UNIVERSITY OF MARYLAND EXTENSION

Greenhouse TPM/IPM Report

Central Maryland Research and Education Center
Ellicott City, Maryland

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Mint Moth

By: Stanton Gill

Leanne Pundt, University of Connecticut Extension, reported activity of the mint moth in greenhouses in Connecticut. Since we have several greenhouse and cut flower growers growing herbs, you might want to watch for activity in your area. Mint moth is in the genus, *Pyrausta* (https://bugguide.net/node/view/9722). The mint moth is a day-flying moth, which can be seen on sunny days between April and October. This is unusual since moth moths are night flyers. The caterpillar stage of the mint moth feeds on plants in the mint family, including spearmint, catmint, marjoram, and thyme. Mint moths are a common sight in gardens where these herbs have been planted.

The adult moth is relatively small and has dark purple forewings with orange markings. The markings can be quite variable, but the most consistent one is a large orange blotch, sometimes with smaller orange spots speckled around it. The hindwings are dark with a short golden band that rarely reaches the edges of the wing. Watch for this moth on herbs in 2024. If the damage is significant from the larval feeding, then apply Bt or Spinosad.

You can see photos of the adult and caterpillar on the Royal Horticultural Society website.

European Pepper Moth

By: Stanton Gill

We recently had a sample of a moth we dealt with 7 years ago called the European pepper moth. The European pepper moth, *Duponchelia fovealis* (Zeller), is a native to both freshwater and saltwater marshlands of southern Europe (mainland Spain, parts of France, and Portugal), and the eastern Mediterranean region (Greece, Italy, Corsica). We picked this moth up in 3 Maryland greenhouses damaging poinsettia plants back in 2016. This moth became a notable greenhouse pest in northern Europe and Canada for the cut flower, vegetable, and aquatic plant industries.

European pepper moth caught in pheromone trap. Photo: Suzanne Klick, UME

In the United States, it was detected on begonia in San Diego County, California, in 2004 (though it was

subsequently not detected in 2005). Then in April and July of 2010, the moth was detected again in San Diego County (Bethke and Vander Mey 2010). By September 2011, it had been detected in at least seventeen California counties, along with counties in Alabama, Arizona, Colorado, Florida, Georgia, Mississippi, New York, North Carolina, Oklahoma, Oregon, South Carolina, Tennessee, Texas and Washington (NAPPO 2010). We detected this moth in Maryland in 2016 in commercial greenhouses.

The adults fly at night and can go a fair distance. Once in a greenhouse operation, the adult moths fly between various part of the greenhouse operation. When you find them in a greenhouse during the day, they dart upward rapidly, then zig-zag just above plant foliage, then dart down into the canopy. The forewings are gray-brown in color with two yellowish-white transverse lines. The outermost of these lines has a pronounced "finger" that points towards the back edge of the wing. When at rest, the wings are held out from the body forming a triangle. The adult body measures 9 to 12 mm (0.35 to 0.5 inch) in length. The head, antennae and body are olive brown. The abdomen has cream-colored rings encircling it.

The eggs are whitish-green or straw-colored when laid. Eggs turn pink, then red as the embryo develops, finally turning brown prior to hatching. They are laid singly or in masses of three to 10 (overlapping like roof tiles) mostly on the undersides of leaves (close to the veins). The larvae feed at the base of the plant feeding on the stems and often girdling the plant. The latter instar larvae put silk out of their mouths and cover the feeding site with a silk webbing.

We found Spinosad and Mainspring applications brought this caterpillar under control.

A European pepper moth caterpillar found in a rolled poinsettia leaf (left) and the girdling damage at the base of poinsettia stem caused by the feeding activity of the caterpillar.
Photos: Suzanne Klick, UME

Molybdenum and Deficiency in Poinsettia

By: Andrew Ristvey

Molybdenum is an essential micronutrient for plants. Next to nickel, it's an element that is required in the smallest amount. It is a component of two important enzymes in the nitrogen cycle. In bacteria it's part of nitrogenase, the enzyme that mineralizes atmospheric nitrogen into a the biologically useful form, ammonium. Once molybdenum is taken up by plants, it is mostly translocated to leaves where it becomes a component of nitrate reductase. Nitrate is a good storage ion for nitrogen, but it needs to be reduced to ammonia (in a two-step process) so that it can be combined with carbon to make amino acids and protein. Nitrogen reduction is energy intensive and most of this occurs in the leaves of the plant where photosynthesis occurs. Plants that are fed or

that require ammonium as a nitrogen source do not, in theory, need molybdenum. Interestingly, molybdenum is not very available in low pH soils, where it binds with iron and aluminum and becomes insoluble. Certain groups of plants that prefer acid soils have very little nitrate reductase and little need for molybdenum. Is the adaptation of plants to acid soils partially an adaptation to prefer ammonium as a nitrogen source since molybdenum is unavailable?

In most soils, it is unusual for molybdenum to be in deficit since it is needed in such small amounts, normally much less than 1 ppm. Because of this, molybdenum is typically not a parameter in a plant-tissue test and often, I have to ask for it. In soilless substrates, deficiencies can be slightly more common because of mismanagement of substrate pH. While trying to keep substrate-pH low for optimal nutrient availability, molybdenum can become unavailable.

Molybdenum deficiency is similar to nitrogen deficiency, since nitrate is not being reduced to form amino acids. Nitrate accumulates in the plant, yet cannot be utilized. Appearing in older leaves first, deficiency starts with chlorosis or a chlorotic halo, then marginal curling and wilting follows.

In potted poinsettia production, molybdenum deficiency is not unusual. Poinsettia requirements for molybdenum are relatively high, with typical concentrations which would be considered toxic to some plants. This is especially true for newer varieties.

Balancing nutrient availability between acid-available nutrients like manganese or iron, and nutrients like calcium and molybdenum which are more available in higher pH, can be tricky. Fertility requirements should include nutrient sources with heightened molybdenum concentrations and growers should be proactive before symptoms start. It requires constant monitoring of substrate pH, keeping it between 5.5 and 6.5. Below a pH of 5.5, molybdenum deficiencies can appear. According to Dr. Brian Whipker of NCSU, the target leaf-tissue concentrations in poinsettia should be between 0.1 and 0.5 ppm. Upon determination of a deficiency from tissue analysis, corrective actions can include a drench of sodium molybdate or ammonium molybdate at 77g or 54g respectively, per 100 gallons of water. Rinse foliage off to prevent leaf burn.

In summary, poinsettias have a high requirement for molybdenum. Proactive management of this micronutrient is important. Monitor your substrate pH and ensure you are supplying enough molybdenum in the fertilizer.

UMass Extension has a photo of molybdenum deficiency on their website.

Japanese Beetle Trap Design Using *Beauveria bassiana*

In 2022 & 2023, we have been testing a new trap design concept for Japanese beetles. This trap design concept uses *Beauveria bassiana*, an entomopathogenic fungus, to infect and kill the beetles. The fungus can be found occurring naturally in the environment at low levels, and is not effective unless it contacts the insect's body. We paired this entomopathogen with a traditional pheromone trap to target Japanese beetles in a cut flower system.

The insects are drawn into the trap using sex and floral lures, and once inside they are exposed to high levels of *Beauveria bassiana*. The trap is already proven to be effective at trapping Japanese beetles by itself. Dr. Karen Rane of UMD's plant diagnostic lab was able to test 28 beetles collected from a *Beauveria*-treated trap, and found that 26/28 beetles were infected with the fungus. All beetles collected from untreated traps tested negative, supporting that the trap design is also effective at transmitting *Beauveria*.

This trap can be brought to the next level if we can fashion it to release the beetles after being infected. *Beauveria bassiana* continues to grow inside the insect's body through death, after which the fungus sends out fruiting bodies. These fruiting bodies release spores at the location of the insect's death, ready to infect the next

insect. Since these beetles aggregate in high numbers on select plants, the idea is to have an infected beetle spread the entomopathogen to the rest of the beetles in the system during aggregation. This trap design, if effective, will allow growers to 'set it and forget it' until the *Beauveria* needs to be refreshed within the trap, as opposed to making multiple broad applications throughout the growing season.

If you are interested in participating in our trials next season for this trap, please contact either Suzanne Klick [sklick@umd.edu] or Sheena O'Donnell [sodonne5@umd.edu] so we can make plans to get one out to you in 2024's growing season.

Modified Japanese beetle trap for using with *Beauveria bassiana*.

Outstanding *Ilex* as a Woody Cut Stem

By: Stanton Gill

Last June, Dave Clement, Suzanne Klick, Sheena O'Donnell, and I visited Heartwood Nursery, owned by Sue Hunter in PA. Shortly afterwards, I wrote an article on a very cool *Ilex* we saw there that had strong potential for a cut woody plant for cut flower growers. This holly is called *Ilex pedunculosa* (longstalk holly). In the June article, I mentioned the berries are on individual stalks and turn bright red in fall. Well, this week, at our CMREC labs, they started turning a bright red color. The foliage is still green, but Sue Hunter tells us it will turn ruby red later this fall. Sue said the foliage retains on the cut stem, as do the berries, for a very long time. This makes the plant perfect for fall and winter holiday cut stem decorations.

***Ilex pedunculosa* with berries. Photo: Stanton Gill, UME**

Conferences: Go to the IPMnet Conference Page for links and details on these programs.

December 8, 2023
Advanced IPM Conference
Location: Carroll Community College, Westminster, MD
Details coming in early November

January 10-12, 2024
MANTS
Location: Baltimore Convention Center

February 8, 2024
25th Anniversary - Manor View Farm & The Perennial Farm Education Seminar
Location: Valley Mansion, Cockeysville MD

Speakers: John Stanley (Green Industry International Business Consultant), Vinnie Simone (Planting Fields Arboretum, NY), Janet Draper (Smithsonian Gardens) & Stanton Gill (UMD Extension)
Registration information available soon.

February 14, 2024
Eastern Shore Pest Management Conference
Location: Wicomico Civic Center, Salisbury, MD
Information and Registration: https://www.eventbrite.com/e/2024-eastern-shore-pest-management-conference-tickets-726283502507?aff=oddtdtcreator

February 15 and 16, 2024
Chesapeake Green Horticulture Conference
Location: Maritime Institute, Linthicum Heights, MD

February 29 and March 1, 2024
Biological Control Conference for Greenhouses, Nurseries, and Landscapes
Location: Central Maryland Research and Education Center, Ellicott City, MD

Commercial Ornamental IPM Information
extension.umd.edu/ipm

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