NEW ENGLAND GREENHOUSE FLORICULTURE GUIDE

A Management Guide for Insects, Diseases, Weeds, and Growth Regulators

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SECTION D:
PLANT GROWTH REGULATORS (PGRS)

Recent Changes and New Labels

Since the last edition of the Floriculture Guide, there have been five new labels, several updates to existing labels and two discontinoued products.

New labels include Tide Paclo, N-Large™, Off-Shoot-O and SA50 Florel® and SpinOut®. Tide Paclo contains 0.4% paclobutrazol, the same active ingredient and concentration as Bonzi®, Downsize® Paczol® and Piccolo®. N-Large™ contains 4% gibberellic acid (GA_3), same active ingredient and concentration as Florgib®4L, GA_3 4%, GibGro® 4LS, and ProGibb T&O. S50 Florel® contains 3.9% ethephon, same active ingredient and concentration as Florel® Brand Growth Regulator. Off-shoot-O contains methyl esthers of fatty acids and is labeled as a chemical pinching agent. SpinOut® LF contains 7.1% copper hydroxide and is labeled as a root regulator for application on benches, floors and containers.

Label updates appear on Bonzi®, Dazide®, Downsize®, Fresco®, $GA_3$4%, GibGro®, HappyGro®, and MegaGro™.Bonzi® updated its label's precautionary statements, environmental hazards, mixing and application instruction, storage and disposal. Dazide® 85 WSG updated the label on storage and disposal. Fresco® label was updated and now the information previously provided under the supplemental label for container ornamentals and chemigation application instructions appears all in one label. GA_3 4%, HappyGro™ and MegaGro™ have new EPA Reg No. Amass™ and Chlormequat E-Pro® have been *discontinued*.

INTRODUCTION

What Are Plant Growth Regulators?

Plant growth regulators (PGRs) are chemical compounds that alter plant growth and development by modifying natural hormonal action. Some PGRs are naturally occurring hormones, while others are synthesized hormones that mimic or interfere with the action of natural plant hormones. PGRs can be used to increase or retard plant height, prolong or break dormancy, prolong flower and plant shelf-life, prevent leaf yellowing, abort flowers, or promote rooting, branching and/or flowering.

PGRs and Crop Management

Optimal crop performance is best achieved with a program of sound cultural practices in a carefully controlled environment. PGRs represent just one part of a complete crop management system. A PGR should be used to induce specific crop responses (e.g., control height or induce branching) that cannot be achieved through normal crop management. Remember, PGRs are not substitutes for proper crop culture and accurate environmental control.

Using This Chapter

This section provides general use information on PGR applications and how environmental and cultural conditions, plant genetics, and physical and chemical factors can affect plant response to PGRs. Always refer to the label for detailed instructions on how to use a specific product.

KEY TO TABLES:

- Table D–1: chemical names, REI and EPA registration information for PGRs.
- Table D–2: PGR application rates for height control of bedding plants in flats, pots and baskets.
- Table D–3: PGR application rates for height control of bedding plant plugs.
- Table D–4: PGR application rates for regulating diverse plant responses in bulbs, flower and foliage species, and perennials.
- Tables D–5 to D–19: Dilution rates for specific PGRs.
- Table D–20 and D–21: Granular and drench rates for Topflor® for various pot sizes.
- Table D–22: Conversion factors to use when mixing small quantities of PGRs.
- Table D–23: Ethyl-Bloc® mixing rates.
- Table D–24: Rooting agents' trade names, EPA registration numbers and REIs.
- Table D–25: Dry powder compounds used for plant rooting.
- Table D-26: Liquid and water-soluble formulations used for plant rooting.

Factors that Affect Plant Response to PGRs

Any factor that affects the rate and quality of plant growth and development can influence a plant's response to PGRs. All such factors should be considered in a production system. The dosage for specific crops is in most cases presented as a range of values. The decision to work at the top or the bottom of the labeled dosage range must be made by each individual grower. To make this decision, growers must consider all of the factors that affect plant response to PGRs relative to the conditions in their own greenhouses, past experiences with these compounds, and the desired effects.

Factors influencing plant responses to PGRs can be separated into three groups:

(1) Plant factors: (a) species and cultivar, (b) physiological stage of plant development, (c) plant stress, and (d) plant size;

(2) Environmental factors: (a) weather (light and temperature), (b) medium composition, (c) water quality, and (d) crop nutrition; and

(3) Physical and chemical factors: (a) residual chemical effects, (b) chemical uptake and translocation, (c) spray droplet size, (d) coverage, and (e) application rate and frequency.

A brief discussion of each of these factors follows.

Plant Factors

a) Plant *species and cultivars* vary greatly in growth habits, and in chemical and environmental sensitivity. Chemicals that work on one species may be ineffective on another. Rates that are effective on one cultivar may be too high or too low for another cultivar of the same species. Information on the response of specific crops or cultivars to specific PGRs is not always available. Growers must conduct their own tests to determine the most effective rates.

   In general, cultivars with more vigorous growth habits require more PGR than those with less vigorous growth habits. Selecting the proper cultivar is a very important step in limiting the use of PGRs and in achieving satisfactory results. For example, use less vigorous, slow-growing, or naturally compact plants in lieu of chemicals if height control is important, or use free branching cultivars if this growth habit is most desirable. Avoid using PGR-sensitive cultivars when possible (cultivars that are easily injured by the chemical being applied) or use the low rate of the recommended range if a sensitive cultivar is grown. Information on plant growth habit is available from plant producers and distributors.

b) The *physiological stage of development* refers to the formation and growth of different structures in the plant. Physiological stages of development include bud formation, flower opening, fully expanded leaves, developed roots, stem width, and mature plants, but "two weeks after transplant or pinch" is not a physiological measure of plant development.

   In general, the rate of physiological development is more rapid under warm conditions with high light than under cool and low light growing conditions over the same period of time. Chemicals should be applied at the stage of development specified on the label. If the stage of physiological development is not specified on the product label, it is important for the grower to keep records to aid in future decision making. Treating plants too early or late in development may result in stunting, reduced flowering, lack of growth control, or other damage.

c) *Plant stress* refers to the changes in plant metabolism or physiological status in response to environmental conditions. One example is water stress that results in wilted plants. Wilted leaves do not readily absorb chemicals applied as a spray. Application of PGRs to wilting or soon-to-be-wilted plants makes uniform control difficult and may result in injury. To avoid these problems, irrigate plants prior to applying PGRs. Apply PGRs only to turgid plants. Stress from disease or extreme environmental conditions tends to exaggerate the effect of a PGR.

d) *Plant size* impacts PGR application. Larger plants require more chemical than smaller plants. To achieve the same level of control, a plant in a 6" pot requires more drench or spray than the same cultivar in a 4" pot produced under similar conditions. Likewise, bedding plant plugs require less PGR than the same cultivars in flats, pots and baskets.

Environmental Factors

a) Weather conditions directly affect PGR absorption both immediately after spraying and in the long term. Absoption of water-soluble PGRs (i.e. B-Nine® and Cycocel®) is reduced

under rapid drying conditions (intense light and high temperature), reducing plant growth control. Apply water-soluble PGRs during cloudy weather or late in the day, or pull shade cloth when spraying to maximize chemical uptake. Water-soluble PGRs can be washed off from the plant surface soon after application, to limit the effect of an accidental overdose. PGRs such as A-Rest®, Bonzi® and Sumagic® are absorbed within minutes after spraying and are not affected by rapid drying conditions. These compounds cannot be washed off in the event of an accidental overdose.

Fast plant growth rates in response to long-term exposure to high temperature/high light increase the PGR dosages required and the plants tend to outgrow the effects of the PGR more rapidly. High temperature/low light conditions increase stem elongation or stretch, and result in poor plant quality. Using a growth retardant to try to overcome this problem is an example of attempting to substitute chemical control for good management.

b) Growing medium composition directly affects the efficacy of drench applications of certain PGRs. The effectiveness of active ingredients such as ancymidol (A-Rest®), paclobutrazol (Bonzi®), and and uniconazole (Sumagic®) decreases as the pine bark component of a medium increases. In general, as organic matter content of a growing medium increases, the effectiveness of a PGR drench decreases. As the inorganic content of the medium increases (for example, the amount of sand, soil, rockwool, or perlite), the effectiveness of a PGR drench increases. Growing medium composition may indirectly influence plant response to PGRs by affecting plant vigor. Plants growing in media that reduce, retard or stunt growth (i.e., cause stress) are especially sensitive to PGRs. Slow-growing plants tend to be sensitive to PGR applications, and take a long time to resume normal growth. Uniform application of a PGR drench is critical for uniform height control when multiple cuttings are growing in a single container such as a basket or pot. If most of the PGR is applied to only one side of the pot, then the plants on that side will be more affected than the plants on the opposite side of the pot.

c) Water quality affects the activity of some PGRs. A combination of high pH (>7) and high alkalinity (>100 ppm calcium carbonate equivalent) may reduce the effectiveness of ethephon PGRs (Collate®, Florel®, and Verve™). The optimum water pH for applying RiteWay™ is 5 to 7.

d) Crop nutrition (rate of fertilization), along with tightly controlled irrigation practices, has long been used to control crop growth and development. Crops produced with nutrient levels favoring maximum growth require more PGR and less time to outgrow the chemical effects. Conversely, crops hardened (stressed) by limited water and fertility may require little or no chemical control.

Physical and Chemical Factors

a) Residual chemical effect refers to the length of time a PGR remains active in the plant after application. With chemicals applied as drenches, residual chemical activity in the growing medium is also of concern. Chemicals such as B-Nine® and Cycocel® lose most of their activity in one to two weeks. A-Rest®, Bonzi®, Fascination® and Sumagic® (and brand-name PGRs with the same active ingredients) remain active considerably longer (3–4 weeks). The exact length of time a chemical remains active depends on environmental and plant factors previously discussed. PGRs containing triazol compounds (i.e. paclobutrazol and uniconazole products) can remain active in the growing medium and containers for months.

b) Chemical uptake and translocation vary from one PGR to the next. Bonzi®, Concise® and Sumagic® (and brand-name PGRs with the same active ingredients) are actively taken up by plant roots and are readily transported to shoot tips. The same compounds, although rapidly absorbed by leaves, do not readily move out of leaf tissue, and thus are not effective when applied only to leaves. Spray applications of Concise®, Sumagic® and Bonzi® must be directed toward plant stems. A-Rest® and Topflor® are actively absorbed and translocated from stems, roots and leaves and are effective as both drench and foliar spray. Cycocel® is most effective as a foliar spray but can be used effectively as a drench if high rates are applied. B-Nine® (and brand-name PGRs with similar active ingredients) is not effective as a drench and must be used exclusively as a spray. Fascination® and Fresco® do not disperse well within the leaf, so thorough spray coverage is essential. However, Fascination® does move into the plant through the roots, resulting in excessive stem stretch. Avoid run-off with spray

applications of Fascination®. EthylBloc® is applied as a gas in sealed containers or greenhouses.

c) Spray droplet size affects PGR coverage and penetration. Smaller sized droplets promote good coverage and a superior chemical effect. However, extremely small drops (i.e. fog) result in drift, take a long time (hours) to settle and may require air circulation to achieve good penetration.

d) Coverage refers to the volume of solution drenched per volume of potting medium, or sprayed per square foot of bench. Crop coverage is critical. Be consistent. By varying several factors at once (e.g., PGR concentration, plant spacing and volume of delivery or coverage), a grower loses all means of comparison from crop to crop. High carrier volumes (more spray solution applied per unit area) improve penetration and are especially useful with chemicals such as Bonzi® and Sumagic® (and products with the same active ingredient) that require stem contact, and Fascination® (and products with the same active ingredients) that requires total leaf coverage. When using high volume sprays of these PGRs, growers are advised to reduce PGR concentration. Other products (e.g. Verve™) suggest low spray volumes to prevent runoff, which can result in undesired plant growth. Specific spray coverage rates and drench volumes vary among PGR products.

Note the following differences in recommended drench volumes:

Pot diameter	A-Rest® drench (fl oz)	Bonzi® drench (fl oz)	Cycocel® drench (fl oz)	Topflor Granular (g)
4 inch	2	2	3	0.1-0.3
6 inch	4	4	6	0.2-0.6
8 inch	10	10	8	0.3-1.4
12 inch	40	40	–	1.4-5.6

As a general rule, drench 2½ fluid ounces per quart of potting medium. For recommnedations on specific crops refer to Tables D-2 and D-4, and read the product specimen label.

Use the following spray coverage rates unless otherwise noted on the label or in Tables D-2, D-3 and D-4. Note: Big plants, by virtue of greater leaf surface areas, receive more total PGR than small plants.

WARNING: The following rates refer to volume of diluted solution and NOT of pure product.

Abide®: 2-3 quarts per 100 square feet

A-Rest®: 2 quarts per 100 square feet

Augeo®: 2 quarts per 100 square feet

B-Nine®: 2 quarts per 100 square feet

Bonzi®: 1–3 quarts per 100 square feet
For small plants in small containers, use 1–2 quarts per 100 square feet.
For large plants with well developed canopies use 3 quarts per 100 square feet.

Chlormequat SPC: Same as Cycocel®

Citadel®: 2–3 quarts per 100 square feet
For a light spray to affect only the upper part of the plant, use 1 quart per 100 square feet.

Collate™: No specific coverage listed

Concise®: Same as Sumagic®

Configure®: 1-2 quarts per 100 square feet

Cycocel®: 2–3 quarts per 100 square feet
For a light spray to affect only the upper part of the plant, use 1 quart per 100 square feet.

Dazide®: Same as B-Nine®

Downsize®: Same as Bonzi®

Fascination®: 2 quarts per 100 square feet

Florel: No specific coverage listed

Fresco®: Same as Fascination®

FlorGib 4L: No specific coverage listed

GibGro®: No specific coverage listed

HappyGro™: No specific coverage listed

MegaGro™: No specific coverage listed

N-Large™: No specific coverage listed

Off-Shoot-O: No specific coverage listed

Paclo Pro®: Same as Bonzi®

Paczol®: Same as Bonzi®

Piccolo®: Same as Bonzi®

Piccolo 10XC®: Same as Bonzi®

ProGibb T&O®: 2 qts per 100 sq ft; rates can vary

RiteWay™: Same as Configure®

SA50 Florel®: No specific coverage listed

Sumagic®: 2 quarts per 100 square feet

Tide Paclo: Same as Bonzi®

Topflor®: 2 quarts per 100 square feet
For small plants in containers, spray 1–2 quarts per 100 square feet.
For large plants, use 3 quarts per 100 square feet, except where noted.

Verve™: No specific coverage listed

e) Application frequency has a big effect on final plant appearance. In general, multiple or sequential applications at low concentrations produce the best results. Sequential applications at 50–100% of the low rate, or high volume/low concentration sprays, are most effective for controlling escapes (i.e., the stray shoots that extend high above the others) on crops like chrysanthemum and poinsettia. However, be aware that some labels (e.g. Cycocel) limit the number of applications permitted per crop cycle and in some cases the number of crop cycles permitted per year.

Testing

Growers bear the burden to test when specific recommendations are not available. Most of the factors that influence plant response to PGRs interact, making potential effects difficult to predict. Adequate recommendations are not always available and label recommendations sometimes fail to address many of these important considerations. As a result, individual operations must evaluate the response under their own growing conditions. Growers should test different concentrations of PGRs (including untreated pots) in a small number of plants. Keep a record of each of the factors previously discussed. Simple techniques, such as recording weekly changes in plant height relative to a ruler or stake permanently placed in a pot, help to accurately gauge crop response to a PGR application over time.

ALTERNATIVES TO PGRS

Cultural control of plant form can be used as an alternative to PGR applications for some crops. The best management practice is often a combination of cultural practices and chemical control. Cultural alternatives to PGRs include DIF, light quality, thigmotropism, low phosphorus fertilization, exposure to outdoor growing conditions and mild-to-moderate water stress.

DIF

DIF refers to the day/night temperature difference. DIF can be used to control stem stretch in many plant species. Night temperatures that are equal to day temperatures [zero DIF] or higher than day temperatures [negative DIF] reduce stretch. This is especially true when weather conditions favor stretching (e.g., cloud cover and high temperature). When day temperatures are higher than night temperatures [positive DIF], stem stretch increases. Growers can manage plant height even under low night/high day temperatures (e.g. 60ºF night/70ºF day) by allowing the air temperature to dip to 50–55ºF for 2–3 hours at dawn. This sunrise temperature dip produces the DIF effect. This is a good alternative to warm night/cool day temperature regimes since plant height is controlled without radically altering the natural daily temperature cycle.

Temperature also affects plant development rates. Growth rate is a function of the Average Daily Temperature (ADT). When using DIF, be sure to calculate the ADT associated with the DIF treatment in use. As ADT increases, the rate of plant development increases (reducing crop time on the bench). Conversely, as ADT decreases, the rate of plant growth decreases. To calculate ADT, add (night temperature times the number of hours of the night period) plus (day temperature times the number of hours of the day period), and then divide this total by 24 (the number of hours in the day).

Light Quality

The effect of end-of-day light quality on plant development is similar to the DIF effect. The ratio of red to far-red light (the photomorphogenic radiation) affects stretching and branching of many plant species. An increase in the end-of-day red light component results in plants with shorter internodes and more breaks. By comparison, an increase in the end-of-day far-red light produces plants with longer internodes and less branching. Researchers are studying the use of end-of-day light and developing colored greenhouse films to control plant form.

Thigmotropism

Thigmotropism refers to a plant response to mechanical touch. Vibrating, shaking, or brushing a solid object over a plant induces this response. Plants regularly treated in this manner remain more compact than plants grown undisturbed. Plants exposed to wind produce the same response.

Low Phosphorus Fertilization

All plants need phosphorus to achieve normal growth and normal flower development. However, with many plant species, low-phosphorus fertilization can be used to control plant height without adversely affecting flowering and subsequent garden performance.

Fertilizers with low phosphorus content, such as 20-1-20 or 20-2-20, provide adequate phosphorus for growth and development but restrict stem elongation. As an

alternative, no-phosphorus fertilizers such as 15-0-15 or 20-0-20 can be alternately applied with moderate phosphorus fertilizers such as 15-5-15 to achieve the same effect.

This technique is especially valuable on vegetable bedding plant species that cannot be treated with PGRs. For example, tomato height can be controlled with low phosphorus nutrition and the plants fully recover from the stress once in the field. Growers should beware that species vary in their tolerance to low phosphorus stress and that prolonged or extreme phosphorus deprivation may permanently impair the normal growth and flowering of certain species.

Exposure to Outdoor Growing Conditions

Plants exposed to outdoor conditions through the use of technologies such as roll-out benches, hi-tech cold frames or similar technologies do not stretch as much as those produced exclusively in the greenhouse. Temperature, wind and vibration, and high light may all reduce stretching under outdoor conditions.

Mild to Moderate Water Stress

Mild to moderate water stress can also be used to control plant height. Mild to moderate water stress can be implemented by continuously allowing the root zone to dry and then irrigating right before the plants wilt or when early symptoms of wilt are observed.

However, crops vary in how they recover from wilting and tolerate water stress. Therefore, it is suggested to test a small group of plants for drought tolerance before implementing this practice in a large number of plants. Avoid severe water stress (permanent wilting point), as it will result in irreversible plant damage.

Formulating & Applying PGRs

Recommended formulations vary with each product. Read the entire label and use the product according to directions. Measure the dosage accurately. Use only properly calibrated weighing and measuring devices.

Note: Dosage recommendations for some PGRs are based on the concentration of the applied solution, while recommendations for other PGRs are based on total active ingredient (a.i.) per pot.

Application Methods

PGRs are usually applied as sprays or drenches. The exceptions include bulb dips and soaks with lilies, pre-planting dips on rooted or unrooted cuttings and on plugs, pre-plant soil-surface sprays (PSS), gaseous fumigation (as per EthylBloc®) and the use of rooting hormones on woody and herbaceous cuttings. When using a PGR for the first time, treat a small group of plants and keep accurate records of the response and of the prevailing plant status, and environmental and physical conditions in the greenhouse.

Many PGRs specify a single mode of application for the grower to use (e.g., B-Nine®, Fascination® and Florel® are used solely as sprays). Others provide a choice; for example, A-Rest®, Bonzi®, Cycocel®, Concise® and Sumagic® can be applied as drenches or sprays. In general, sprays require less labor and are more convenient. The actual amount of active ingredient used with a spray may be more or less than with a drench depending on the PGR (e.g. Cycocel® uses considerably less a.i. as a spray, while Bonzi® and A-Rest® require less a.i. when applied as drenches). Sprays require great care to achieve uniform coverage. Multiple low concentration sprays produce the best quality crops. Drenches distribute the active ingredient more evenly within the plant, give better control, and are less likely to damage leaves.

Applying Sprays

- Spray only recently irrigated and turgid plants.
- Observe the proper waiting period between PGR spray application and overhead irrigation - several hours (until dry) for brand-name PGRs with the same active ingredients as B-Nine® and Cycocel®, while material similar to A-Rest®, Bonzi®, and Sumagic® are absorbed within minutes.
- Do not use wetting agents with the PGRs listed in Tables D–2, D–3 and D–4, unless specified. Avoid use of uptake enhancers. Spray adjuvants increase the risk of plant injury. Use adjuvants only when applying Fresco® as a foliar spray on plants with waxy leaves and when using RiteWay™.
- Use only properly functioning spray equipment. Dedicate sprayers exclusively to PGR applications.
- Avoid chemical waste. Place plants close together and cover the bench at recommended rates.
- Sequential applications of A-Rest®, Bonzi®, Sumagic® and similar products at the lowest rate produce the best crop uniformity.

Applying Drenches

- Treat only plants with well-developed root systems.
- Drench only recently irrigated pots containing a uniformly moist medium.
- Apply recommended drench volumes in each pot (enough to uniformly wet the entire root system), roughly 2½ fl oz drench per qt of potting medium.
- Avoid waste from excess dripping.
- Make sure drench treatments are applied uniformly to the potting medium when multiple plants are in a single container such as a hanging basket.

Chemigation

- Chemigation consists on applying PGRs through subirrigation (i.e. ebb and flood benches, saucers, flood floors, etc.), overhead irrigation (i.e. mist, fog, sprinklers, etc.) or drip irrigation.
- Treat only plants with well-developed root systems.
- Inject PGRs only in irrigation systems with functional check valve, vacuum relief valve and low pressure drain to prevent backflow into the water source.
- Do not mix PGRs with fertilizers.
- Avoid runoff of solutions treated with PGRs into public water systems or back into irrigation water sources.
- Not all PGRs can be applied in irrigation. Abide, Topflor, Bonzi (and similar products) and Fresco are labeled for use in irrigation. Follow instructions on the label to identify the type of irrigation that can be used with each chemical.

Directions for Mixing

- Mix and use PGR solutions the same day. Do not store application solutions for prolonged periods, even overnight.
- Remember that the final volume of a mixed solution includes both water and PGR (i.e. a 16-ounce per gallon solution contains 16 ounces of PGR plus enough water to equal one gallon of solution). See Table D–22 for help in formulating small quantities or low rates.
- Do not use additional spreader-stickers, unless specifically directed to do so by the label (see "When Applying Sprays," above).
- Do not mix PGRs with pesticides or fertilizers.
- Always read and follow label directions.

Storage

Store PGRs in tightly sealed containers in a cool, dry, dark location. Temperatures above 100–120°F or below freezing adversely affect the storage life of most PGR products. Cycocel® and B-Nine® last at least two years under proper storage conditions. A-Rest® lasts at least three years. Ethephon products last very long when stored properly.

State Registrations

By law, all pesticide products must be registered in the state where they are used. Registrations change each year. The information herein is accurate as of publication but is subject to change. For questions regarding product registration, use EPA Registration Numbers (see Table D–1) and contact the pesticide division in your state (see Appendix II). See Table D–23 for EPA registration information for rooting compounds.

Specified Label Warnings

When using the following compounds, heed the following warnings as specified on the label:

- B-Nine® and Dazide®: Do not tank mix with copper-containing products. Do not apply within 7 days before or after applying copper-containing products, as burning of leaves may result. Do not add a wetting agent or mix with insecticide, fungicide or fertilizer solutions as burning of leaves may result.
- Bonzi®, Downsize, Paclo Pro®, Piccolo®, Piccolo 10XC®, Paczol® and Tide Paclo: Do not use on annual vinca or fibrous begonia. Do not reuse containers that previously held plants or soil treated with Piccolo®. Do not use as a liner dip (plug dip) on begonia, pansy or vinca or on crops where the spread of root disease is a concern. Sprays should not result in excessive runoff as too much runoff may result in excessive height control.
- Cycocel®, Citadel, and Chlormequat Pro®: Test before using spray rates over 1500 ppm, as leaf damage may occur. The number of applications per crop cycle and the number of crop cycles permitted per year may be limited as per specific labels directions (you can find this information in Tables D-2, D-3 or D-4).
- Florel®, SA50 Florel®, Collate® and Verve®: Do not apply through any type of irrigation system.
- Sumagic® and Concise®: Do not apply through any type of irrigation system. Heed warning about sensitive species.
- Topflor®: Do not use on plugs of begonia, pansy, salvia or annual vinca.