Pest e-alerts

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Broad Mites on Blackberries

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A new pest of blackberries has been detected in Oklahoma orchards. Broad mite, *Polyphagotarsonemus latus*, attacks a wide variety of economically important crops and occurs worldwide. This mite is a pest of crops representing 60 plant families and includes fruit, vegetable, and ornamental crops. Due to its wide host range, this mite is also known as chili mite, citrus silver mite, jute white mite, tropical mite, and yellow tea mite. Blackberries have been known as a potential host plant for the past decade, but in 2017 broad mites have been detected on blackberries in Arkansas, Illinois, Indiana, Maryland, North Carolina, South Carolina, Pennsylvania, Virginia, California, and now Oklahoma. The reason for the sudden prevalence of broad mites on blackberries is not known, but recent mild winters may be contributing factors.

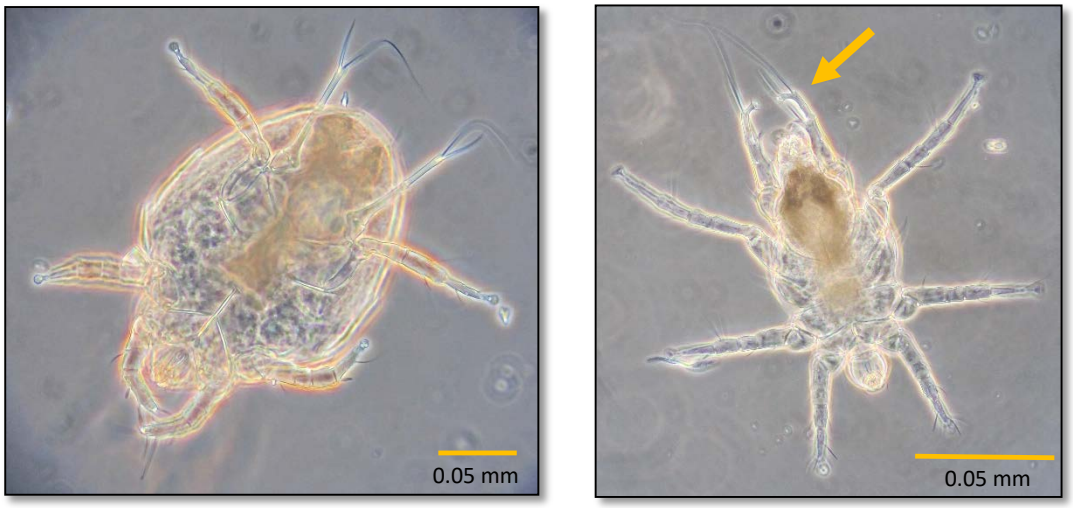

Figure 1. Adult broad mites at high magnification, female (left) and male (right). Note enlarged, grasping hind legs of male (arrow). Photos: Rick Grantham, OSU.

Identification

Broad mites are very small, and can only be viewed under magnification. Females measure about 0.2 mm long and are oval with swollen bodies and translucent yellow to green coloration (Fig. 1).

With the exception of larvae, broad mites have four pairs of legs, but the pair of hind legs on females are reduced in size and are whip-like. Males are smaller than females, measuring about 0.1 mm, but are similar in color. Males are much faster than females and have enlarged hind legs for grasping quiescent females (nymphs) for subsequent mating (Figs. 1 and 2). Eggs measure 0.08 mm long and are elliptical and translucent with white dots (tubercles) present on the surface (Fig. 3).

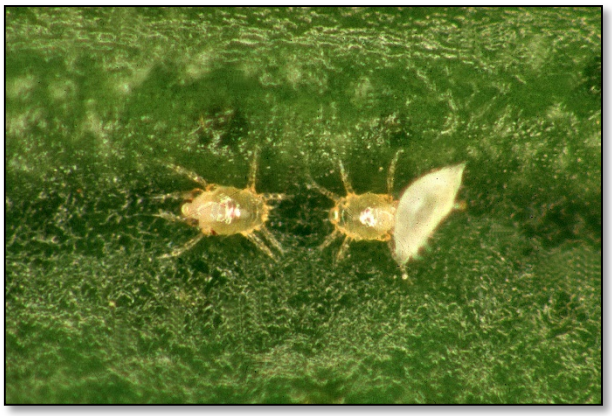

Figure 2. Adult male broad mites. Note that one male is carrying a quiescent female (nymph). Photo: Dept. of Agriculture and Food, Government of Western Australia.

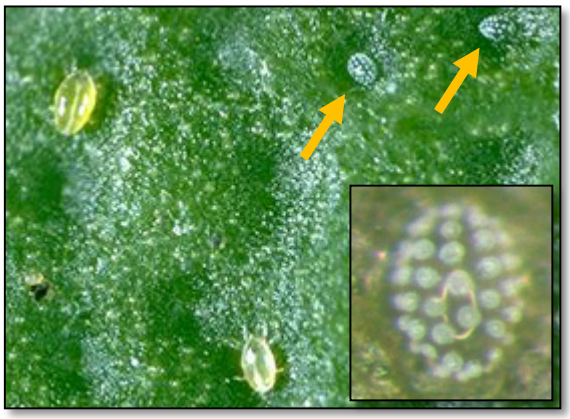

Figure 3. Adult female broad mites and eggs (arrows). Inset shows an egg at high magnification. Photos: Univ. of California (main image) and Rick Grantham, OSU (inset).

Larvae emerge from eggs and only have three pairs of legs. They appear white due to minute ridges on the body, measure 0.1 to 0.2 mm long, and move slowly. Larvae molt into quiescent nymphs that are clear and pointed at both ends (Fig. 2).

Life Cycle and Biology

The entire life cycle is extremely short, only lasting 5 days from egg to adult. Adult females can live up to 2 weeks and lay between 1 to 5 eggs per day. Broad mite reproduction is most prolific at temperatures ranging between 70° and 80° F. Many generations are produced during the growing season and populations can increase rapidly. Due to the short life cycle and rapid generation time of broad mites, pesticide resistance has been a primary concern in managing this pest in other crops. In Arkansas, broad mites have been found to overwinter on canes, leaves, leaf litter, and soil, but the majority of mites occur in leaf litter. Thus, broad mites use a variety of substrates to survive during winter and re-infest new growth the following spring. Interestingly, broad mites are able to hitchhike on whiteflies by latching onto their legs and mouthparts, which may at least partially explain how broad mites have recently invaded blackberries and emerged as a significant pest of this important crop.

Damage

Broad mites feed on leaves, buds, and fruits of affected plants, but on blackberries their damage appears to be limited to new, tender shoot growth on primocanes. Feeding damage from broad mites causes terminal leaves to become deformed, a result of the toxic saliva injected by broad mites. Affected leaves curl upward and become somewhat discolored (Fig. 4). This causes floricanes (second-year, fruit-bearing canes) to have delayed bud break, and the canes may become weakened or die prematurely. Ultimately, broad mite feeding damage leads to yield loss.

Figure 4. Feeding damage from broad mites on blackberry leaves at the Cimarron Valley Research Station in Perkins, OK. Note the leaves showing upward cupping and discoloration. Photos: Becky Carroll, OSU.

Survey and Detection

When scouting blackberries for broad mite damage, look for malformed terminal leaves and stunted growth. Direct observation of mites from damaged tissues can be difficult because of their extremely small size, so a 10X or stronger hand lens should be used. However, a microscope with at least 100X magnification will make detection much easier. Research at the University of Arkansas has demonstrated two new mite extraction techniques that recover more mites than traditional techniques such as direct counting and Berlese funnels (heat extraction), thereby improving efficiency and reliability of calculating treatment thresholds. The first technique involves washing affected plant tissues with a mild solution of bleach and soap over a 500-mesh sieve. Thus, mites are separated from leaves, buds, and canes as they pass through the sieve. The other technique involves using a solution of sugar water for floating the mites. This technique works best for extracting mites from soil and leaf litter placed in a Berlese funnel. The sugar solution floats mites out of the jumble of soil, debris, and other arthropods that fall into the collection jar at the bottom of the funnel. These new extraction techniques will prove useful in detection and determining if treatment thresholds have been reached.

Management

Because broad mites are a new pest of blackberries, the number of miticides registered for controlling this pest are limited to one product, Agri-Mek (abamectin). This is a restricted use pesticide as it is toxic to fish, mammals, and aquatic organisms. There is valid concern over resistance developing in broad mite populations if few active ingredients are used to control this pest. Several other products have been evaluated for broad mite control in Arkansas, and materials showing promise include insecticidal soap and horticultural oil. However, only Agri-Mek can be used at this time, and it should only be used sparingly when mite populations meet or exceed the treatment threshold of 5 mites per leaf (based on 150 random leaf samples). Early in the season, broad mites tend to aggregate, so check for hot spots in the orchard.

Cultural management options include eradicative pruning and rogueing of dead or severely impacted plants, followed by careful monitoring of the orchard for further damage via effective scouting practices. In this case, scouting should be concentrated on plants surrounding infested plants. Pruning and rogueing are only practical when the broad mite infestation is light and/or

highly aggregated within the orchard. Because mites overwinter predominantly in leaf litter, cultural management should also include sanitation by removing accumulated leaf litter in the fall and early winter. This strategy may not be effective for orchards that are heavily mulched, as mulch and other organic matter can serve as a suitable overwintering substrate for broad mites.

Finally, biological control may be an effective option for managing broad mites, especially since few miticide products are registered for use on blackberries. The predatory mites, *Amblyseius swirskii* and *A. cucumeris* (Figs. 5 and 6), can be used to control broad mites in blackberries. These biological control agents are available commercially and are effective at high temperatures. Research at University of Arkansas shows that these two predators, released alone or in combination with sulfur early in the growing season, can delay increases of broad mite populations to early July. Predatory mites show potential as effective components of an integrated pest management program for broad mites in blackberry orchards.

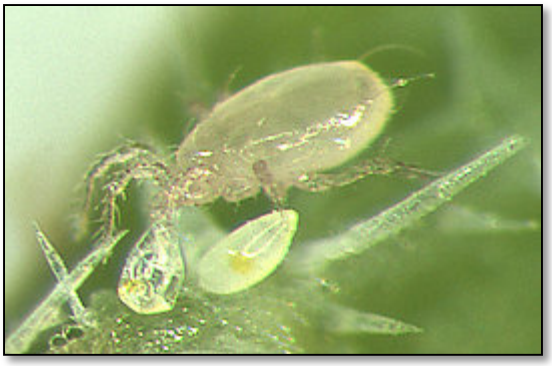

Figure 5. The predatory mite, *Amblyseius swirskii*. Photo: www.allaboutswirskii.com.

Figure 6. The predatory mite, *Amblyseius cucumeris*. Photo: www.bioplanet.it.

If you observe blackberries showing signs and symptoms of broad mite infestation in your county, please notify Dr. Eric Rebek (405-744-4846; eric.rebek@okstate.edu), State Extension Specialist for Horticultural Insects, or contact your local county extension educator.

References

LeFors, J. 2017. Broad Mite IPM in Arkansas. Powerpoint presentation by graduate student at University of Arkansas.

Fasulo, T.R. 2016. EENY-183: Featured Creatures – Broad Mites. University of Florida. Available at: http://entnemdept.ufl.edu/creatures/orn/broad_mite.htm.

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