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Mealybugs: Arch Nemesis No More

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Overview: What To Expect

- Introduction
- Mealybugs:
  - –Types
  - –Biology and Damage
  - –Management: Cultural, Physical, Insecticidal, and Biological
- Questions and Discussion

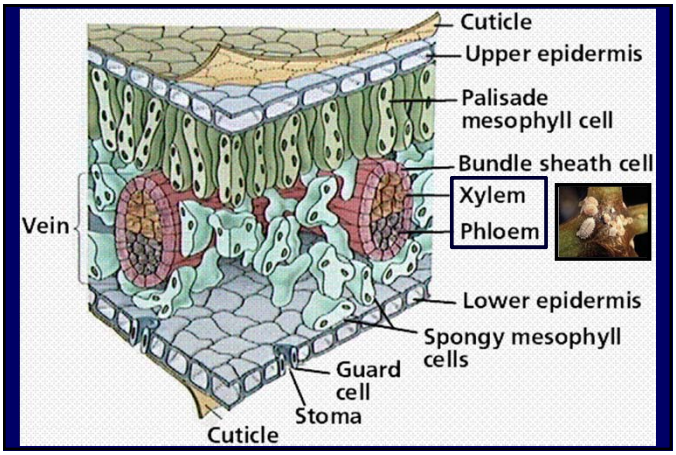
Greenhouse Environment

How Do I Get Rid Of Mealybugs?

Mealybugs Are “Sneaky Insect Pests”

Insect And Mite Pest Feeding Behaviors

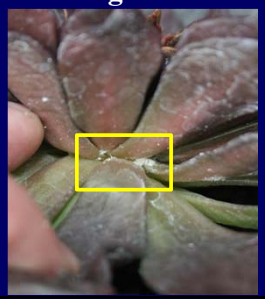
- Phloem-Feeders: Aphids, Whiteflies, Mealybugs, Leafhoppers, and Soft Scales
- Xylem-Feeders: True Bugs, Spittlebugs, and Leafhoppers
- Chewers: Beetles, Caterpillars, and Fungus Gnat Larvae
- Miners: Leafminers
- Chlorophyll-Feeders: Spider Mites
- Mesophyll and Epidermal Fluid-Feeders: Thrips



Why Are Mealybugs A Problem?

- Located in very secluded (cryptic) habitats, which makes detection difficult and ability to obtain contact with insecticides a challenge.
- Early instars (crawlers) are hard to detect.
- Later instars and adults develop a protective waxy (hydrophobic) covering, which inhibits the effectiveness of contact insecticides.
- Mealybug females have high reproductive potential (can lay over 400 eggs).
- Broad host range—mealybugs feed on many different plant types.

Mealybugs Tend To Feed In Cryptic Habitats. Thus They Escape Exposure From Visual Observation, Spray Applications Of Insecticides, And Biological Control Agents



Mealybugs Reside Or Hide Underneath The Sheaths Of Orchids

Mealybugs

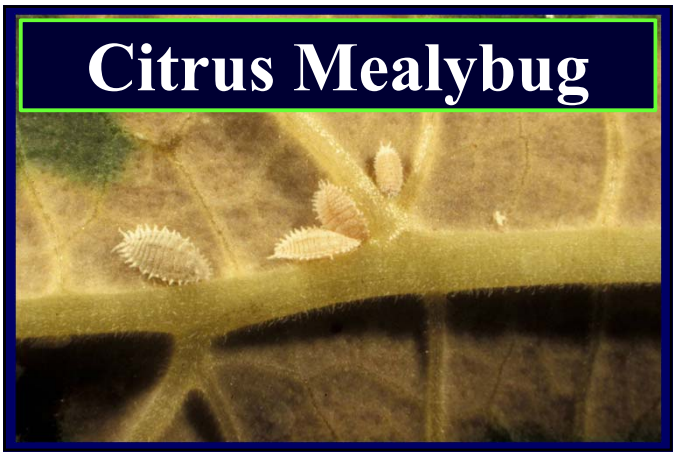
* Feed within the vascular system removing plant fluids (=phloem feeder).

* Damage symptoms: leaf distortion, plant stunting and wilting.

* Produce copious amounts of honeydew.

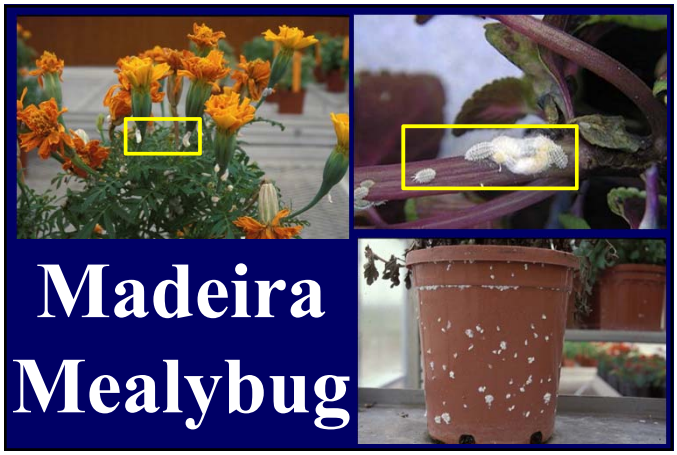
Honeydew On Schefflera Leaves

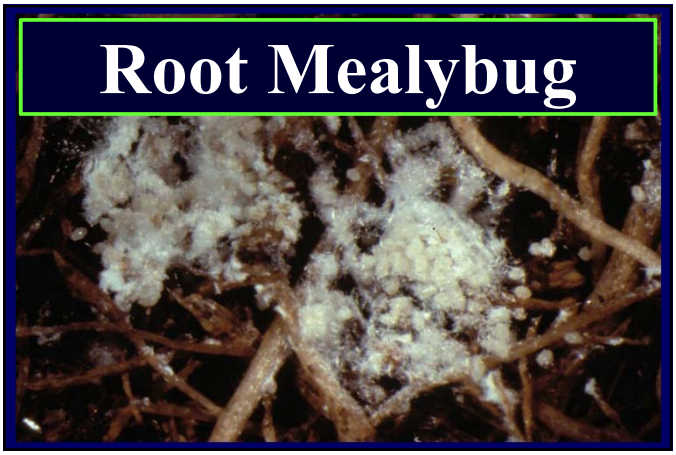

Citrus Mealybug


Citrus Mealybug

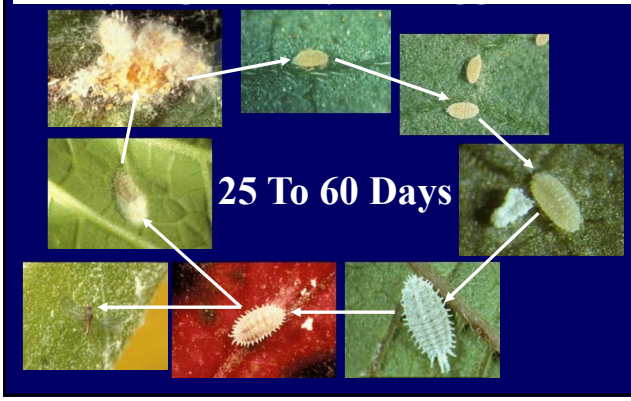

Longtailed Mealybug


Infestation Of Longtailed Mealybug

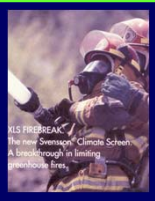

Madeira
Mealybug


Root Mealybug

Mealybug Life Cycle: Egg To Adult



Plant Protection Strategies



- Cultural

- Physical
- Insecticides

- Biological

Plant Protection: Cultural

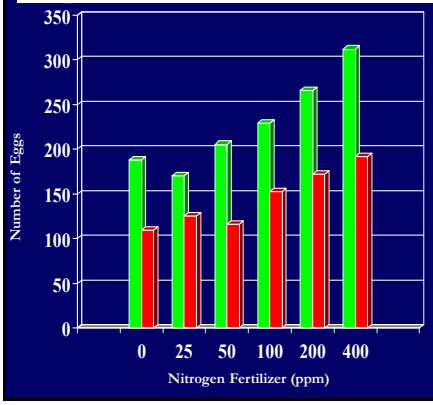
- Avoid plant stress: maintain healthy, vigorous growth.

- Implement proper cultural practices: watering and fertility.

- Use plant varieties or cultivars that are less susceptible to mealybugs (if possible).

- Avoid applying excess fertilizer (e.g. nitrogen) as this increases mealybug reproduction or causes females to lay more eggs than normal.

Impact Of Fertility On Citrus Mealybug



- Wash crawlers off plants with a forceful water spray or use a brush to remove mealybugs from plants.

- Prune out heavily-infested branches and remove plant debris from vicinity.

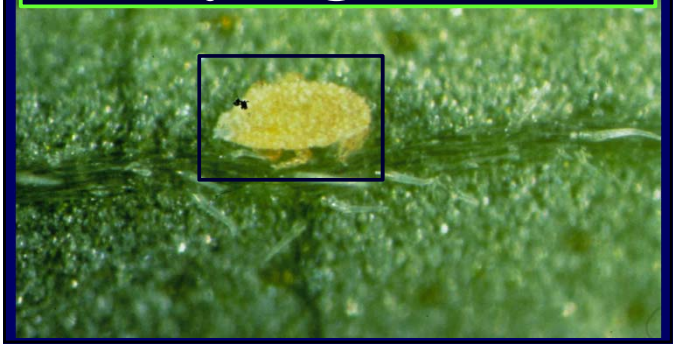
- Dispose of heavily-infested plants immediately.

What Would You Do In This Situation?

Plant Protection: Insecticides

- Repeat or multiple applications will be required as eggs do not all hatch simultaneously.
- Crawlers are most susceptible to insecticides because they have not formed a protective waxy (hydrophobic) covering.
- Rotate insecticides with different modes of action in order to minimize the potential of resistance developing in mealybug populations.

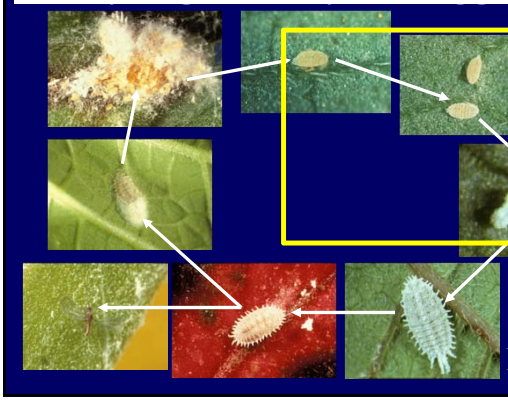
Mealybug Crawler



Plant Protection: Insecticides

- Contact Insecticides
- Insect Growth Regulators

Mealybug Life Cycle: Egg To Adult



Target Life Stages Of Insecticides

Contact Insecticides

- Acephate (Orthene)
- Acetamiprid (TriStar)
- Bifenthrin (Talstar)
- Chlorpyrifos (DuraGuard)
- Clarified hydrophobic extract of neem oil (Triact)
- Cyfluthrin (Decathlon)
- Mineral oil (Ultra-Pure Oil/SuffOil-X)
- Potassium salts of fatty acids (M-Pede)
- Pyrifluquinazon (Rycar)

Insect Growth Regulators

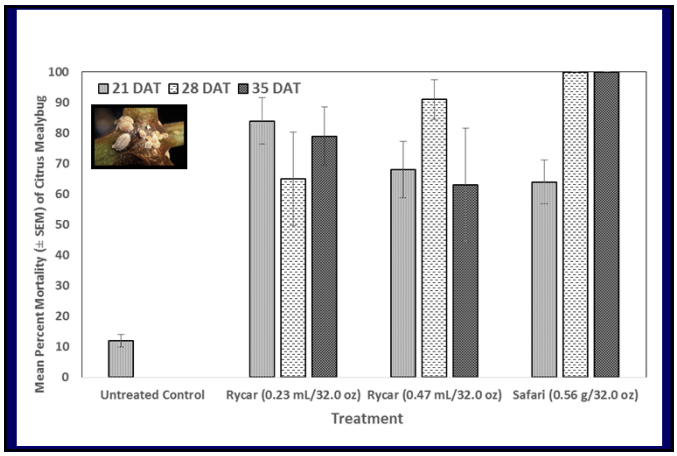
- Buprofezin (Talus): Chitin Synthesis Inhibitor

- Kinoprene (Enstar): Juvenile Hormone Mimic

How To Effectively Use Insecticides Against Mealybugs

1. Timing: apply insecticides when the most susceptible life stages of mealybugs are present.
2. Coverage: when spraying an insecticide, it is important to obtain thorough coverage of all plant parts, including: leaves, stems, and flowers.
3. Frequency: apply insecticides within timely intervals, which is dependent on the residual activity of a given insecticide. Always read the label for information associated with frequency of application.

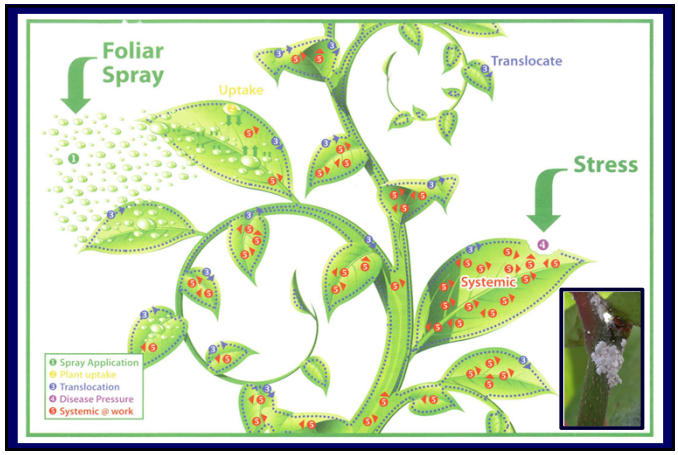
Be Sure To Thoroughly Cover All Plant Parts With Insecticide Sprays



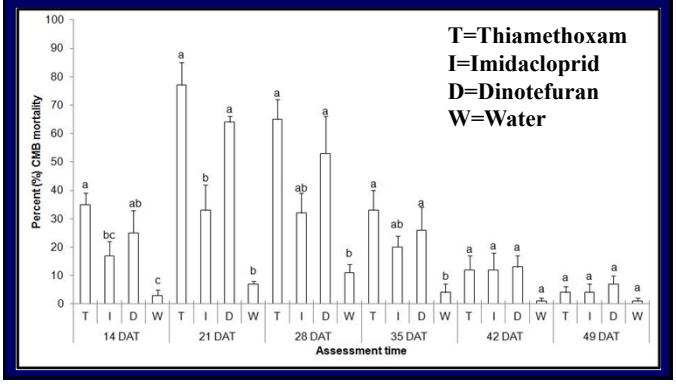
Factors Responsible For Failing To "Manage" Mealybugs With Insecticides

- Not implementing a scouting program*.
- Using inappropriate insecticide.
- Poor coverage of plant parts with insecticide spray applications.
- Improper timing of insecticide applications.
- Extended insecticide application intervals (not frequent enough).
- Not disposing of "pet" plants.

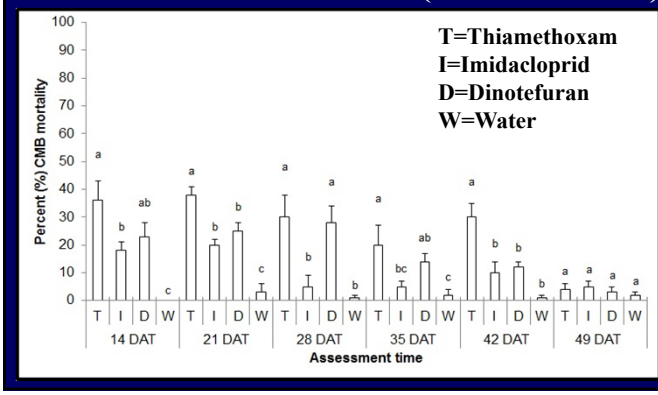
Are Systemic Insecticides Effective Against Mealybugs?

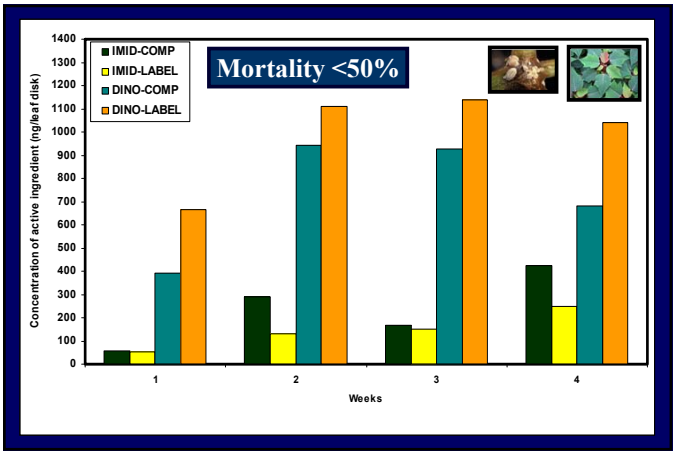


Neonicotinoid Insecticides (Labeled Rate)



Neonicotinoid Insecticides (2X Label Rate)

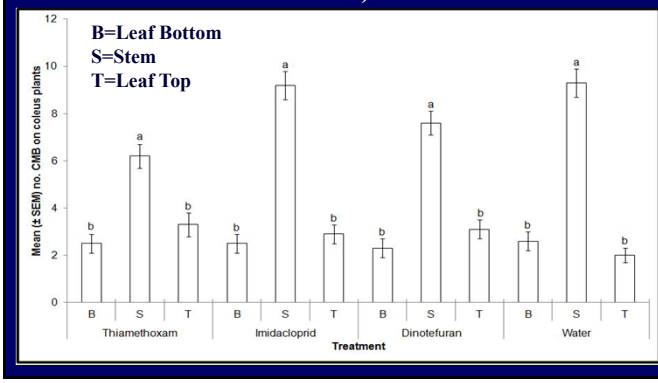




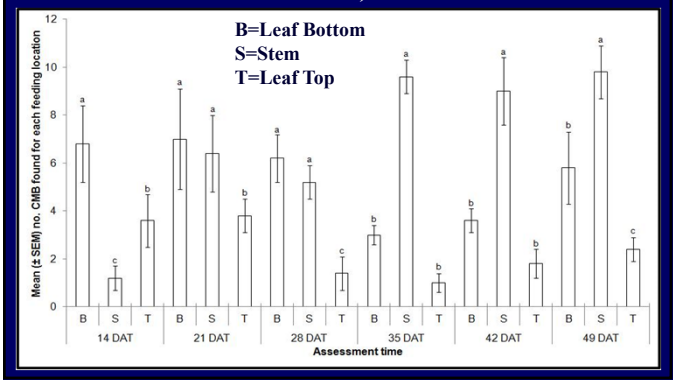
Mealybugs And Whiteflies Feeding On Poinsettia Leaf

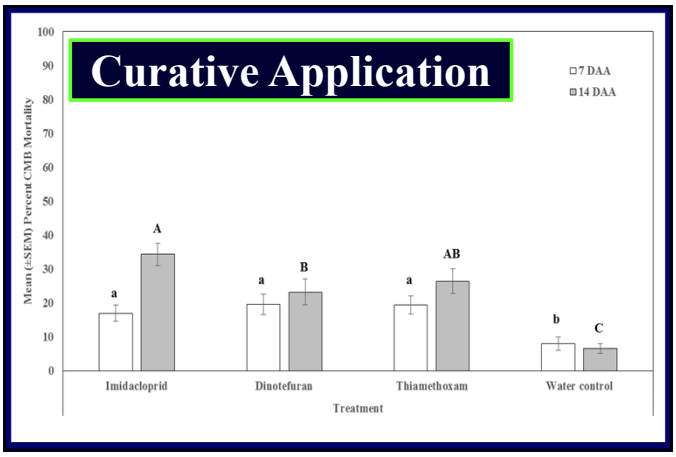
Female Citrus Mealybugs Feeding On Plant Stem

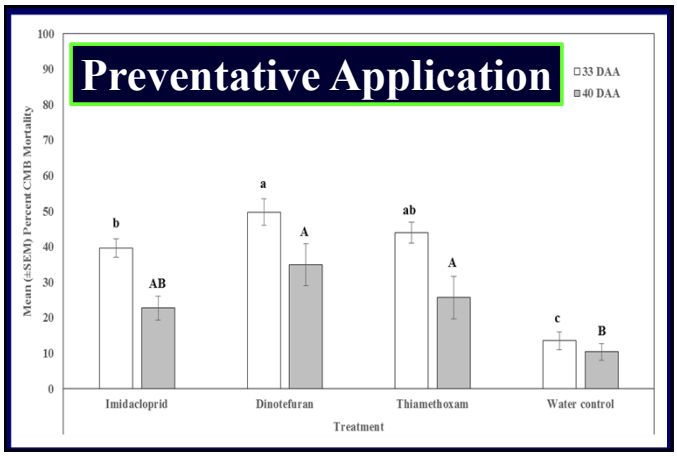
Feeding Location: Neonicotinoid Insecticides (Label Rate)

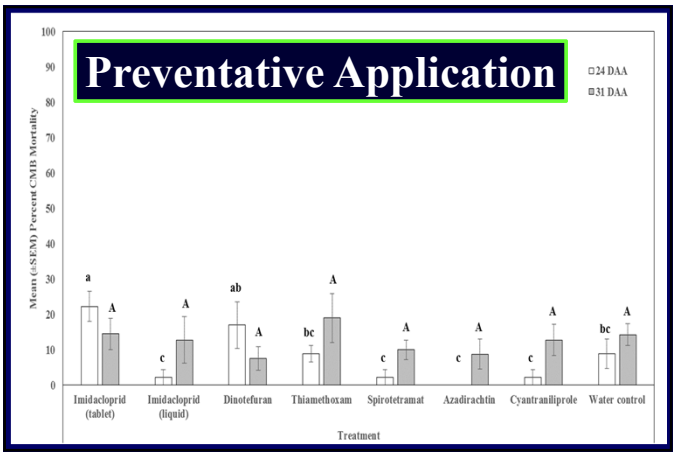


Feeding Location: Neonicotinoid Insecticides (2X Label Rate)

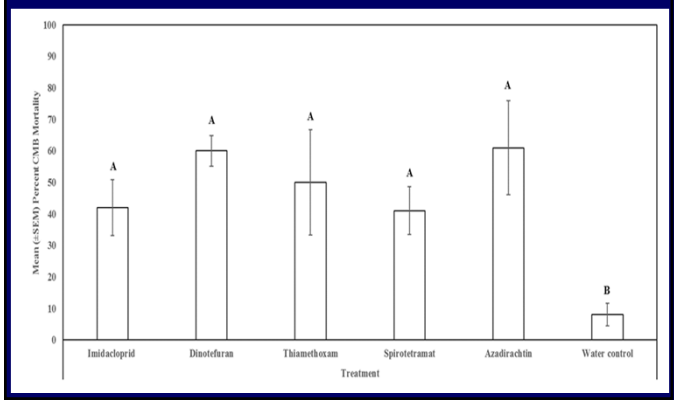




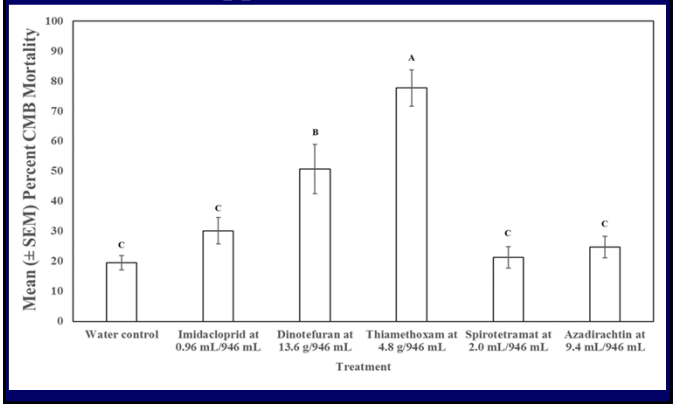




Preventative Application (4X The Label Rate)



Preventative Application (8X The Label Rate)



Mealybug Feeding Behavior

- Although mealybugs feed in the phloem sieve tubes similar to aphids and whiteflies; they feed differently.

- Feeding involves variations in the number and length of time of intracellular punctures, intervals between the first phloem-ingestion periods, and stylet motility or movement during the phloem searching process.

- Feeding behavior could impact the ability of systemic insecticides to suppress citrus mealybug populations.

Biological Control Agents: Mealybugs

Predators:

- Mealybug destroyer, *Cryptolaemus montrouzieri*

- Green lacewing, *Chrysoperla* spp.

Parasitoids:

- *Leptomastix dactylopii**
- *Anagyrus pseudococci**

Mealybug Destroyer: Adult And Larvae

Leptomastix dactylopii

Anagyrus pseudococci

If You Are Going To Implement A Biological Control Program You Will Need To Control/Manage Ants!

Alternative Plant Protection Strategy: Flame-Out®

There Are No "Silver Bullets" When It Comes To Dealing With Mealybugs!

Publication

Cloyd, R. A. 2011. Mealybug: Management in Greenhouses and Nurseries. Kansas State University Agricultural Experiment Station and Cooperative Extension Service. MF-3001. Kansas State University, Manhattan, KS. 4 pages.

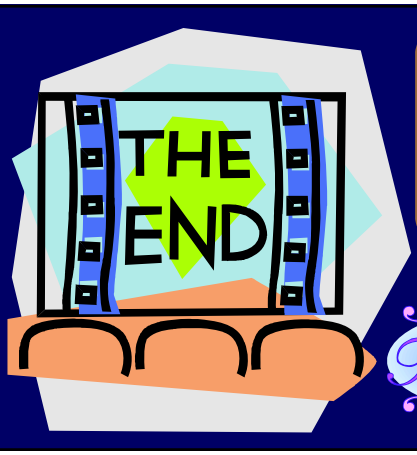
www.ksre.ksu.edu/library/entml2/mf3001.pdf

Summary: Write This Down!

- If plants are heavily-infested with mealybugs; then dispose of plants immediately.

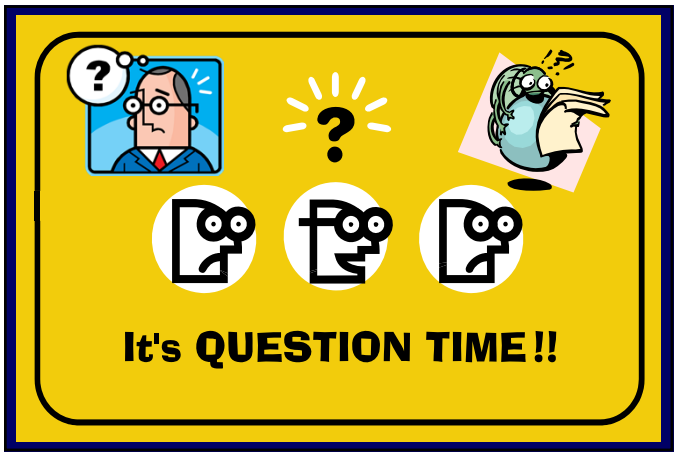
- When using insecticides, be sure to make frequent enough applications and thoroughly cover all plant parts.

- When implementing a biological control program be sure to control ants.
- If you have any questions contact your state or regional extension entomologist.



Thank You For Your Attention!

I Hope You All Learned Something!


It's QUESTION TIME!!