K-STATE Research and Extension

Broad Mite and Cyclamen Mite

Management in Greenhouses and Nurseries

Broad mite (*Polyphagotarsonemus latus*) and cyclamen mite (*Phytonemus pallidus*) are two mite species that may be encountered in greenhouses and nurseries. Broad and cyclamen mites are classified as tarsonemid mites and feed on plants in more than 60 plant families, including a wide variety of horticultural crops such as African violet, begonia, browallia, chrysanthemum, cissus, cucumber, cyclamen, dahlia, delphinium, eggplant, English ivy, exacum, fuchsia, impatiens, jasminum, magnolia, New Guinea impatiens, pepper, snapdragon, strawberry, tomato, and zinnia. Both mites have been major pests of transvaal daisy (*Gerbera jamesonii*) crops grown in greenhouses since the 1930s. Broad and cyclamen mites usually cannot be observed with the naked eye.

Broad and cyclamen mites are typically a problem when temperatures are between 60˚F and 70˚F (15˚C and 21˚C) and the relative humidity is 60 to 80 percent, which is conducive for development and reproduction. Broad and cyclamen mites tend to avoid light. All life stages (egg, larva, nymph, and adult) may be present simultaneously during the growing season. Both mite species feed on young leaves and flower parts, including flower buds, which may retard growth and prevent flowers from fully developing. They tend to reside and feed on the meristematic tissues of plants, requiring tender living tissue, which provides an ideal food source for development. Typically, broad or cyclamen mites are detected when plant injury becomes noticeable, as the mites themselves are rarely detected.

Broad Mite

Broad mite adults are approximately 0.0009 inch (0.25 mm) long, shiny, amber to dark-green in color, and oval (Figure 1). There are four distinct life stages: egg, larva, nymph, and adult. Females can lay up to 40 eggs during their life span, depending on temperature and relative humidity. Unmated females produce only males. The sons of virgin females may mate with their mothers and produce eggs that hatch into female offspring. The sex ratio is usually 1:4 (one male to four females).

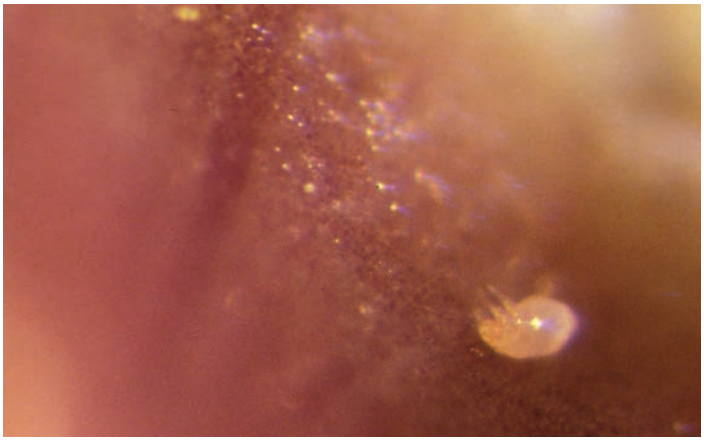

Figure 1. Broad mite adult

Eggs are oval, white, and covered with bumps (Figure 2). Six-legged larvae emerge from eggs, which transition into eight-legged nymphs, and then eventually adults. Females have short and thin hind legs. Males are usually smaller than females. Broad mites feed in groups, primarily on the underside of young leaves (Figure 3) and in flowers, where females lay eggs.

Figure 2. Broad mite eggs

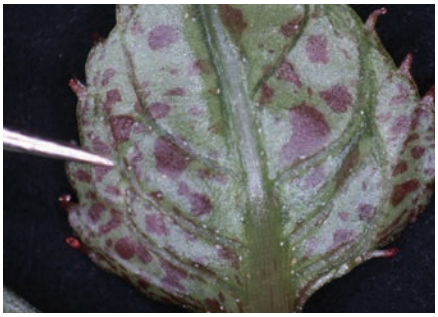

Figure 3. Broad mites on leaf underside

Broad mites are cell-feeders. They use piercing mouthparts to feed on the epidermis of young leaves, causing leaf-margins to curl and become brittle, puckered, and shriveled (Figure 4). They may also inject

Figure 4. Broad mite leaf-feeding damage

toxins as they feed. When broad mite populations are extensive, individuals may move and feed on the upper side of leaves, resulting in severe distortion. Lower leaf surfaces may also appear bronzed.

Broad mite feeding damages the meristematic tissue of the growing tip or apical shoot, which may inhibit growth, decrease leaf number, leaf size and area, and reduce plant height. Leaves may increase in firmness and appear darker green than normal (Figure 5). Damage may resemble

Figure 5. Damaged leaves may appear darker than usual

exposure to a phenoxy-based herbicide such as 2,4-D (Figure 6); a virus; or nutritional imbalances such as magnesium deficiency. Broad mites can cause distortion or malformation of transvaal daisy blooms.

Figure 6. Broad mite feeding damage may resemble herbicide injury

Development from egg to adult takes 5 to 6 days at 70˚F to 80˚F (21˚C to 26˚C), and 7 to 10 days at 50˚F to 65˚F (10˚C to 18˚C). Broad mites may spread among greenhouse or nursery-grown crops via air currents, leaves of adjacent plants in contact with each other, and by workers handling infested plants and then touching non-infested plants.

Depletion of the food source may also contribute to broad mites dispersing among the crop. Broad mite females attach to the legs and antennae of greenhouse whitefly (*Trialeurodes vaporariorum*) or sweet potato whitefly B-biotype (*Bemisia tabaci*) adults. But adult whiteflies may not remain still long enough for the mites to take hold and may even resist them. Broad mites will not attach to thrips or aphids. Male broad mites may carry female nymphs to young leaves, playing an active role in distribution. Males may also transport eggs and adult females to new leaves.

Cyclamen Mite

Cyclamen mites are 0.0009 inch (0.25 mm) long. Eggs are oval and smooth with no bumps (Figure 7). The life cycle from egg to adult takes 1 to 3 weeks to complete, depending on temperature. Cyclamen mite females are yellow to brown in color and can lay 1 to 3 eggs per day and up to 16 during their life span. Eggs are usually deposited in clusters within buds.

Figure 7. Cyclamen mite and eggs

Similar to broad mites, cyclamen mites may disperse throughout a greenhouse or nursery production facility by attaching to whitefly adults. In fact, this may be the primary method by which cyclamen mites are distributed. Much like broad mites, cyclamen mites are also cell feeders. Symptoms of cyclamen mite feeding include leaf distortion or twisting, bronzing, and curling. Leaves may appear wrinkled, brittle, and rough. Heavily infested plants are stunted, with small leaves that eventually turn brown to silver. Flower buds may abort or not open properly (Figure 8).

Figure 8. Flower buds damaged by cyclamen mite

Management

Both broad and cyclamen mites require a food source for survival, so implementing sanitation practices, such as cleaning greenhouses before introducing new plants and disinfecting benches, will alleviate problems with both mite species. Broad and cyclamen mite populations are difficult to suppress with contact miticides because they are located in the meristematic tissues.

Miticides with translaminar properties may be more effective, and typically, broad and/or cyclamen mites are listed on the label. Translaminar means that after a foliar application, the material penetrates leaf tissues and new terminal growth, forming a reservoir of active ingredient within the leaf or new growing points. As a result, these miticides are more likely to come in contact with broad or cyclamen mites feeding in the meristematic tissues. Miticides labeled for suppression of broad mite and cyclamen mite populations are presented in Table 1. Preventive applications may be required, particularly on highly susceptible crops, because once damage is evident it is too late to initiate practices that may suppress populations of either mite species. It is recommended that growers remove and immediately dispose of plants exhibiting symptoms, and those adjacent to symptomatic plants (Figure 9), to prevent broad and cyclamen mite populations from spreading.

Figure 9. New Guinea impatiens exhibit stunted growth as a result of broad mite feeding

Biological control of broad and cyclamen mite is another management option that involves the use of commercially available predatory mites. The predatory mite, *Neoseiulus barkeri,* has been used successfully in suppressing broad mite populations, and the predatory mites, *Neoseiulus* (=*Amblyseius*) *cucumeris* and *N. californicus* have been utilized to suppress cyclamen mite populations on certain greenhouse-grown crops including vegetables. It is important to apply predatory mites early in the crop production cycle before broad and cyclamen mites become established.

Hot water treatments are another management option. Studies have shown that exposure times between 15 and 45 minutes at temperatures between 105˚F (40˚C) and 110˚F (43˚C) are effective in killing both mite species. Plants must be immersed in the hot water long enough to allow penetration into areas such as the meristematic tissues where mites are located, but not so long as to damage plants. Producers may consider implementing this procedure as a short-term solution. Plants placed back among crops can be infested.

There has been, in general, an increase in broad and cyclamen mite populations on a variety of greenhouse and nursery-grown horticultural plants, even those that were not initially considered susceptible. This may be due to the extensive use or reliance on the neonicotinoid insecticides including imidacloprid (Marathon/Merit), thiamethoxam (Flagship), acetamiprid (TriStar), and dinotefuran (Safari). These insecticides have systemic activity and are commonly applied to the growing medium to control phloem-feeding insect pests such as aphids, whiteflies, and mealybugs; however, they have no activity on mites.

Before the introduction of the neonicotinoid insecticides, greenhouse and nursery producers usually applied broad-spectrum insecticides/miticides including aldicarb (Temik) and oxamyl (Vydate) to control or suppress the diversity of insect and mite pests. In addition to suppressing populations of target insect or mite pests, applications of these insecticides/miticides likely indirectly maintained broad and cyclamen mite populations below damaging levels, thus preventing outbreaks. As a result, reliance on neonicotinoid insecticides may allow broad and cyclamen mite populations to escape exposure and build up to damaging levels.

Table 1. Miticides (active ingredient and trade name) that have broad and/or cyclamen mite on the label, and activity (translaminar and/or contact).

Common Name (active ingredient)	Trade Name	Mites on Label	Activity
Abamectin	Avid	Broad and cyclamen mite	Translaminar and contact
Chlorfenapyr	Pylon	Broad and cyclamen mite	Translaminar and contact
Fenpyroximate	Akari	Broad and cyclamen mite	Contact
Pyridaben	Sanmite	Broad mite	Contact
Spiromesifen	Judo	Broad and cyclamen mite	Translaminar and contact

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Photo credit: Broad mite eggs, Figure 2, Karen Rane, University of Maryland

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Kansas State University Agricultural Experiment Station and Cooperative Extension Service

MF-2938 **November 2010**

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