GROWERTALKS

Features

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Managing Bulb Mites

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Mites that feed on plants can be a problem in greenhouses if not detected early in production before populations reach plant-damaging levels. There are various mite species that feed on horticultural crops (e.g. ornamentals and vegetables) grown in greenhouses, including two-spotted spider mite (*Tetranychus urticae*), Lewis mite (*Eotetranychus lewisi*), broad mite (*Polyphagotarsonemus latus*), cyclamen mite (*Phytonemus* [previously *Steneotarsonemus*] *pallidus*) and bulb mites (*Rhizoglyphus* spp.).

Figure 1. Bulb mite adult feeding on decayed plant material. Photo: Raymond Cloyd.
Figure 2. Bulb mite adult. Photo: Utah State University.

Biology & behavior

The two bulb mite species encountered in greenhouses are *Rhizoglyphus robini* and *Rhizoglyphus echinopus*. They're a pest of ornamentals in storage or in greenhouses. Bulb mites feed on a variety of plants in the *Liliaceae* family, such as, amaryllis, crocus, freesia, gladiolus, hyacinth, lily, narcissus and tulip. The bulb mite life cycle consists of an egg, larva, protonymph, deutonymph, tritonymph and an adult. Development rate and longevity of the male and female depends on temperature and food quality. Bulb mites are 1/50 to 1/25 of an inch (0.5 to 0.9 mm) in length, shiny white to translucent with two brown spots on the body, and red to orange legs (Figures 1 and 2). Females can lay up to 100 eggs during their lifespan. Eggs are laid individually or in clusters near damaged and/or decaying tissue on the surface of bulbs. Six legged larvae emerge (eclose) from eggs and then in three to eight days larvae transition into a protonymph that has eight legs. The protonymph stage feeds for up to four days then progresses to a tritonymph, which eventually becomes an adult.

When populations are abundant, another stage called a "hypopi," or heteromorphic deutonymph, may develop due to overcrowding or depletion of the food source. The heteromorphic deutonymph doesn't feed, but attaches to a flying insect—such as an adult whitefly, thrips, fungus gnat or shore fly—which allows the heteromorphic deutonymph to be distributed to another location within the greenhouse. The type of behavior exhibited by the heteromorphic deutonymph is called phoresy.

The bulb mite life cycle takes approximately 40 days to complete; however, completion depends on relative humidity, plant type and temperature. For example, at 77F (25C), the life cycle from egg to adult is completed in 12 days. Bulb

mites are less active during the winter; however, they don't undergo diapause and all life stages may be present throughout the growing season. Bulb mites can be distributed within and among greenhouses by workers or growing medium.

Damage

Bulb mites are considered secondary mite pests because they're associated with decaying plant matter as a result of feeding by fungus gnat larvae or an infestation of soilborne root pathogens. However, bulb mites will feed on the roots and below-ground structures of certain plants (Figure 3). They also feed on the leaves and stems of lilies. The mites infest bulbs and corms by penetrating through the basal plate or outer skin layers. Bulb mites can establish in the inner layers, which makes managing populations difficult.

Feeding wounds created by bulb mites provide entry sites for soilborne fungal pathogens, such as, Pythium, Rhizoctonia and Fusarium. In addition, bulb mites may vector fungi, such as *Fusarium oxysporum*. The condition of bulbs and corms influences how rapidly bulb mites will colonize and establish in bulbs and corms. For example, bulb mites are attracted to and colonize bulbs infected with *F. oxysporum*.

Furthermore, populations develop faster on bulbs that are infected with soilborne diseases, such as *Fusarium* spp., indicating that infected bulbs provide conditions that favor bulb mite development. Several bacteria and fungi associated with *Gladiolus* corms are attractive to bulb mites. However, the relationship increases the difficulty in determining what's primarily responsible for causing plant damage. In addition, visible signs of damage aren't noticeable until bulb mite populations reach outbreak proportions.

Management

Pesticides, including insecticides and miticides, have been used to manage bulb mite populations. The typical procedure was to immerse bulbs prior to planting in a solution of dicofol (Kelthane), which appeared to reduce problems with bulb mites. However, Kelthane is no longer available. Currently, there are no pesticides labeled for managing bulb mites in greenhouses.

Bulb mite populations can vary in their susceptibility to pesticides. In addition, studies have demonstrated that bulb mite populations have developed resistance to certain pesticides in the organophosphate and carbamate chemical classes. The mechanisms of resistance are associated with reduced penetration through the cuticle and increased metabolic detoxification.

Figure 3. Bulb mites feeding on decayed plant material. Photo: University of Maryland.

Another strategy that can be implemented to manage bulb mite populations is releasing biological control agents. Studies have reported that the nymphal and adult stages of the soil-dwelling predatory mite *Gaeolaelaps aculeifer* feeds on all life stages of *R. echinopus*. However, the larvae, nymphs and adults of *G. aculeifer* prefer to feed on the larvae and nymphal stages of *R. echinopus*, not the adults. The ability of *G. aculeifer* to manage bulb mite populations below plant-damaging levels depends on the population level and exposure to the predatory mite because bulb mites can hide in the inner folds of bulbs, which increases the difficulty of the predatory mite to find bulb mites. Bulb mites may migrate (vertically) through the growing medium and reside underneath the basal plate of bulbs or in decaying organic matter, thus making management difficult when using pesticides or biological control agents. Future studies

need to determine if the rove beetle, *Dalotia (Atheta) coriaria*, a predator of fungus gnat larvae and western flower thrips (*Frankliniella occidentalis*) pupae, is a viable biological control agent for management of bulb mite populations.

Research has demonstrated that bulb mite populations may be managed by immersing infested plants in 110F (43C) water for 30 minutes. However, the procedure is a short-term remedy and may directly or indirectly damage some bulb crops. **GT**

For more information on bulb mites, refer to the following extension publication: Cloyd, R. A. 2010. "Bulb mites: Management in Greenhouses and Nurseries." Kansas State University Agricultural Experiment Station and Cooperative Extension Service. MF2939. Kansas State University; Manhattan, Kansas.

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