

# VEGETABLE CROPS HOTLINE

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

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**BACTERIAL LEAF SPOT OF PUMPKIN** - (Dan Egel, [egel@purdue.edu](mailto:egel@purdue.edu), 812-886-0192) - Bacterial leaf spot of pumpkin is perhaps the most serious disease of pumpkin in Indiana today. While I have not had many reports of this disease yet, I have had many calls from growers who have observed bacterial spot in the past and want to avoid the disease in 2014.

**Symptoms:** Bacterial spot causes 1/8-1/4 inch angular leaf lesions that are white to light brown in color (see Figure 1). These leaf lesions may be accompanied by yellowing (chlorosis). The more important symptom is the lesions on fruit that are scabby to raised, round and a light brown in color. These lesions are often less than 1/8 inch in diameter and do not extend into the surface of the fruit. However, lesions may become secondarily infected in which case lesions can become an inch or more in diameter (see Figure 2). Such lesions may grow into the flesh of the fruit. Any type of fruit lesion can ruin the marketability of the fruit.



**Figure 1.** Leaf lesions of bacterial leaf spot of pumpkin. Lesions may be more numerous around veins due to an increase of moisture in these areas. (Photo by Dan Egel)



**Figure 2.** Bacterial leaf spot can cause small scabby lesions on pumpkin, which may become secondarily infected as in the larger lesion shown here. (Photo by Dan Egel)

**Biology:** Leaf lesions, while unimportant economically, are important in diagnosing bacterial spot before fruit is present. This head start allows growers to begin preventive measures. The idea behind such measures is to slow the spread of leaf lesions in which the bacteria survive and grow. Fruit lesions often begin when bacteria splash from the leaf to the fruit. Fruit remain susceptible to lesions of bacterial spot until about 14 days post pollination.

**Management:** Foliar applications of a copper product, usually copper hydroxide or copper sulfate, are started once the leaf lesions of bacterial spot have been confirmed or when pumpkin plants have started vining if the disease threatens. That is, don't wait to start copper applications if one expects bacterial spot to occur either because of field history or some other factor. Applications of a copper product are more likely to be more effective if applied with a mancozeb product. Dithane® and Manzate® are mancozeb products that are labeled on pumpkins. Be sure to be in possession of the supplemental label that mentions pumpkins at application time.

Another product that is labeled for bacterial spot of pumpkins is Actigard®. Actigard® is a product that 'tells' the plant it is under attack. The active ingredient itself is

not active against any fungus or bacterium. Instead, it starts the plant's defense system. So, in the case of bacterial spot, we would hope it sends a signal to the plant to start producing plant compounds that help slow the disease. There is data to support the use of Actigard®. Otherwise, it wouldn't be labeled. However, Actigard® can also lower yields if applied when the plant is under stress. That's why there are specific restrictions on the label. For example, only apply Actigard® to healthy plants and do not apply more than 8 oz. per acre per year. Actigard® is labeled for pumpkins for bacterial spot and angular leaf spot as well as other diseases: powdery mildew, downy mildew, bacterial fruit blotch, etc. But I would use it only for bacterial spot and angular leaf spot. If you decide to use Actigard® for bacterial spot, I would still use copper.

All the fungicides in the world, however, will not reduce bacterial spot problems if there has not been proper crop rotation. After a pumpkin crop, growers should keep fields out of cucurbits for 3-4 years. This is, perhaps, the most important management decision for bacterial spot.

The literature on the seed borne nature of the bacterial spot pathogen is not clear. However, it makes sense not to save seed from pumpkins that were grown in a field with bacterial spot. Closely monitor seedlings for symptoms of bacterial spot.

I will be happy to answer any questions about bacterial leaf spot of pumpkins or any of the products mentioned.



**EUROPEAN CORN BORER** - (Rick Foster, [fosterre@purdue.edu](mailto:fosterre@purdue.edu), 765-494-9572) - I continue to receive a few calls about problems with European corn borers. See the last issue of the Hotline for more details. Especially for sweet corn growers, corn borers can be managed fairly easily. First, it is relatively easy to determine that you have an infestation because they will feed on other plant parts, usually leaves or tassels, before they enter the ear. Second, a single well-timed application of an insecticide will usually provide complete control. The best time to spray is just before tassels emerge. Most of the larvae will be living down inside the whorl and will move toward the ear when the plant tassels and the whorl disappears. The whorl acts like a funnel that directs the insecticide down where the corn borer is living. So, when you spray, be sure to have a nozzle directly over the top of the plant to get the maximum amount of insecticide where you need it. Finally, corn bores are fairly easy to kill. Any of the pyrethroid insecticides will provide good to excellent control. See the *Midwest Vegetable Production Guide (ID56)* for spray details.



**CORN EARWORM** - (Rick Foster, [fosterre@purdue.edu](mailto:fosterre@purdue.edu), 765-494-9572) - Corn earworms pheromone trap catches have been quite variable around the state, ranging from near zero to some rather high catches, as many as 52 per night, in my trap here near Lafayette. Obviously, the way you manage earworms in your sweet corn is going to be very different if you are catching no moths versus catching 50 or more per night. That is again why sweet corn growers need to have their own earworm traps so they can make smart decisions. Normally we are in a lull period for moth catches right now, but weather patterns are apparently bringing up moderate numbers of moths from southern locations. Again, I am suggesting that you spray your sweet corn with an appropriate insecticide every 3-5 days when silks are green and you are catching any moths in your trap until the field corn around you starts to silk. At that point, you should raise the threshold for spraying to 10 moths per night, because the field corn will draw a lot of the moths away from your sweet corn.



**YELLOWSTRIPED ARMYWORM** - (Rick Foster, [fosterre@purdue.edu](mailto:fosterre@purdue.edu), 765-494-9572 and Liz Maynard, [emaynard@purdue.edu](mailto:emaynard@purdue.edu), 219-531-4200) - In past years, yellowstriped armyworm has been almost a novelty pest, showing up on occasion but never really causing a lot of damage. The larvae are very easy to identify because of the distinct yellow lines running down each side of the body. The larvae are general feeders on a lot of plants, including many vegetables, but we are mostly seeing them on tomato, where they will feed on leaves and fruit. We are seeing them commonly in high tunnels, but they are also present in many field situations as well. Yellowstriped armyworms are easy to kill with a variety of insecticides. I don't have data to show if the Bt products are effective, but the pyrethroids and many of the other insecticides that control caterpillars will provide excellent control.



**STINK BUGS** - (Rick Foster, [fosterre@purdue.edu](mailto:fosterre@purdue.edu), 765-494-9572) - We continue to be on the lookout for brown marmorated stink bug, which has the potential to be a major pest of tomato, pepper, sweet corn, and lots of other vegetables. We had our first confirmed damage to late sweet corn last year but so far we have had no reports this year. However, for whatever reason, our native stink bugs seem to be doing just fine this year. Native species such as the green stink bug, can be serious pests of tomato and pepper (but not sweet corn) and appear to be quite numerous this year. Keeping your field as weed-free as possible will help to keep stink bug numbers down. However, this weed management needs

to occur early before fruit start to set. If you kill weeds after you have fruit, the stink bugs (and tarnished plant bugs) will move to your crop and cause even more damage. There are several insecticides listed in the *ID56* that will provide excellent control of stink bugs.



**SPIDER MITES** - (Rick Foster, [fosterre@purdue.edu](mailto:fosterre@purdue.edu), 765-494-9572) - I have received reports of spider mites causing problems in two very different scenarios. First, tomatoes in high tunnels frequently are the target of twospotted spider mite attack. The conditions in high tunnels are very favorable for the development of spider mite problems. Rainfall is an important mortality factor for spider mites and obviously rainfall doesn't do anything inside of a tunnel. Remember as you make miticide selections for use in high tunnels that the Office of the Indiana State Chemist defines a high tunnel as a greenhouse, so products that cannot be used in a greenhouse cannot be used in a high tunnel. There are three potential scenarios with regard to pesticide label language about use in greenhouses. If the label says for use in greenhouses, it of course can be used. If the label prohibits its use in greenhouses, it cannot be used. Most labels, however, don't mention greenhouses either way, so the State Chemist has determined that those products can be used in a greenhouse or high tunnel. See page 40 (Table 16) in the *ID56* for a listing of which category many of our commonly used pesticides fall into.

We have also had few reports of spider mites on melons. Watermelons are most commonly attacked but muskmelons will occasionally suffer damage. The problem most commonly occurs during hot, dry weather or near a dusty road. Growers should scout their melons frequently by looking on the underside of leaves for the tiny spider mites and/or webbing. If you wait until you see symptoms such as the dieback along the middle of the row, you have likely already suffered yield loss. Spider mites will also feed on watermelon fruit, giving the rind a sandpaper-like texture, which is not very appealing for customers. See *ID56* (page 111) for recommended miticides.



**VINE DECLINES OF SQUASH** - (Dan Egel, [egel@purdue.edu](mailto:egel@purdue.edu), 812-886-0198 and Rick Foster, [fosterre@purdue.edu](mailto:fosterre@purdue.edu), 765-494-9572) - There have been several reports of vine declines of squash. This article will discuss possible reasons why squash plants might wilt, decline and die.

**Bacterial wilt** is caused by a bacterium that is vectored by either the striped or spotted cucumber beetle. Cucumber and cantaloupe are the primary crops affected by bacterial wilt. However, if cucumber beetle feeding

is heavy before the five true leaf stage of the squash plant, it is possible that squash plants may be affected by bacterial wilt. Affected squash plants may wilt, turn yellow and exhibit a general decline. Look for cucumber feeding on the leaves and stems of the squash plant for clues that the wilt and decline of the squash plant are due to bacterial wilt (see Figure 3). The Purdue Plant and Pest Diagnostic Laboratory (PPDL) will be able to confirm bacterial wilt with a plant sample. Management of bacterial wilt of squash depends on managing the cucumber beetle. However, once symptoms show up, it is too late to manage cucumber beetles for bacterial wilt.



**Figure 3.** Feeding damage from cucumber beetles on a squash stem. Such feeding damage may result in the transmission of bacterial wilt of squash. (Photo by Dan Egel)

**Cucurbit yellow vine** has been confirmed in Indiana. However, it has not been an important disease of cucurbits in Indiana. Squash, pumpkin, watermelon and cantaloupe may be affected. Symptoms usually occur just before fruit maturity. Plants may be stunted and yellow. In severe cases, the plant may collapse suddenly. The vascular tissue of affected plants may become brown. The disease may be transmitted by squash bugs. Where yellow vine is suspected, look for the adults, nymphs or eggs of the squash bug. Diagnosis is specialized; growers who believe their fields have been affected should contact the PPDL or Dan Egel.

**Squash vine borer** may cause a squash or pumpkin vine to wilt and decline. Although I have not observed any cases of the pest yet in 2014, growers should be on the look out for this insect. Vines or plants that have wilted due to squash vine borer will have white larvae inside the lower stem that may be as big as a thumb (see Figure 4). One might notice frass on the outside of the stem.



**Figure 4.** A large, white larva of squash vine borer in a zucchini stem. This type of feeding damage can cause the rapid collapse of the plant. (Photo by Dan Egel)

Several different root diseases may cause a squash plant to decline. These diseases include **Phytophthora blight, Pythium root rot and Fusarium crown and root rot**. Phytophthora blight often causes obvious foliar symptoms in addition to root rots. Pythium root rot may cause small roots to rot which leads to the wilt and decline of the plant in severe conditions. Both Phytophthora blight and Pythium root rot are more likely where plants are not well drained and there has been a lot of rain. Specialized fungicides can help to slow the spread of these two diseases, but the best management is prevention: plant in well-drained fields, use raised beds and crop rotation.

Fusarium crown and root rot is usually recognized by the observation of individual wilted leaves. These symptoms often progress to the death of entire plants. A brown lesion can be observed at or just under the soil line of affected plants. Roots may have become a dark brown and decayed. As with the diseases above, well-drained soils and crop rotation will help to prevent Fusarium crown and root rot.

Soil borne diseases such as Phytophthora blight, Pythium root rot and Fusarium crown and root rot are can often be found in heavier soil or where water tends to accumulate. Bacterial wilt and cucurbit yellow vine, since insects vector them, will often be spread out across the field in a somewhat random fashion.



**OLD LEAF SYNDROME** - (Dan Egel, [egel@purdue.edu](mailto:egel@purdue.edu), 812-886-0198) - The leaves pictured here (see Figure 5) may cause some concern. There is a yellow (chlorotic) pattern on the leaves. There are holes in the leaf. Is it a disease? Here are some possibilities.

- The pattern may look like typical spider mite damage. However, spider mites normally cause damage toward the inside of the leaf, not the edge of the leaf. It isn't possible to see the lower leaf here, but spider mites cause webbing on the lower leaf surface and the mites themselves can be seen with a 10X hand lens. This is not spider mite damage.
- Many growers may worry that this pattern indicates disease. However, there are no discrete lesions... instead a general chlorosis can be observed. Most foliar disease will cause a brown or yellow lesion. Most root diseases would cause the leaf to wilt or begin to die. This isn't a disease
- This leaf is actually just old. Older leaves may turn yellow since most of the major nutrients are mobile and are transported to newer leaves where they are needed the most. In some cases, a process known as guttation (where water is secreted from the leaf in the early morning) causes yellowing along the edge of a leaf. This water may eventually turn the edge of the leaf yellow due to the accumulation of plant related chemicals in the water. Another factor that may turn old leaves yellow is stress due to hot, dry weather. Finally, there are tears and holes in the leaf probably due to weather.

There is no reason to worry about the leaves pictured here. No action is required. However, it is always good to scout fields for possible problems and become familiar with symptoms and pests. Get an official diagnosis when you are not sure about symptoms.



**Figure 5.** These leaves are yellow due to age and do not have a disease or any insect damage. (Photo by Dan Egel)



Office of

**INDIANA STATE CHEMIST AND SEED COMMISSIONER**

*Protecting Indiana's Agriculture and Environment - Feed, Fertilizer, Pesticide and Seed*

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**WHAT:** An **Indiana Pesticide Clean Sweep Project** designed to collect and dispose of suspended, canceled, banned, unusable, opened, unopened or just unwanted pesticides (weed killers, insecticides, rodenticides, fungicides, miticides, etc.) is being sponsored by the Office of Indiana State Chemist (OISC). This disposal service is free of charge up to 250 pounds per participant. Over 250 pounds there will be a \$2.00 per pound charge. This is a great opportunity for you to legally dispose of unwanted products at little or no cost.

**WHO:** All public and private schools, golf courses, nurseries, farmers, ag dealers, cities, towns, municipalities and county units of government or others receiving this notice are eligible to participate.

**WHEN:** 9:00 a.m. to 3:00 p.m. Local Time

**WHERE:** **August 12, 2014: Clay County Fairgrounds, Brazil, IN**  
**August 13, 2014: Dubois County Fairgrounds, Huntingburg, IN**  
**August 19, 2014: Lake County Fairgrounds, Crown Point, IN**  
**August 20, 2014: Tippecanoe County Fairgrounds, Lafayette, IN**  
**August 21, 2014: Hendricks County Fairgrounds, Danville, IN**

**HOW:** Complete the **Pesticide Clean Sweep Planning Form** to the best of your ability. Mail, fax or e-mail the completed form to Kevin Neal at 765-494-4331 or [nealk@purdue.edu](mailto:nealk@purdue.edu) no later than **Monday, July 28, 2014**. Then bring your labeled, leak free and safe to transport containers to the collection site. **DO NOT** mix materials. In case of an emergency, you should bring with you a list of products you are carrying and a contact phone number.

\*NOTE: OISC reserves the right to cancel this Pesticide Clean Sweep Project if there is not adequate demand. Participants submitting the planning form by July 28, 2014 will be contacted immediately if cancellation is necessary.