Vegetable Crops Hotline

A newsletter for commercial vegetable growers prepared by the Purdue University Cooperative Extension Service

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Caterpillars on High Tunnel Tomatoes - (*Rick Foster*) - Caterpillars can be very damaging on tomatoes grown in high tunnels, especially late in the season when plants in many fields are starting to dry down. Yellowstriped armyworms seem to be the most common caterpillar recently (see Figures 1 and 2). This insect is fairly easy to identify because of the obvious yellow stripe down each side. Cutworms such as the variegated cutworm and tomato fruitworms may also be causing problems. Remember that in Indiana, high tunnels are considered to be greenhouses, so if the label prohibits use in greenhouses, the pesticide cannot be used in high tunnels. However, if the label is silent about greenhouses, then it may legally be used within a high tunnel. See the table on page 40 of the *Midwest Vegetable Production Guide for Commerical Growers 2013* (ID-56) for insecticide choices. Most of the pyrethroid insecticides are legal to use in high tunnels and will provide good levels of control. One of my concerns about workers in high tunnels is the daily intimate contact they have with the plants. Therefore, growers may want to consider some of the softer products that will also provide good control, including the Bt products such as DiPel® and another organically approved product, Entrust®.

Figure 1: Yellowstriped armyworm feeding on a green tomato fruit. (*Photo by Liz Maynard*)

Figure 2: Bright yellow stripes down both sides give the yellowstriped armyworm its name. The caterpillars may feed on the surface, or burrow into the tomato fruit. (*Photo by Liz Maynard*)

Corn Earworms/Tomato Fruitworms - (*Rick Foster*) - Whenever I write or speak about late season populations of earworms/fruitworms, I always mention the likelihood that a tropical disturbance in the Gulf of Mexico will bring large numbers of moths to Indiana. This year we made it through the month of August without a single hurricane forming and no tropical storms hitting the Gulf Coast. As a result, we have had little or no migration of corn earworm moths northward this year, as evidenced by the continuing low numbers of moth caught in pheromone traps **extension.entm.purdue.edu/cornearworm/index.php**. Normally by late August we are catching hundreds of moths per night in the traps but this year the counts are very low. Tomato growers can probably get by with few if any insecticide applications targeting fruitworms and sweet corn growers can increase the interval between sprays and use lower rates of insecticides. This is about the time when populations begin to drop off so unless something drastic happens, it appears we have escaped the dreaded earworm this year.

Pumpkin Health Update - (*Dan Egel*) - I have had many questions about diseases and other problems of pumpkins recently. The information below should help to provide some answers.

Downy mildew. Downy mildew has been reported in four Indiana counties: Knox County on cucumber, cantaloupe and butternut squash; Washington County on pumpkin; Wayne County on cucumber; LaPorte County on cucumber. Under the appropriate conditions of cool, wet weather, downy mildew can rapidly destroy any cucurbit crop. Pumpkin growers who are close to final harvest should have little to worry about since downy mildew does not affect fruit directly. However, growers who have immature fruit may want to consider a fungicide application as described earlier (*Vegetable Crops Hotline* issue 573).

Symptoms of downy mildew of cucurbits include yellow lesions on the surface of leaves that may appear angular since they are often bordered by veins. Under moist conditions, the underside of such lesions is often covered with the growth of the fungus that causes downy mildew.

Stress problems. Most of the problems I have seen on pumpkins, however, are not related to disease, but to stress mostly due to hot, dry weather. Typically, such leaves have a yellow border which later turns brown or black (see Figure 3). Since older leaves are most often affected, it is sometimes possible to see symptoms down the row (see Figure 4). Symptoms are often worse in areas where pumpkins plants are too dry or sat in water earlier in the season. The conditions described here may be aggravated by the normal transport of nutrients from older to younger leaves. No fungicide treatments are necessary unless an infectious disease is observed.

Yellow vine. Pumpkin plants affected by this disease occur randomly throughout the field. The inside of the lower stems may appear a honey brown. This disease is transmitted by squash bugs, so one should see adults, nymphs or eggs of this insect. Confirmed cases of this disease in Indiana are rare.

Squash vine borer. Like yellow vine discussed above, plants affected by squash vine borer (SVB) occur randomly across the field. The adult of this insect pest is a clearwing moth, but looks like a wasp. The larvae of the insect burrow into the stems of the pumpkin plant from an egg laid on the stem. It is the burrowing which may eventually kill the plant. At this point in the season, it is too late for control measures for SVB.

For the most part, it is too late to apply control measures for most pumpkin disorders in 2013. However, it is still useful to scout pumpkin fields so that one might learn from the lessons 2013 might have to offer.

Figure 3: Symptoms such as seen here on this pumpkin leaf are often due to the stress brought on by hot, dry weather. (*Photo by Dan Egel*)

Figure 4: Symptoms of stress on pumpkin leaves are often observed on older leaves and appear to go down the row. (*Photo by Dan Egel*)

Sweet Corn Ear Rots - (*Kiersten Wise, Dan Egel and Liz Maynard*) - While this has been a pretty good year for sweet corn, a few producers may have observed ears of questionable quality and wondered what the problem may have been and what to do about it. Sweet corn ears may be affected by ear rots caused by fungi that grow on corn ears and reduce quality. Although affected ears are unsightly and likely to be left unharvested or graded out in the packing line, it is important not to sell or eat any part of affected ears due to the possible presence of mycotoxins, poisons that may be produced by ear rot fungi. Below is some information about ear rots of corn.

Aspergillus ear rot. Aspergillus ear rot is caused by the fungus *Aspergillus flavus*, and is one of the most important ear rots due to its associated mycotoxin, aflatoxin. Aspergillus ear rot is typically identified by an olive green, dusty mold that is often at the tip of the ear, but can be scattered on kernels throughout the ear. Symptoms usually appear first in fields with dry soils or other issues, such as nutrient deficiencies, or insect damage.

Diplodia ear rot. Humid weather and rains prior to and after pollination will favor disease development. Diplodia ear rot is identified by white fungal growth on the cob, often forming a mat of fungus across the ear. Infected kernels may also be brown-gray in appearance. Small, black fungal structures called pycnidia may form on the kernels or the cob. No mycotoxins have been associated with this disease in the US.

Fusarium ear rot. The Fusarium fungus infects corn after pollination, and often overlaps with Aspergillus ear rot since infection is favored by warmer temperatures. Fusarium-infected ears may have white fungal growth on the cob, or symptoms may appear as discolored kernels scattered throughout a cob or associated with insect feeding. Visible fungal growth may not be obvious on the cob, but a white "starburst" pattern in kernels can sometimes be observed on ears infected by this fungus. The mycotoxin fumonisin is associated with Fusarium ear rot.

Gibberella ear rot. Gibberella ear rot, caused by the fungus *Gibberella zeae*, is common during cool, rainy years. The fungus infects during early silking and pollination, and is favored by cooler temperatures than the previously described ear rots. This fungus produces a fungal mat on the ear, similar to Diplodia ear rot, but often with a pink or reddish color to the mold (see Figures 5 and 6). *Gibberella zeae* produces the mycotoxin deoxynivalenol (DON).

Ear rot management. Preventative management of ear rots is critical, and can be accomplished by selecting less susceptible hybrids and reducing the amount of corn residue that can serve as a source for the fungus to overwinter. This is accomplished through crop rotation and tillage. In-season management of ear rots is limited at this point in the season. It is important to scout fields regularly during development to look for sweet corn pests. Proper management of insects should eliminate some of the wounding that allows fungi to enter ears.

Because some of the fungi that cause corn ear rots may also produce mycotoxins, that is, substances that are poisonous to humans and animals, it is important to remember that no part of sweet corn ears affected by rots is to be sold or consumed. If you are unsure about whether an ear is healthy or not, don't sell it. Questionable samples may be sent to the Plant Pest and Diagnostic Laboratory at Purdue University **www.ppdl.purdue.edu**.

References. Excerpts from this article from: Kuldau, G.A., and Woloshuk, C.P. Screening for Mycotoxins in Silage.

Isakeit, T. 2011. Sampling for Aflatoxin. Texas A&M AgriLIFE Extension bulletin.

Jones, R.K., Duncan, H.E., Payne, G.A., Leonard, K.J. 1980. Factors influencing infection by *Aspergillus flavus* in silk-inoculated corn. Plant Dis. 64:859-863.

Figure 5: The dry husk and pinkish mold visible at tip of this sweet corn ear are typical of Gibberella ear rot. (*Photo by Liz Maymard*)

Figure 6: Inside the husk, mold around sweet corn kernels also has a pinkish cast when caused by Gibberella ear rot. (*Photo by Liz Maymard*)

The Sample App: Photos for Diagnosis - (*Tom Creswell*) - The Purdue Plant and Pest Diagnostic Lab, working in partnership with 7 other state diagnostic labs, has developed a new plant problem sample submission app for iOS devices. It allows users to take and send digital photos and plant-problem descriptions to any of the eight participating labs (see Figure 7). The university diagnostic labs involved are Alabama Cooperative Extension, University of Connecticut, University of Illinois Extension, University of Kentucky (County ANR/HORT Agents Only), Michigan State University, University of New Hampshire (UNHCE Field & State Specialists only), Ohio State University, and Purdue University.

When submitting samples, users answer questions based on the specific types of plant problems they need to identify, such as agronomic crops, vegetables, ornamentals, insect ID or lawn problems (see Figure 8). Submissions are sent to the lab you select (see Figure 9) using the built-in mail app on the iPhone or iPad, which requires an email account on the device. Each participating diagnostic lab has specific fee policies for photo samples, so users should check with their preferred lab for details.

Interest in the new sample app is building and we hope to have an Android version next year.

See these articles for more information: **www.ppdl.purdue.edu/PPDL/hot13/8-12.html** and **ag.purdue.edu/aganswers/Pages/archive.aspx?story=312#.UhxmeLyE6X1)**

Click here to download the app: **itunes.apple.com/us/app/sample-submission/id669269520?mt=8**

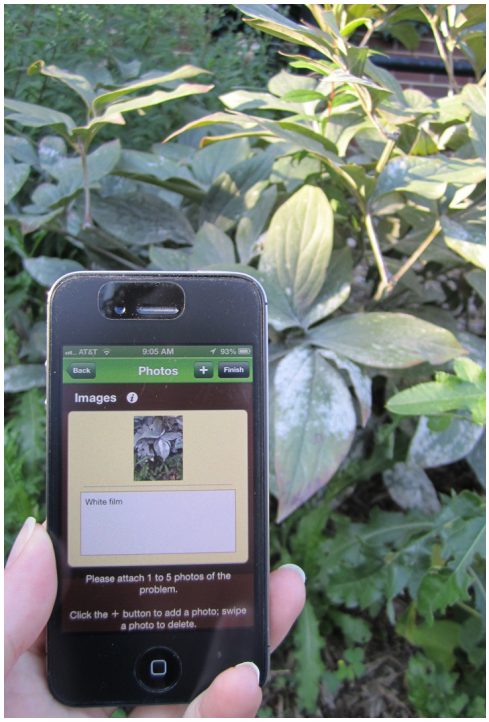

Figure 7: Taking a photo with the sample app.

Figure 8: Choosing the sample type from a menu.

Figure 9: Choosing the diagnostic lab where photo will be sent.

Comment Period Extended for FDA Food Safety Rules - (*Liz Maynard*) - FDA has extended the public comment period for the Produce Safety Rule and the Preventive Controls Rule until November 15, 2013. The produce rule covers most activities on vegetable farms. The preventive controls rule covers processing, holding, and packing, but exempts many activities done as part of normal post-harvest handling for fresh vegetables, so it will not apply to all producers.

For a primer on the rules, check out the FDA fact sheets, available at **www.fda.gov/Food/GuidanceRegulation/FSMA/ucm247546.htm**. Recordings of Q & A sessions with FDA about the produce safety rule held earlier this year provide additional information about the proposed produce rule and are available from the Produce Safety Alliance (PSA): **producesafetyalliance.cornell.edu/news.html**.

The PSA offers this advice about commenting on the rule: "The FDA recognizes that there are many situations and practices that they may be unaware of and may affect how the regulation should be revised. Comments that are thoughtful and substantive, containing real examples and data that support your position are encouraged and will have the most impact." A list of specific issues the FDA requests comments on is published in Section IX of the proposed rule http://www.fda.gov/Food/GuidanceRegulation/FSMA/ucm334114.htm#sectionIX

You may comment electronically at **www.regulations.gov/#!docketDetail;D=FDA-2011-N-0921** (Produce Rule)
www.regulations.gov/#!docketDetail;D=FDA-2011-N-0920 (Preventive Controls Rule)

You may fax comments to the FDA at 301-827-6870.

You may mail comments to:

Division of Dockets Management (HFA-305)
Food and Drug Administration
5630 Fishers Lane, Room 1061
Rockville, MD 20852

In any written comments include the Agency name and Docket No.:
Produce Rule: FDA-2011-N-0921, and RIN 0910-AG35
Preventive Controls Rule: FDA-2011-N-0920, and RIN 0910-AG36.

Please contact me if you have questions about how to comment or how to get information about the rules.

Upcoming Events

Vegetable Crops Research Twilight Tour. Monday, September 9, 2013, 5:30-7:30 P.M. Purdue Meigs Horticulture Research Farm, S. County Road 100 East, Lafayette, IN. For more information and to register, contact Jessica Garvert at **jgarvert@purdue.edu** or (765) 494-1296.

Illiana Vegetable Growers Symposium. Tuesday, January 7, 2014. Teibel's Restaurant, Schererville, IN. Program will be available in early December and posted at **www2.ag.purdue.edu/hla/fruitveg/Pages/Events.aspx**. Contact: Liz Maynard at (219) 531-4200 ext. 4206 or **emaynard@purdue.edu**.

Indiana Horticultural Congress. January 21 – 23, 2014. Wyndham Indianapolis West, Indianapolis, IN. **www.inhortcongress.org**. Contact: Tammy Goodale at (765) 494-1296 or **tgoodale@purdue.edu**.

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