GROWERTALKS

Features

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Mealybugs: What Can You Do?

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Mealybugs are destructive and economically important insect pests of a wide range of greenhouse-grown horticultural crops, including annuals, perennials, foliage plants, orchids, succulents and holiday plants. The primary mealybug species encountered in greenhouse production systems is the citrus mealybug, *Planococcus citri*.

Mealybugs are major insect pests due to a number of factors including: 1) They're located in very secluded or cryptic habitats, which makes detection difficult and ability to obtain contact with insecticides challenging; 2) early instar nymphs or crawlers are hard to detect because of their size (2.0-mm long); 3) later instar nymphs and adults develop a protective waxy covering that inhibits the effectiveness of contact insecticides by preventing contact with the body; and 4) mealybug females have high reproductive capacity—laying over 400 eggs.

Mealybugs feed in cryptic habitats, which allow them to escape exposure from visual observations, insecticide spray applications and releases of biological control agents or natural enemies. Moreover, mealybugs reside and hide underneath the sheaths of orchids, which help them avoid detection and provide protection from insecticide spray applications. The nymphs or crawlers are most susceptible to insecticides because they haven't formed the protective covering.

Mealybugs feed within the vascular system (phloem sieve tubes) removing plant fluids. The damage associated with mealybug feeding includes: leaf distortion, plant stunting and wilting. Furthermore, mealybugs exude copious amounts of honeydew while feeding. Honeydew is a clear, sticky liquid that serves as a growing substrate for black sooty mold. Also, ants feed on the honeydew and protect mealybugs from natural enemies, such as parasitoids and predators.

The life cycle (egg to adult) takes between 25 and 60 days depending on temperature. Males develop into winged individuals that mate with females. However, males do not feed on plants because they don't possess functional mouthparts. After mating, females continue development, lay their complement of eggs and then

die.

Plant protection against mealybugs involves scouting, cultural, physical, insecticidal and biological practices. Scouting involves regularly visually inspecting plants highly susceptible to mealybugs. Scouting will help detect mealybug populations early during the crop production cycle, which will help to appropriately time insecticide applications and releases of biological control agents. Cultural practices that must be implemented to avoid problems with mealybugs include:

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

2) Avoid over-fertilizing plants (especially with water-soluble nitrogen-based fertilizers), as this increases female mealybug reproduction or causes females to lay more eggs than normal.

Physical practices are those designed to quickly remove mealybugs from plants or from the production area. These include:

1) Washing crawlers off plants using a forceful water spray or using a brush to remove mealybugs from plants

2) Pruning out heavily-infested branches and removing plant debris from the vicinity

3) Immediately disposing of heavily infested plants

When using insecticides to suppress mealybug populations, be sure to follow the guidelines provided below:

1) Repeat or multiple applications will be required as eggs do not all hatch simultaneously. In addition, the nymphs and crawlers are most susceptible to insecticide applications.

2) Rotate insecticides with different modes of action in order to minimize the potential of resistance developing in mealybug populations.

3) A surfactant or spreader-sticker (if not already in the formulation) should be added to the spray solution to enhance the spreadability of the spray droplets—thus increasing coverage of plant parts.

The types of insecticides used against mealybugs are contact and insect growth regulators. Contact insecticides will kill mealybugs by direct contact, whereas insect growth regulators are only active on the nymphs or crawlers. Below are three ways to effectively use insecticides against mealybugs:

• **Timing:** Apply insecticides when the most susceptible life stages (e.g., nymphs or crawlers) are present.

• **Coverage:** When spraying an insecticide, be sure to obtain thorough coverage of all plant parts, including leaves, stems, flowers and fruits.

• **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.

Factors that may result in insufficient suppression of mealybug populations when using insecticides include:

1) Failure to implement a scouting program

2) Using inappropriate insecticides

3) Poor coverage of plant parts with insecticide spray applications

4) Improper timing of insecticide applications

5) Extended insecticide application intervals (not frequent enough)

6) Failure to dispose of “pet” plants that serve as a reservoir for mealybug populations

In our research program at Kansas State University, we’ve found that systemic insecticides aren’t effective in suppressing citrus mealybug populations on coleus (*Solenostemon scutellarioides*) plants, which may be associated with the fact that, although mealybugs feed in the phloem sieve tubes—similar to aphids and whiteflies—they feed differently. For instance, feeding involves variations in the number and length of time of intracellular punctures, intervals between the first phloem-ingesting periods, and stylet motility or movement during the phloem searching process. Therefore, feeding behavior could impact the ability of systemic insecticides to suppress mealybug populations.

The use of biological control agents or natural enemies may be problematic due to the somewhat limited availability of natural enemies for regulation of mealybug populations. In addition, when implementing a biological control program, it’s critical to control ants, which protect mealybugs from their natural enemies and can distribute them among plants. Furthermore, mealybugs may actually encapsulate the eggs of certain parasitoids. Encapsulation is a process by which the immune system of an insect (in this case, mealybug) responds to a foreign body (egg) by surrounding the egg, thus resulting in asphyxiation or suffocation. Therefore, encapsulation can reduce the ability of parasitoids to provide sufficient regulation of mealybug populations.

Below are the natural enemies (predators and parasitoids) commercially available for use against mealybugs:

Predators:

• Mealybug destroyer (*Cryptolaemus montrouzieri*)

• Green lacewing (*Chrysoperla spp*.)

Parasitoids:

• *Leptomastix dactylopii*

• *Anagyrus pseudococci*

In conclusion, in order to minimize problems with mealybugs:
1) Immediately dispose of plants heavily-infested with mealybugs; 2) when using high-volume applications of insecticides, be sure to make frequent enough applications and thoroughly cover all plant parts; and 3) when implementing a biological control program always be sure to control ants. **GT**

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