GROWERTALKS

Pest Management

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Bulb Mites: The Critters from the Deep

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Plant-feeding mites are problematic in greenhouses, interiorscapes and conservatories, and if left unchecked, populations may reach abundant levels within a short period of time. There are various mite species that feed on ornamental plants; however, the primary mite pests you may encounter in greenhouses include the twospotted spider mite (*Tetranychus urticae*), Lewis mite (*Eotetranychus lewisi*), broad mite (*Polyphagotarsonemus latus*), cyclamen mite (*Steneotarsonemus pallidus*), and bulb mites (*Rhizoglyphus* spp.).

The two most common bulb mite species that may be present in greenhouses are *Rhizoglyphus echinopus* and *Rhizoglyphus robini*. They're primarily 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.

Life cycle

The life cycle of bulb mites include an egg, larva, protonymph, deutonymph, tritonymph and adult. The rate of development and longevity of both male and female is dependent on temperature and food quality. Bulb mites are 1/50 to 1/25 in. (0.5 to 0.9 mm) in length, shiny white to translucent with two brown spots on the body, and smooth with short, red-orange legs. Females undergo sexual reproduction, laying up to 100 white, elliptical eggs during their lifespan. Eggs are laid either individually or in clusters near damaged and/or decaying tissue on the surface of bulbs. Six-legged larvae emerge from eggs, and then within three to eight days larvae molt into a protonymph that has eight legs. This stage feeds for up to four days then molts into a tritonymph, and then eventually becomes an adult. When populations are extremely abundant, another stage called a "hypopi" or heteromorphic deutonymph may form due to overcrowding or depletion of the food source. This stage doesn't feed but can attach itself to a flying insect (e.g. adult whitefly, thrips, fungus gnat, or shore fly) and is then distributed to another location within the greenhouse. This type of behavior is referred to as phoresy.

The life cycle takes approximately 40 days to complete. However, this depends on relative humidity, plant type and temperature. For example, at 77F (25C) the life cycle is completed in 12 days. Bulb mites may be less active during the winter months; however, they don't undergo diapause (a kind of dormancy), and all life stages may be present throughout the growing season. Bulb mites may be moved in and between greenhouses by workers or growing medium.

Bulb mites are considered secondary arthropod pests commonly associated with decaying plant matter as a result of damage caused by fungus gnat larvae or soil-borne root pathogens. However, bulb mites will feed on the roots and below ground structures of certain plants. They also may be found feeding 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 may establish in the inner layers, which makes control extremely difficult.

Feeding wounds created by bulb mites provide entry sites for soil-borne fungal pathogens such as pythium, rhizoctonia and fusarium. The condition of bulbs and corms influences the rate of colonization and establishment by bulb mites. Bulb mites, for example, are attracted to and establish in bulbs infected with Fusarium spp., more so than healthy bulbs. Furthermore, populations increase faster on bulbs that are initially infected with soil-borne diseases such as *Fusarium* spp., indicating that infected bulbs create conditions that are favorable for bulb mite development. Several bacteria and fungi associated with gladiolus corms are attractive to bulb mites. This relationship may, however, make it difficult to determine what's primarily responsible for causing plant damage. Moreover, visible signs of damage may not be noticeable until bulb mite populations reach outbreak proportions. Bulb mites may migrate (vertically) through the growing medium and reside underneath the basal plate of bulbs or in decaying organic vegetation, which may make control difficult when using either pest control materials (miticides) or biological control agents (natural enemies).

Management

Miticides and even some insecticides have been commonly used to "control" bulb mites. The typical procedure was to immerse bulbs, prior to planting, in a solution of dicofol (Kelthane). This appeared to reduce problems with bulb mites. However, Kelthane is no longer registered for this type of application and isn't even labeled for "control" of bulb mites. Miticides such as abamectin (Avid), hexythiazox (Hexygon), fenbutatin-oxide (ProMite), and pyridaben (Sanmite) may provide some "control" of bulb mites; however, none of these materials is even registered (or labeled) for bulb mites. Currently, there are no miticides labeled for control of bulb mites in greenhouses. In addition, it's difficult to conduct robust studies that quantitatively evaluate the efficacy of miticides.

Bulb mite populations may vary in their susceptibility to pest control materials. In addition, research has shown that bulb mite populations have developed resistance to certain insecticides in the organophosphate and carbamate chemical classes. The mechanisms of resistance include reduced penetration through the cuticle and increased metabolic detoxification.

The primary means of dealing with bulb mites using natural enemies has focused on the use of predatory mites. It has been reported that the nymphal and adult stages of the soil-dwelling predatory mite *Hypoaspis aculeifer* feed on all stages of *R. echinopus*. Both the immatures (larvae and nymphs) and adults prefer to feed on the immature stages of *R. echinopus*, not the adults. However, the ability of *H. aculeifer* to "control" bulb mites will depend on the population level and exposure to the predatory mite since bulb mites hidden in the inner folds of bulbs may be more difficult for the predatory mite to locate. Research has demonstrated that bulb mite populations may be "controlled" by immersing infested plants in 110F (43C) water for 30 minutes. However, this is a short-term remedy, and may directly or indirectly damage some bulb crops.

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