisels spaced 10 to 12 inches apart when soil temperature is between 50° and 80°F. Seal immediately after application. If soil is waterlogged or temperature is below 60°F, allow additional time before planting. Use only on crops listed on the respective label.

## 1,3-D AND CHLOROPICRIN (E.G., TELONE C-17)

**Warnings:** Fumes are irritating to eyes and nasal passages. Prolonged inhalation is dangerous; poisonous to growing plants. Avoid contact with skin. Wash off with soap and water. Wear goggles, rubber footwear and rubber gloves when handling. Wear full coverage protective clothing and a MSHA/NIOSH-approved respirator with the proper carbon filter.

### Rate and Method of Application

Apply as a preplant broadcast treatment at least 14 to 21 days prior to planting. Late summer or early autumn is usually best for applying soil fumigants in Michigan. Inject 8 inches deep with chisels spaced 10 to 12 inches apart when soil temperature is between 50° and 80°F. Seal immediately after application. If soil is waterlogged or temperature is below 60°F, allow additional time before planting. Use only on crops listed on the respective label.

## SODIUM METHYLDITHIOCARBAMATE (METHAM) (E.G., VAPAM OR VAPAM HL)

**Warnings:** Avoid breathing vapor or spray mist. Do not get in eyes, on skin, or clothing. Causes skin irritation. May be fatal if absorbed through skin. Wash with soap and water. Wear full coverage protective clothing and a MSHA/NIOSH-approved respirator to reduce exposure.

### Rate and Method of Application

With a sprinkling can, fill with 1 to 1 1/2 pt metham and water and sprinkle uniformly over 50 sq ft of well-prepared soil. Sprinkle immediately with water until soil is sealed, or tarp for 48 hours. Seven days after treatment cultivate area to a depth of 2 inches to aerate soil. Do not seed earlier than 21 days after application if tarp is used. For soil injection, space injectors 5 inches apart and inject metham 4 inches into well-prepared soil. Follow immediately with a roller to smooth and compact the soil surface. Light watering or a tarp after rolling helps to prevent gas escape. For seedbeds, 75 to 100 gal/A (1 1/2 pt to 2 pt per 100 sq ft) is recommended.

## APPENDIX B Nematodes and Michigan Vegetable Production

George W. Bird, Professor  
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Nematodes are believed to be the most common animals on our planet. They inhabit most soil, fresh water and marine environments. At least 12 types of nematodes are known to parasitize or cause infectious diseases of Michigan vegetable crops. Hundreds of other species are involved in making nutrients available for plant growth. The objectives of this article are to: 1) provide an overview of the nematode problems associated with vegetable production in Michigan, 2) discuss the management options for plant-parasitic nematodes, 3) describe how nematodes are involved in nitrogen mineralization and 4) provide some recommendations on how to enhance the role of nematodes in making nutrients available for plant growth.

The 12 types of plant parasitic nematodes that feed on vegetable crops in Michigan cause diverse symptoms, attack a wide variety of crops and have different behaviors.

### ROOT-KNOT NEMATODES

Only one species, the Northern Root-Knot Nematode is known to over-winter under Michigan conditions. Other

species can be brought into the state on transplants produced in the south.

**Crop Symptoms** -Root galls, yellowing, wilting, stunted top growth, stunted root growth, low crop yield and poor crop quality.

**Crops Attacked** -Beets, Broccoli, Brussels Sprouts, Cabbage, Carrots, Cauliflower, Celery, Cucumber, Eggplant, Garlic, Leeks, Lettuce, Melons, Onions, Parsnips, Peppers, Potatoes, Pumpkins, Squash, Tomatoes.

**Nematode Behavior** -Second-stage juveniles invade root tissue a short distance behind the root tip. They migrate towards the root tip, stop, turn and then migrate to where the vascular cylinder is being formed. Here, the plant forms nurse cells for use by the nematodes for their growth and development. The plant also forms root galls for protection of the hundreds of eggs in each egg mass. Extensive amounts of plant matter and energy are used in this process, resulting in unsatisfactory crop growth and development. A close relative, the False Root-Knot Nematode, has been found associated with sugar beets in Michigan and has the potential to feed on beets and potato.

This species, however, has not been detected in Michigan during the last 25 years.

## **CYST NEMATODES**

Michigan is the home to nine different species of cyst nematodes. Three of them, Carrot Cyst Nematode, Soybean Cyst Nematode and Sugar Beet Cyst Nematode can be serious problems in Michigan vegetable production.

**Crop Symptoms** -Yellowing, stunted top growth, stunted root growth, poor nodulation, pinhead size white females on root tissue, poor crop yield and poor crop quality.

**Crops Attacked** -Carrot Cyst Nematode (carrots), Soybean Cyst Nematode (Snap Beans, Peas) and Sugar Beet Cyst Nematode (Beets, Broccoli, Brussels Sprouts, Cabbage).

**Nematode Behavior** -Second-stage juveniles invade root tissue about one half of an inch behind the root tip. They burrow to where the vascular cylinder is being formed and induce the plant to form nurse cells for nematode feeding. The female swells and breaks through the root tissue. When she has filled her body with eggs, she dies and drops from the root. Her body hardens to become a protective cyst that can survive in soil in the absence of a host for up to 12 years. Extensive amounts of plant matter and energy are used in this process, resulting in poor crop growth and development.

## **ROOT-LESION NEMATODES**

The Penetrans Root-Lesion Nematode is the most common plant parasitic nematode in Michigan and feeds on the root systems of many crops. A second nematode, the False Root-Lesion Nematode causes damage to mint grown in muck soil.

**Crop Symptoms** -Yellowing, stunted top growth, stunted root growth, root lesions, poor crop yield and poor crop quality.

**Crops Attacked** -Beets, Broccoli, Brussels Sprouts, Cabbage, Carrots, Cauliflower, Celery, Corn, Cucumber, Eggplant, Garlic, Leeks, Lettuce, Melons, Mint, Onions, Parsnips, Peppers, Potatoes, Pumpkins, Squash, and Tomatoes.

**Nematode Behavior** -All stages of root-lesion nematodes are mobile and penetrate root tissue as endoparasites. After root penetration, the nematodes migrate throughout the root cortex, where females deposit their eggs. This migration, combined with chemical exudates, results in reduced uptake and transport of water and nutrients throughout the plant. Root-lesion nematodes are known to interact with soil-borne fungi to cause disease complexes. The best known of these is the Potato Early-Die Disease Complex.

## **NEEDLE NEMATODES**

There are two types of Needle Nematodes in Michigan, the Common Needle Nematode and the Corn Needle Nematode. They can exist in both muck and mineral soil.

**Crop Symptoms** -Greatly stunted top growth, barren areas, swollen root-tips, reduced crop yield and poor crop quality.

**Crops Attacked** -Celery, Corn, Garlic, Onions.

**Nematode Behavior** -Needle nematodes are large ectoparasites and only the nematodes' stylets penetrate root tissue. The Corn Needle Nematode feeds early in the growing season and then migrates deep into the soil. Its distribution is limited to very coarse textured sandy soils. The Corn Needle Nematode has a narrow host range and can easily be managed through crop rotation. Needle nematodes have the ability to vector viruses.

## **BULB AND STEM NEMATODES**

Bulb and Stem Nematodes feed on shoot and not root tissue. There are two very different species associated with Michigan vegetable production systems. One attacks onion and celery, and the other feeds in potato tubers. Both are rarely detected in vegetable fields in Michigan.

**Crop Symptoms** -Yellowing, stunted top growth, a highly characteristic odor, bloated leaves and bulbs or tuber rot, reduced yields and unsatisfactory crop quality.

**Crops Attacked** -Onions, Garlic and Potato.

**Nematode Behavior** -The Bulb and Stem Nematode is a migratory endoparasite of shoot tissue. Fourth-stage juveniles penetrate onion tissue at the junction of the root and shoot system. They migrate through leaf and bulb tissue resulting in greatly deformed growth.

## **PIN NEMATODES**

There are two types of Pin Nematodes associated with Michigan vegetable production, one limited to muck vegetable production and the other associated with mineral soil production systems. **Crop Symptoms** -Stunted top growth, no feeder roots (witches-broom), reduced yield.

**Crops Attacked** -Carrots, Celery and Corn.

**Nematode Behavior** -Pin Nematodes are small ectoparasites that feed only from the outside of root tissue. These nematodes have a long stylet that can be inserted into the central vascular system of roots.

## **STUBBY-ROOT NEMATODES**

Although several species of Stubby-Root Nematodes are known to exist in Michigan, they have not been detected as often recently as in the past. **Crop Symptoms** -Yellowing, stunted tops, stubby roots and poor yields. **Crops Attacked** -Corn and Onions. **Nematode Behavior** -

Stubby-Root Nematodes are small ectoparasites. They feed close to the root-tip and prevent cell division and root elongation.

## **MANAGEMENT OF PLANT PARASITIC NEMATODES IN MICHIGAN VEGETABLE PRODUCTION**

The first part of any pest management program is proper identification of the problem. While the cause of some nematode problems can be confirmed under field conditions, a laboratory analysis is usually needed. Michigan growers are encouraged to submit soil and plant tissue samples to MSU Diagnostic Services for confirmation of the cause of an existing problem or information for use in problem avoidance. MSU has two Nematode Diagnosticians responsible for nematode analyses. Additional details about this service can be obtained by contacting [www.pestid.msu.edu](http://www.pestid.msu.edu) or your local county office of MSU Extension.

As with all pest issues, problem avoidance is always the first-line defense and best strategy. This can be achieved by growing or purchasing high-quality nematode-free transplants or propagation material. Most of the other tactics related to problem avoidance or exclusion are based on common sense. For example, a field with a documented nematode infestation should not be worked immediately before moving equipment to a high quality nematode-free site. With proper planning, it is often possible to isolate or contain a nematode problem to a single field without infesting the rest of the farm. When this fails, control or nematode population reduction is usually required. In many cases this is expensive and results in a significant reduction in potential profits.

Once a Michigan vegetable production site is infested, crop rotation is the first control tactic that should be considered. For example, corn and wheat are not hosts for the Northern Root-Knot Nematode and can be used to reduce population densities of this species below its damage threshold. Crop rotation with agronomic crops is the main reason that current Michigan mineral soil carrot producers have very few nematode problems. In general, muck soil carrot growers have not had this option and have had to contend with serious nematode problems. Although the only known host in Michigan for the Carrot Cyst Nematode is carrots, this species can survive for up to a decade in the absence of a host, making the use of crop rotation impractical. Corn Needle Nematode problems can be resolved with a year or two of a non-host crop. Cover, trap and green manure crops that produce decomposition chemicals with nematicidal properties have been used in Michigan vegetable production. Cover crops, however, are variety specific in relation to their suitability for use in nematode management systems. For example, Defender

oilseed radish is an excellent trap crop for control of the sugarbeet cyst nematode but most other varieties of oilseed radishes are good hosts and their use with result in increased numbers of these nematodes. Because of this complexity, it is often necessary to interact with a consultant or MSU Diagnostic Services for assistance in designing of the best possible nematode management program.

Nematode population reduction can also be achieved through the use of nematicides. There are basically two types, fumigant and non-fumigant nematicides. Telone II and metham are the most commonly used soil fumigants in Michigan vegetable production. Telone II must be injected into the soil; whereas, metham (Vapam and others) can be injected or applied as a chemigant in irrigation water. Methyl bromide, Telone C-17, Telone C-35 and chloropicrin can also be used under special circumstances. The non-fumigant options are organophosphates or organocarbamates. Vydate and Mocap are the most commonly used non-fumigant nematicides. These materials are all very different in relation to the best methods of application and suitability for specific nematode species. Information about the use of nematicides is present in this MSU Extension Bulletin (E-312).

## **ROLE OF NEMATODES IN NITROGEN MINERALIZATION**

Plants take-up inorganic forms of nitrogen from soil for use in their growth and development. While we often think that the fertilizers applied serves this role, the situation is often more indirect and complex. Fertilizers often feed microbes and subsequently the microbes feed the plants. Bacterial and fungal feeding nematodes play important roles in this process. For example, plant root-exudates or decomposing organic matter serve as food for bacteria. The bacteria serve as food for bacterial feeding nematodes which receive excess organic nitrogen from this process. The excess nitrogen is transformed into an inorganic form and excreted from the nematode into the area immediately adjacent to the root surface when it is taken-up by the plant for use in the growth and development process. It is important to maintain high population densities of bacterial and fungal feeding nematodes. Most of these species have relatively short life cycles (72 hours); whereas, life cycles of plant-parasitic nematode range from 30 days to two years, with the exception of the cysts which may remain viable in the absence of a host for up to 12 years.

## **NEMATODES AND SOIL QUALITY**

Soil quality can be defined as the ability of a soil to resist degradation and respond to management. Soils with nematode problems are not high quality soils. Anything that can be done to increase quality soil organic matter

(SOM) will decrease risk to plant parasitic nematodes and enhance soil quality. What is quality organic matter? Quality SOM is composed of active soil carbon and active soil nitrogen. The term active refers to the ability of the SOM to mineralize soil carbon and soil nitrogen, respectively. Much of this is done by microbes and soil fauna such as bacterial and fungal feeding nematodes. The best way to create an appropriate environment for these organisms and their essential functions is to maintain a diversity of plants and organic amendments in the system. Mixtures of

grass and legume cover crops supplemented with manure or compost can be used to create a biologically active soil that is highly productive and devoid of problems caused by plant parasitic nematodes. Do not hesitate to contact me at [birdg@msu.edu](mailto:birdg@msu.edu) or (517) 353-3890 if you have any questions about nematodes and their relationship to soil quality. The MSU Nematode Diagnosticians, Fred Warner (517-432-1333) and Angela Tenney (517-353-8563) are available to provide information about management of plant-parasitic nematodes.

## **Appendix C**

### **Detecting and Avoiding Nematode Problems**

Plant-parasitic nematodes are microscopic roundworms that live in soil and feed on roots or foliage of economically important plants. Nematode feeding can result in diseased plants with symptoms such as stunting, yellowing, wilting, yield reduction, root galling and the formation of root lesions. Although damage from plant parasitic nematodes costs Michigan vegetable growers millions of dollars annually, many of these losses are never correctly diagnosed. This appendix provides instructions for the nematode detection methods necessary to avoid or diagnose nematode problems.

A laboratory analysis of soil and root or shoot system tissue is usually necessary for diagnosis or long-term avoidance of plant-parasitic nematode problems. In Michigan, this service is provided by the Michigan State University Nematode Laboratory within Diagnostic Services. There are also private sector laboratories that provide nematode detection services. A \$25 fee is charged by MSU for analyzing each combined soil and root sample.

Samples for nematode analysis should be forwarded to:

Diagnostic Services  
578 Wilson Rd.  
Room 101 CIPS  
Michigan State University  
East Lansing, MI 48824-6469

Samples taken directly to MSU should be delivered to Room 101 in the Center for Integrated Plant Systems (formerly the Pesticide Research Center). All samples must be submitted with a completed sample information form. These forms are available at county MSU Extension offices or can be downloaded from the Diagnostic Services web site at [www.pestid.msu.edu](http://www.pestid.msu.edu).

#### **Sample objective**

The results from the samples are used to decide how to deal with nematode problems and how to avoid problems.

#### **Diagnosing problems**

When plants exhibit symptoms such as stunting, yellowing, wilting, early-die, yield reduction, root-galling, root-lesions or plant mortality that cannot be attributed to other causes, take samples of appropriate soil, root system, or shoot systems, and submit them for nematode analysis.

#### **Avoiding nematode problems**

Generally soil from Michigan agricultural sites should be analyzed for nematodes every 3-5 years at the minimum. If nematodes are a major limiting factor in the production of particular crops (e.g. northern root-knot nematodes on carrot), sites should be sampled every fall or spring prior to the growing of these crops. The test results are used to make decisions for avoiding nematode problems.

#### **When to sample**

Generally, soil and root samples can be taken, submitted and reliably processed whenever the soil is not frozen. For the best possible results, however, do not take samples until 45 days after annual root growth, and not after the soil is frozen in late fall or winter. When considering fall soil fumigation, collect and submit samples between August and November. To determine if non-fumigant nematicide use is warranted, sample between March and May.

## How to sample

**Sampling instrument:** Take samples with a soil sampling tube, trowel, or narrow-bladed shovel at a 2-to 12-inch depth. Include as many feeder roots as possible.

Feeder roots or shoot tissue must always be included for samples submitted for best assessing the population densities of endoparasitic nematodes.

**Sample size:** Each sample should consist of a pint to a quart of soil taken from a larger sample composed of 10 or more subsamples. The number of samples needed depends on the size, history, and uniform soil texture of the area being investigated.

- Small area (less than 5,000 sq. ft.), take at least 10 subsamples (soil cores or borings).
- Medium area (5,000 sq. ft. to 1 acre), take at least 25 subsamples.
- Large area (1 to 80 acres), take at least 50 subsamples. In Michigan, no one sample should represent more than 80 acres, and each sample should be from an area of uniform soil texture.

The sampling pattern depends on the commodity and field history. Mix subsamples in a clean pail or a plastic bag and submit one pint to a quart for nematode analysis.

Subsamples from problem area: Plant-parasitic nematodes feed only on living tissues and are rarely found in dead roots. Therefore, take samples from the margin of the problem areas where the plants are still living.

**Sampling container:** A plastic bag can be used for nematode samples. Place samples in plastic bags as soon as possible. Nematodes will be killed if the sample is allowed to dry, and it is important that nematodes are living when the sample arrives at the laboratory.

**Sample storage:** Soil and root samples should be regarded as perishable. Handle accordingly, and process as quickly as possible. Ideally, they should be stored at 10-15C (50-58F). Do not expose them to direct sunlight or store them in hot areas, such as the trunk of your car. Temperatures greater than 40C (100F) will kill nematodes.

## How to submit samples

Samples are usually submitted to the MSU Nematode Laboratory through the local extension office, accompanied by a completed form. The information required on the form is essential for diagnosing nematode problems and proper recommendations for nematode population management.

It generally takes two weeks from the time a sample is taken until the results are returned to the grower. The results may be returned through the local extension agent, a private consultant, or directly. The rapid root and soil assays used for mineral soils, however, are not always satisfactory for analysis of organic soils. In a few cases, a bio-assay that requires a 45-day incubation period is used to analyze organic soils. When this procedure is recommended, the grower will be immediately notified of the delay and will receive the results within two months after the sample was received.

## Results and recommendations

The types and numbers of nematodes will be recorded on the assay form along with an indication of whether or not nematodes are a problem. If nematodes appear to be a problem, you will be occasionally referred to an appropriate extension bulletin for a recommendation. The recommendation should be discussed in detail with the local extension agent or private consultant.