CROP PEST:

Broad Mite

Polyphagotarsonemus latus

OVERVIEW:

Broad mites (*Polyphagotarsonemus latus*) are tiny tarsonemid mites which are difficult to scout for, and may spread on clothing, air currents, or even other pests. They are pests of 60 plant families, which include food and ornamental crops (Zhang 2003). Affected plants include pepper, tomato, cucumber (Heinz et al. 2004; Zhang 2003), soybeans, citrus (Vacante and Kreiter 2017), blackberry, raspberry, strawberry (Gobin et al. 2017), African violet, begonia, chrysanthemum, cyclamen, dahlia, gloxinia, fuchsia, gerbera, hibiscus, impatiens, and ivy (Heinz et al. 2004; Zhang 2003).

DESCRIPTION:

Broad mites are very small (0.007" long; Heinz et al. 2004; Vacante and Kreiter 2017) and have varying colors that are influenced by the host plant (Zhang 2003; Vacante and Kreiter 2017). Their bodies are typically hard and shiny (Gerson and Weintraub 2007) and the females will have a faint white stripe in the center of their backs (Zhang 2003; Vacante and Kreiter 2017). Males are shorter than females and tapered toward the rear (Zhang 2003). Positive identification requires slide-mounted specimens and a skilled acarologist but knowing the host plant and being able to recognize the signs and symptoms can provide an indication of their presence. A useful diagnostic for broad mites is their eggs, which look like small footballs with rows of protruding white spots.

Polyphagotarsonemus latus female with eggs and larva. Used with permission from Dennis Haines, Tulare County Agricultural Commission

Jalapeno pepper: Broad mite feeding injury. Photo by Scot Nelson.

DAMAGE:

Broad mites feed on buds, blossoms, new leaves, and young fruit (Gerson and Weintraub 2007; Vacante and Kreiter 2017; Weintraub et al. 2017; Zhang 2003) which results in damage similar to that from hormonal weed killers (Zhang 2003). Generally, this manifests as bronzed leaves with down-curling margins, aborted and distorted buds and vegetation, twisted shoots, and misshapen or russeted fruit (Vacante and Kreiter 2017). The feeding prevents flower and fruit development on pepper seedlings and causes flower loss and silvering of fruit on older plants (Vacante and Kreiter 2017). Damage to eggplants is similar to that of peppers (Vacante and Kreiter 2017). To gerbera, leaves can split or crack open resulting in a rugged look, and flowers have distorted and discolored rays (Vacante and Kreiter 2017). The signs and symptoms can persist for multiple weeks following the removal of mites (Vacante and Kreiter 2017).

LIFE CYCLE:

The optimal conditions for broad mite development are moderate temperatures (77F), high humidity (90-100%), and low light intensity (Heinz et al. 2004; Vacante and Kreiter 2017). Broad mites are normally active throughout the year in greenhouse situations, with reproduction slowing in cooler months (Vacante and Kreiter 2017). Males deliver dormant females to new growth (Gerson and Weintraub 2007; Vacante and Kreiter 2017). Females oviposit approximately 25-50 eggs during their 10-11 day lifespan within the hollows of the lower leaf surface, and on young fruit (Zhang 2003; Vacante and Kreiter 2017). Fertilized eggs produce females, while unfertilized eggs produce males (Vacante and Kreiter 2017). The emerging stage is called a larva and lasts for one day (Vacante and Kreiter 2017). It takes approximately four more days until they develop into adults (Vacante and Kreiter 2017). They can disperse to other plants and plant parts by walking, wind, human transport, and by latching onto the legs of whiteflies (Gerson and Weintraub 2007; Weintraub et al. 2017; Zhang 2003).

MONITORING TIPS:

Keep a close eye on plant species that are likely to be attacked by broad mites. Greenhouse plants that are “magnets” for broad mites include: Zonal geraniums, New Guinea impatiens, thunbergia, torenia, verbena, rieger begonias, scaevola, angel wing begonia, ivy geranium, and buddleia (Lindberg 2017a). Examine the undersurfaces of young leaves, crevices between leaves and stems near apical growth and flower buds (Zhang 2003) for their presence. Use a 20x hand lens or microscope (UCONN IPM 2020). Damage is generally not noticeable until 20-30 days after the initial infestation and the mites have likely moved onto neighboring plants at this point, so scouting efforts should focus on surrounding vegetation (Lindberg 2017b).

BIOLOGICAL CONTROLS:

Which predatory mite to apply will depend on the host plant, environmental conditions, and other biocontrols being used. Predators of tarsonemid mites include *Neoseiulus cucumeris*, *Neoseiulus californicus*, and *Amblyseius swirskii* (Heinz et al. 2004; Weintraub et al. 2017). Preventative releases of predatory mites should be used when you have plants that are susceptible or have a history of broad mites (Jandricic 2015).

Neoseiulus cucumeris will feed on pollen, thrips, and other small mites in addition to broad mites (Weintraub et al. 2017). They do not establish well on tomatoes but will establish on sweet peppers when pollen and prey are present, and on cucumber when prey is present (Weintraub et al. 2017). On greenhouse peppers, good broad mite control was achieved by releasing 600 N. cucumeris on each or every other plant (Gerson and Weintraub 2007). *Neoseiulus cucumeris* performs as well as *A. swirskii* during winter months in temperate greenhouses and may be the desired choice in winter because of its lower price (Buitenhuis et al. 2015).

Amblyseius swirskii is an aggressive generalist predator of broad mites, tomato russet mites, whiteflies, and thrips (Buitenhuis et al. 2015; Weintraub et al. 2017). Additionally, they feed on pollen and applications of supplemental food can enhance their success (Gobin et al. 2017). In a greenhouse trial on *Rhododendron simsii*, *A. swirskii* achieved better control of broad mites than repeated applications of abamectin (Gobin et al. 2017). In greenhouse sweet pepper, good control was obtained by releasing the mites at rates of 5-10 per square foot (Gerson and Weintraub 2007). Releases of 63 mites per plant effectively controlled broad mites in field-grown peppers and eggplants (Stansley and Castillo 2013). Avoid the use of *A. swirskii* if you are also using *Aphidoletes aphidimyza* for aphids. They are known to devour the eggs of *A. aphidimyza* and can disrupt aphid control (Messelink et al. 2011).

Neoseiulus californicus are generalist predators with a preference for *Tetranychus* spp. mites (Zhang 2004). They are able to tolerate lower humidity and higher temperature than the last two mite species. Greenhouse releases of one predator for every 5-15 prey considerably reduced broad mite densities on limes for weeks after the initial release. Similar results were obtained on field-grown limes during the moderate winter-spring conditions of Florida. *Neoseiulus californicus* could not keep up with a broad mite population boom during the hot and humid summer-fall (Phytoseiidae 2011). *Neoseiulus californicus* can be an excellent choice if you also have a history of spider mites.

USING CHEMICALS:

Broad mites are excellent at hiding in curly leaves and unexposed areas, making whole-plant coverage with pesticide sprays difficult (Zhang 2004), which is why preventative releases of predatory mites are so important. However, there are some conditions in which mite predators are not able to keep up with the population growth of broad mites, and biorational pesticides should be used. Dips of mineral oil can be used to clean up incoming plants or cuttings, and entomopathogenic fungi may be sprayed in propagation domes where the humidity is high and conducive to their germination. For extreme infestations, knockdowns with sulfur products may be warranted. If that is the case, do not combine sulfur with oils. Sulfur and oil products are highly incompatible and will burn your plants when used together.

OTHER MEASURES:

If there is a small number of infested plants, they must be bagged and eliminated before any further spread (Heinz et al. 2004). Because of the wide host range of broad mites, controlling weeds inside and outside of greenhouse structures might also reduce the overall pest abundance and carryover from previous crops (Vacante and Kreiter 2017). Always inspect incoming plant material to ensure that it is free of pests. Dipping the foliage of cuttings in a pesticide can help lessen the incoming pest load (Vacante and Kreiter 2017). Host plant resistance has not been thoroughly investigated for broad mites, but in general healthier plants are able to cope better with feeding damage. Soil drenches of beneficial microbes have induced foliar resistance against different pests and should be investigated for broad mites.

Author: Alec Blume, 2020.

Buitenhuis R, Murphy G, Shipp L, Scott-Dupree C. Amblyseius swirskii in greenhouse production systems: a floricultural perspective. Exp Appl Acarol. 2015;65(4):451-464. doi:10.1007/s10493-014-9869-9

Gerson U, Weintraub PG. Mites for the control of pests in protected cultivation. Pest Manag Sci. 2007;63(7):658-676. doi:10.1002/ps.1380

Gobin B, Pauwels E, Mechant E, Audenaert J. Integrated control of broad mites in ornamental plants under variable greenhouse conditions. IOBC-WPRS Bulletin 2017;124:125-130.

Heinz KM, Driesche RV, Parrella MP. Biocontrol in Protected Culture. Ball Pub.; 2004.

IPM Scouting and Decision Making. UCONN IPM website. http://ipm.uconn.edu/pa_greenhouse/. Accessed April 12, 2020.

Jandricic S. Banishing Broad Mite. OnFloriculture blog website. https://onfloriculture.com/2015/06/02/banishing-broad-mite-new-post-in-floriculture-ipm-blog/. June 2, 2015. Accessed April 12, 2020.

Lindberg, H. Attention scouts: Crops that are insect "magnets" in the greenhouse. MSU Extension website https://www.canr.msu.edu/news/crops_that_are_insect_magnets_in_the_greenhouse. February 2, 2017. Accessed April 12, 2020.

Messelink GJ, Bloemhard CMJ, Cortes JA, Sabelis MW, Janssen A. Hyperpredation by generalist predatory mites disrupts biological control of aphids by the aphidophagous gall midge Aphidoletes aphidimyza. Biological Control. 2011;57:246-252.

Phytoseiidae. In: Mites (Acari) for Pest Control. John Wiley & Sons, Ltd; 2007:173-218. doi:10.1002/9780470750995.ch26

Stansly PA, Castillo JA. Control of Broad Mites, Spider Mites, and Whiteflies using Predaceous Mites in Open-field Pepper and Eggplant. Proceedings of the annual meeting of the Florida State Horticultural Society. 2013;122:253-257.

Vacante V, Kreiter S. Handbook of Pest Management in Organic Farming. CABI; 2017.

Weintraub PG, Recht E, Mondaca LL, Harari AR, Diaz BM, Bennison J. Arthropod Pest Management in Organic Vegetable Greenhouses. Godfrey L, Siebert MW, eds. Journal of Integrated Pest Management. 2017;8(1). doi:10.1093/jipm/pmx021

Zhang ZQ. Mites of Greenhouses: Identification, Biology and Control. CABI; 2003.