Vegetable Crops Hotline

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

Liz Maynard, Editor
600 Vale Park Road
Valparaiso, IN 46383
(219) 531-4200
emaynard@purdue.edu

vegcropshotline.org

No. 601
July 9, 2015

IN THIS ISSUE

European Corn Borer - (*Rick Foster, **fosterre@purdue.edu**, 765-494-9572*) In years past, the European corn borer was the most important pest of sweet corn, as well as being a pest of peppers and other vegetables. Since the advent of Bt field corn, the overall population of corn borers has been dramatically suppressed, so far that we often forget about it being a pest of sweet corn. However, occasionally the corn borers like to remind us that they are still around and can still be damaging to our crops. These outbreaks usually occur in the northern part of the state, often in areas where the landscape is not dominated quite as much with field corn and soybeans. Corn borers have a broad host range, so diverse habitats provide them with a choice of suitable foods.

Management of corn borers in sweet corn is relatively easy. As your sweet corn approaches tasseling, look for corn borer feeding and confirm that borers are present by looking for them in the rolled up leaves. The optimal time for treatment is just before the tassels start to emerge. An insecticide spray over the top of the plant will funnel the insecticide down into the whorl of the plant where the borers are hanging out. There are lots of good choices of insecticides for corn borer control, both conventional and organic. See the Midwest Vegetable Production Guide for details. Remember that we have not seen resistance to pyrethroids in corn borers like we have in corn earworms.

Corn Earworm - (*Rick Foster, **fosterre@purdue.edu**, 765-494-9572*) - We are again seeing a lull in pheromone trap catches of corn earworms. However, I caution sweet corn growers to remain vigilant in checking their traps. Populations can increase rapidly, especially if carried north on storm fronts from the Gulf Coast. It is also important to watch the development of the field corn around your sweet corn fields. If the field corn is not yet silking, use a threshold of 1 earworm moth per night to determine if you need to spray when your sweet corn is silking. If the neighboring field corn starts to silk, it will draw a lot of earworm moths away from your sweet corn and the treatment threshold goes up to 10 moths per night. Particularly during this lull in moth flights, this is an opportunity to save money and time by avoiding spraying silking sweet corn.

Striped Cucumber Beetle - (*Rick Foster, **fosterre@purdue.edu**, 765-494-9572*) - Populations of striped cucumber beetles continue to remain high. Muskmelon and cucumber growers should continue to monitor and spray as needed to avoid transmission of the pathogen that causes bacterial wilt of cucurbits. Wilt symptoms are showing up on melons throughout the state at this time, with greater prevalence in the southern counties and less further north. Growers are encouraged to spray as late in the day as possible, preferably after the flowers have closed and the bees have left the field, so that effects on pollinators are minimized.

Potato Leafhopper - (*Rick Foster, **fosterre@purdue.edu**, 765-494-9572*) - I've seen some substantial populations of potato leafhoppers recently. Leafhoppers can be a significant pest of a number of vegetable crops, with potato and snap beans being particularly affected. Look for adults flitting off the plants when they are disturbed and for nymphs feeding on the underside of the leaves. It is important not to wait until you see symptoms (hopper burn) before you take action. Scouting is the best way to avoid leafhopper injury.

Yellowstriped Armyworm – (*Rick Foster, **fosterre@purdue.edu**, 765-494-9572*)) – Yellowstriped armyworms continue to cause problems for tomato growers, especially in high tunnels. The populations are often spotty within a field or high tunnel, but can easily reach damaging levels. Most of the insecticides listed in the Midwest Vegetable Production Guide for control of caterpillars on fruiting vegetables (pages 135-6) will control yellowstriped armyworms. If spraying within a high tunnel, be sure that the label allows use in a greenhouse or high tunnel. Consult Table 16 on page 40 for available options.

Replanting Poor Stands of Pumpkins - (*Liz Maynard, **emaynard@purdue.edu**, 219-531-4200*) - Growers may be wondering whether to replant pumpkin fields where the stand is uneven due to excess moisture. Potential yield of the replants is one thing it would be good to know.

We have data on yield of pumpkins direct-seeded or transplanted in mid-July in northern Indiana. The trials were no-till planted into a harvested wheat field. Pumpkins were harvested in mid to late October. Yield of direct-seeded pumpkins ranged from 0 to 0.6 tons per acre for 8 varieties in 2004, and from 2.6 to 6.4 tons per acre for 5 varieties in 2005. Yield of transplanted pumpkins ranged from 2 to 8 tons per acre for 8 varieties in 2004 and from 4.4 to 9 tons per acre for 5 varieties in 2005. For comparison, typical yields at this site for an early- to mid-June planting date with conventional tillage range from 10 to 25 tons per acre.

Weather explains some of the difference in yield between years. During the pumpkin crop period in these trials (July 15 – Oct. 20), average temperature at the trial location was 68°F in 2005 and only 62°F in 2004. Growing degree day (GDD) accumulation for the period was 1807 in 2005 and only 1424 in 2004. For comparison, the 30-year Normals for July 15 – Oct. 20 are 64°F and 1535 GDD for the trial site, 67°F and 1736 GDD for Indianapolis (SE side), and 70°F and 1975 GDD for SWPAC in Knox County.

Based on this information, seeding pumpkins now in northern Indiana probably won't produce an acceptable yield at a reasonable time. Mid-October is late to be starting a pumpkin harvest for most markets. In southern Indiana the yield would probably be greater and the harvest earlier. Early-maturing pumpkin varieties would be the best bet. Since there isn't as much time for vines to grow, a restricted vine or bush variety that branches earlier in its development and produces pumpkins on the branches should have a better chance of setting multiple fruits early enough for them to mature than a variety that produces one main vine with pumpkins spaced along that vine. If normal practice is to use wide row spacings (e.g. 10 ft. or more) to accommodate vigorous vine growth, it may be possible to reduce row-spacing if a variety with smaller vines is used. Compared to full-size pumpkins, seedings of mini-pumpkins, small pie pumpkins, and gourds are more likely to produce an earlier yield.

If reseeding seems like the way to go, note that any pumpkin plants from the original seeding will very likely produce more fruit per plant than the replants. If original plants are present in any significant number, it's probably worth thinking about a way to save them when replanting. Don't forget to review herbicide labels for any replant restrictions.

Yield is important, but is just one of several considerations that go into a decision about replanting. If there is more information you need to help with a decision, please feel free to contact me.

Food Safety Considerations for Flooded Vegetable Crops - (*Scott Monroe, **jsmonroe@purdue.edu**, 812-886-0198*) - With the record-setting rainfall we've seen over the past month, flooding of fields is very widespread (see Figure 1). Fields that have experienced flooding present growers with difficult management choices. Flooding is defined (per FDA) as the "flowing or overflowing of a field with water outside a grower's control." Flooding is associated with streams, creeks, or ponds that overflow their banks and cannot be controlled. The FDA considers food contacted by flood water to be "adulterated" and not fit for human consumption. Due to microbial and other concerns, produce cannot be harvested and sold into the public food supply once it contacts flood water.

Figure 1. Flooding in a field. Note that the Wabash River is visible through the break in the trees. (*Photo by Scott Monroe*)

Frequently, only a portion of a field is affected by flooding. If only part of a field is affected and flood water contacts the edible portion of the crop, growers should manage the contaminated crop so that it does not affect uncontaminated crops. To protect uncontaminated crops, growers should:

1. Document the extent of flooding with photos and markers in the field. This will ensure that the flooded area remains defined once flood waters have receded. Photos will also help other involved parties (e.g. insurance adjusters, third-party auditors) to understand the extent of the issue.
2. Define a buffer zone beyond the flooded area where no produce will be harvested. It is recommended that the area be at least 30 ft. This will help to reduce the risk of cross contamination of splashing from overhead irrigation or additional rainfall.
3. If at all possible, avoid traveling through the flooded area to access the field. This helps to ensure that microbes don't hitch a ride into the harvestable area on boots, shoes, or tires.
4. Wear boots and gloves while working in flooded areas. Be sure to clean them thoroughly before entering the unaffected areas.
5. Any equipment that is used in flooded areas should be thoroughly cleaned prior to entering unaffected areas. Ideally, equipment should be used in unaffected areas first, and flooded areas last.

In those cases where flooding occurs in or near the crop but does not contact the edible portion of the crop, FDA guidance states that growers should, "Evaluate on a case-by-case basis for the likelihood of contamination." If crops have been exposed to flood water, growers may want to consider testing for pathogens, mycotoxins, PCB's, heavy metals, pesticides, or other contaminants. Growers should also remember that these tests are not definitive. Because we can't test every ounce of soil and, by necessity, use representative samples, there is always the chance for a "false negative." Before investing in expensive tests, growers are encouraged to seek technical advice.

More common than flooding is ponding or pooling (see Figure 2). Pooled water generally accumulates in lower areas of the field or between rows, especially if raised beds are used. The key distinction between flood water and pooled water is that flood water originates from an uncontrollable source such as a river or creek. Standing water that originated from a river or creek would still be considered flood water. Pooled water can cause damage to crops, and if it remains for an extended period of time can increase the risk of contamination, but is generally not considered to introduce as much risk of contamination as flood water. In the case of pooled water, growers should consider whether or not the water is contacting the edible portion of the crop, how long the water was pooled, previous soil amendments, and whether or not the pooled water resulted in increased wildlife activity in or near the affected area.

Flooding and pooling in fields can cause additional food safety challenges and have the potential to introduce additional risk into the production system. However, with proper management, many of these risks can be mitigated.

Reference: FDA 2011. Guidance for Industry: *Evaluating the Safety of Flood-affected Food Crops for Human Consumption*. **http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/EmergencyResponse/ucm287808.htm**

Figure 2. Water has pooled, or collected, in the low corner of this asparagus planting.

Boiler Hopyard Update - July 9, 2015 - (*Clayton Nevins, cnevins@purdue.edu, 765-592-6270*) – **Burrs and Cones.** Both of the trellises in the Boiler Hopyard have begun flowering and coning. The primary shoots were pruned at the top of the net on the dwarf trellis in order to promote lateral growth. The pruning took place on May 19 and again on May 28. The bines on the dwarf trellis have been flourishing with flowers and now cones. Out of the six cultivars in the hopyard, Galena was the first to reach the top of the dwarf trellis and begin flowering. The tall trellis began flowering in early June along with the dwarf trellis, but after adding the last dose of nitrogen the plants in the tall trellis began putting on more vegetative growth, including lateral branches. This appeared to delay flowering and allowed for more lateral growth development. The plants in the tall trellis are now in full bloom and appear to be several weeks behind the dwarf trellis.

Apple Mosaic Virus. Apple mosaic virus (ApMV) is a common pathogen that is found worldwide with a broad host range. ApMV has been identified in the Boiler Hopyard (see Figure 3). Symptoms of this virus include chlorotic ringspot that can turn necrotic, and/or yellow speckling on leaves, as well as a reduction

in cone yield and alpha-acids (see Figure 4). Symptoms can vary among cultivars with some displaying no symptoms at all. Disease severity can vary among cultivars, climates, and even seasons. Although viruses are commonly transmitted through vectors such as insects, ApMV has no known vectors and is spread through sap and plant-to-plant contact. The spread of ApMV through hopyards is generally slow because spread is often between adjacent plants. This virus can be spread by routine field activites such as mowing, pruning, stringing, training, leaf stripping and thinning. Prevention is the most effective method against ApMV. Begin by establishing hopyards with certified virus-free materials. After detection of ApMV, control the virus by implimenting proper sanitation methods. Infected plants should be worked last to avoid spread. Before moving from an infected portion of the field to a disease-free section, equipment should be cleaned of all plant debris, and sanitized with a disinfectant labeled for that use. Removing and destroying plants that are severely stunted or yellowed should be considered. The infected plants in the Boiler Hopyard have yet to be removed, but will receive special treatment to avoid spreading the virus.

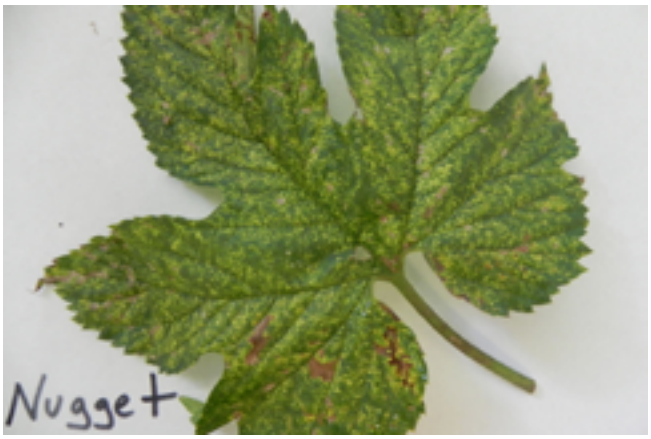


Figure 3. Apple mosaic virus on hop leaf from the cultivar Nugget. (*Photo by Clayton Nevins)*

Figure 4. Hop leaf showing necrotic lesions and yellow speckling that is common with apple mosaic virus. (*Photo by Clayton Nevins)*

Fusarium Canker. Fusarium canker has been discovered in the Boiler Hopyard (see Figure 5). Infected bines can be identified by sudden wilting and a swollen base near the crown. The bases of infected bines swell and eventually girdle near the crown causing it to easily detach (see Figure 6). *Fusarium sambucinum*, the causal organism of Fusarium canker, is ubiquitous in the soil and has a broad host range. Fusarium canker can appear sporadically throughout a hopyard and growing seasons. Plants which appear healthy can develop canker. Canker has been associated with fields with poor drainage and/or heavy rains. A lot of canker has been observed in the Boiler Hopyard this year, which is probably due to heavy rains this spring and summer. Bines that were in full bloom have suddenly wilted and died. This can have major effects on yield.

It is thought that this disease affects plants primarily through wounds at or below the soil line, which could be created from a tractor, sprayer, wind, or insects. These wounds are entry areas for *F. sambucinum*, and cankered bines should be removed from the field. Preventative measures such as avoiding bine damage during planting helps decrease the risk of canker. *F. sambucinum* can also cause Fusarium cone tip blight. This disease has yet to be reported in Indiana.

Figure 5. Hop plant showing sudden wilting of leaves that can occur due to Fusarium canker. (*Photo by Clayton Nevins)*

Figure 6. The base of this hop bine is swollen and has detached near the crown because it is infected with Fusarium canker. (*Photo by Clayton Nevins)*

Potato Leafhoppers. Potato leafhoppers made their appearance in Southern Indiana as early as May, and have been present in the Boiler Hopyard since mid-June. This insect overwinters in the south, and migrates northward in early spring. Potato leafhoppers are lime green, 3-mm-long insects that feed on the veins of leaves with their sucking mouthparts. They are not hop specific as they feed on over 100 cultivated and wild plants. This insect uses its sucking mouthparts to probe around plant vascular tissue. Damage from this pest is notoriously characterized by marginal chlorosis and necrosis on the leaves (see Figure 7). This V- shaped pattern is commonly referred to as hopper burn. Potato leafhoppers have been a minor pest in the Boiler Hopyard, and have not required any chemical management practices. This is likely due to the very wet/humid conditions and mild temperatures Indiana has experienced this season. Symptoms were most severe this season in the cultivar Mt. Hood. Infestations in Indiana hopyards may be specific to cultivars, and not uniform throughout, which requires more thorough scouting. While monitoring hops, carefully check the backside of leaves, looking for these small, wedge-shaped hoppers. The adults, with wings, are very skittish and will fly if disturbed. There is not an established threshold for potato leafhopper in hops, but it has been suggested that an average of 2 leafhoppers per leaf may induce hopper burn.

Figure 7. The term "hopper burn" is used to describe the V-shaped chlorosis and necrosis caused by potato leafhoppers that is seen on the outer edges of these hop leaves. (*Photo by Clayton Nevins)*

Looking Ahead. The Boiler Hopyard will maintain a routine downy mildew spray schedule until harvest. With that being said, it is important to start considering pre-harvest intervals for pesticides as potential harvest dates in Indiana are rapidly approaching.

Our next field day at Meigs Horticulture Farm south of Lafayette, IN is scheduled for August 3. The event will involve many of the demonstration and research plots that are managed by the Specialty Crop Systems Lab at Purdue. The Boiler Hopyard will be available for viewing during the field day.

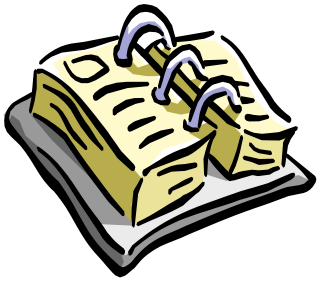
References

Purdue University Field Crops IPM. Potato Leafhopper. **http://extension.entm.purdue.edu/fieldcropsipm/insects/sg-potato-leafhopper.php**.

Wilson, C.R., Pethybridge, S.J., and K.C. Eastwell. 2009. Diseases Caused by Viruses and Viroids. pp 39-41 *in* Mahaffee, W, S. Pethybridge, and D. H. Gent, eds. Compendium of Hops Diseases and Pests. APS Press, St. Paul, MN.

Eastwell, K. and C.M. Ocamb. Hop (*Humulus lupulus*)-Virus Diseases**.** *in* Pscheidt, J.W., and Ocamb, C.M., senior editors. 2015. Pacific Northwest Plant Disease Management Handbook [online]. Corvallis, OR: Oregon State University. **http://pnwhandbooks.org/plantdisease/hop-humulus-lupulus-virus-diseases**.(accessed 7 July 2015).

Ocamb, C.M. and J.C. Bienapfl. 2009. Diseases Caused by Fungi and Oomycetes. pp 23-24 *in* Mahaffee, W, S. Pethybridge, and D. H. Gent, eds. Compendium of Hops Diseases and Pests. APS Press, St. Paul, MN.



Upcoming Events

Pinney Purdue Vegetable Field Day and Sweet Corn Sampler. Thursday, August 13, 2015. 4:00 p.m. - 8:00 p.m. CDT. Pinney Purdue Ag Center, 11402 S. County Line Rd., Wanatah, IN. Plot tours include soil health management and disease suppressive soils, tomatoes and peppers in high tunnels, and sweet corn varieties. To register, contact Lori Jolly-Brown, ***ljollybr@purdue.edu***, or 765-494-1296.