

VEGETABLE CROPS HOTLINE

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

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SQUASH BUGS - (Rick Foster) - Squash bug is the most consistent insect pest of squash and pumpkins and is the most difficult to control. The key to management is early detection and control of the nymphs (Figure 1). The



Figure 1: Squash bug control is easiest when in the gray nymph stage. Inset: An adult squash bug lays eggs on a pumpkin leaf. (Photo by Dan Egel)

adults are extremely difficult to kill. Foliar insecticides should be applied to control the nymphs when you have more than an average of one egg mass per plant. When you find egg masses, mark them with flags and check every day or two to see when they hatch. When many of

the egg masses are hatching, that is the time to begin application. Since eggs are laid and hatch over an extended period of time, several applications may be required. Brigade®, Mustang Max® and Warrior® have provided excellent control.

Squash bugs are also thought to be the vectors of a pathogen that causes a disease known as Cucurbit Yellow Vine Decline. The way to control this disease is to control the squash bugs. Scout your field to confirm the presence of the bugs (don't bother to count them; just make sure they are there) and, if so, apply one of the insecticides listed above.



KEEPING PRODUCE FRESH AT MARKETS AND FARM

STANDS - (Liz Maynard) - Vegetables quickly lose quality after harvest if not properly cooled and stored. Cooling slows biochemical processes in the harvested produce, helping to maintain flavor and minimize decay. Preventing water loss by maintaining appropriate relative humidity reduces weight loss and shriveling or wilting. Even when post-harvest care at the farm is adequate, keeping produce fresh at a farm stand or farmers market can be a challenge. Vegetables that look beautiful just after harvest can quickly lose their appeal after a few hours of sun and wind on a market stand. Consider these guidelines for keeping produce at its freshest.

- 1) Start with properly cooled produce. Avoid harvest during the heat of the day (if possible), keep harvested produce in the shade, remove field heat by cooling immediately after harvest, store at proper temperature and relative humidity. See the 2010 Midwest Vegetable Production Guide (ID-56) p. 19 for storage conditions for a number of crops (<http://www.btny.purdue.edu/Pubs/ID/ID-56/postharvestHandling.pdf>). For short-term storage, see Table 1 below with vegetables grouped according to acceptable short-term storage temperatures.
- 2) Provide shade at the market.
- 3) Provide windbreaks if market is in a windy location. Wind speeds up water loss from produce. Water loss reduces the weight of the produce and results in shriveling or wilting.
- 4) Use ice for crops that tolerate it: asparagus, cole crops, leafy greens, leeks, green onions, beets, carrots, radishes, turnips, lettuce, or sweet corn. Crops can be placed

directly on crushed ice on a display table. At a farmers market it may be easier to rest produce on refreezable cold packs covered with a clean towel or ice in plastic bags. Ice should be made from water that meets drinking water standards.

5) Mist with clean, cold water if the crops tolerate it such as: broccoli, leafy vegetables, green onions, root crops, or peas. Misting maintains high relative humidity. Water should be of drinking water quality and stored in a clean container.

6) Display in shallow containers to minimize bruising. Bruised produce will decay more quickly. Shallow containers are also more easily cooled.

7) Keep produce not on display as close to proper temperature and relative humidity as possible. It's not necessary to display all the produce at once. Consider displaying enough to get through busy periods and then restocking as it is sold to minimize the time produce is not under optimum storage conditions.

Table 1: Acceptable Temporary Storage Temperatures at Relative Humidity 85% to 95% and less than 1 ppm ethylene. Minimize ethylene by venting or scrubbing. Asterisk indicates products sensitive to ethylene.

32-36°F - arugula*, asparagus*, beet, broccoli*, brussel sprouts*, cabbage*, cantaloupe, carrot*, cauliflower*, celery*, chard*, collard*, daikon*, garlic, green onion*, herbs (not basil), horseradish, kale, kohlrabi, leek*, lettuce*, mustard greens*, parsnip, radish, rutabaga, rhubarb, spinach*, pea*, sweet corn, turnip, turnip greens*;
45-50°F - basil, cucumber*, eggplant*, okra*, pepper, snap bean, summer squash*, tomatillo, watermelon*;
55-65°F - ginger, dry onions, potato, pumpkin, winter squash, sweet potato*, tomato.

Source: Adapted from Kitinoja and Kader, 2002, page 205.



SWEET CORN INSECTS - (Rick Foster) - This is the time of year when keeping worms out of sweet corn ears becomes a serious challenge. We have 4 different species of caterpillars that may attack our sweet corn ears. Late planted sweet corn is most vulnerable to at least 2 of those insects.

In years past, European corn borer was our most serious pest of sweet corn. However, the widespread adoption of Bt field corn has virtually eliminated corn borers as a pest. You can tell that you have corn borers by checking sweet corn that is in the whorl stage. If you find larval feeding damage, sacrifice a few plants to make sure that corn borers are causing the problem. If you need to treat for corn borers, the best time to apply an insecticide is just before tasseling.

Western bean cutworm is a relatively new pest that is mostly a problem in northwest Indiana (see figure in *Hotline* issue no. 526). There is only one generation per year and the moth flight is pretty much over. However,

there is still the possibility of damage to ears. One difference between this pest and the others is that western bean cutworms will damage one ear and then move to another ear and damage it. In contrast to corn earworms, treating after the ears are infested may reduce future damage.

Fall armyworms do not overwinter in Indiana and must migrate from southerly locations each year. We are now seeing them in sweet corn throughout the state. The damage they do, especially in the whorl stage, is much more severe than corn borers, so it is easy to recognize (Figure 1). Like corn borers, the best time to treat is before tasseling. Once silks have formed and the ears start to develop, sprays for control of fall armyworms are of limited value.



Figure 1: Fall armyworm damage to sweet corn and frass located in the whorl can be seen above. (Photo by Dan Egel)

Corn earworms are clearly the most important pest of sweet corn in Indiana, especially in the late season. We have recently had a large increase in moth catches in pheromone traps around the state. Please continue to monitor your traps or our website at: <http://extension.entm.purdue.edu/topics/vegetable.php> for updates on moth catches around the state. The threshold for treatment is 10 moths per night when silks are present. The first insecticide application should go on if the threshold has been exceeded, when 70% of the plants have silks present. The interval between sprays should be 2-5 days. The longer interval will be sufficient when moth catches are in the 10-20 range and when temperatures are relatively cool (highs in the low 80s). Shorter intervals should be used when moth catches are high (greater than 100 moths per night) and when temperatures are hot (highs in the 90s). Spraying can cease when silks turn brown.

For each of these pests, I still think the best insecticides are the pyrethroids, primarily Brigade®, Mustang Max®, and Warrior®. We have consistently gotten good results with those products over the years. The resistance problems that we feared a few years ago for corn ear-

worms have not materialized, although we will continue to monitor the situation. There are several fairly new insecticides with alternative modes of action available, such as Belt®, Coragen®, and Radiant®.

Some growers are growing Bt sweet corn, which contains a toxin that selectively kills caterpillars. During the late season, I think growers who use Bt sweet corn should continue to spray insecticides. Frequently, the Bt toxin will not kill the caterpillar, but will greatly reduce its rate of development. In some of our trials, half of the untreated Bt sweet corn ears were infested with corn earworms. The larvae were small, but many customers don't like small earworms in their sweet corn any better than large earworms. Combining the Bt technology with a good spray program will provide the best possible levels of control.



WIREWORMS IN MELONS - (Rick Foster) - Once again this year, we are receiving reports of wireworms infesting melon fruit in southwest Indiana. Frankly, this situation is perplexing to me. Wireworms are supposed to be deep in the soil when temperatures are this hot, not feeding on the underside of melons. Evidently, our wireworms have not read the textbook lately. For us to be able to develop a management plan for these wireworms, we need your help. One of the first steps in developing a management plan is correct identification of the pest. Wireworms are somewhat unique because some species have a 1 year life cycle, some have a 3 year life cycle, and some live for up to 5 years. We need to look at as many wireworm specimens as possible so that we can determine which species we have. If you find any wireworms feeding in your melons, please save the wireworms and contact me at 765-494-9572 or rfoster@purdue.edu.



Figure 1: Growers are asked to collect and save wireworms for species identification. (Photo by Dan Egel)

SOUTHERN BLIGHT OF TOMATO - (Dan Egel) - This disease has been observed in southern Indiana on staked tomatoes. Southern blight has a wide host range affecting many vegetable, field and ornamental crops. Tomato is the most important host.

Affected plants wilt and die. At the base of the plant, one is likely to notice a white mold and tiny sesame-sized sclerotia (Figure 1). These sclerotia are survival structures for the fungus and allow the disease to occur in the same location years later. The fungus also lives off of organic matter without being parasitic (saprophytic).



Figure 1: The white fungal growth and sesame-sized sclerotia (red arrow) are characteristic of southern blight of tomato. (Photo by Dan Egel)

Control of this disease can be difficult. The best crops for rotation are grass plants such as corn and small grains. Deep plowing the residue may help reduce the severity of the disease. Fungicides are not available to manage this disease. The use of high calcium levels and ammonium type fertilizers has been reported to help in management.

Regular readers of the *Hotline* will recognize similarities between this disease and white mold (timber rot). The fungi that produce these diseases are related. The easiest way to tell the difference between these diseases is the size/shape of the sclerotia. The sclerotia for southern blight are about the size and shape of sesame and usually occur near the base of the plant. Sclerotia of white mold are irregular in shape, are pea-size and may occur several feet up the plant.

As the name suggests, southern blight is a disease of southern areas. It may be that the extremely warm weather has favored this disease. Growers in Missouri have also reported this disease recently.



CUCURBIT DOWNY MILDEW IN INDIANA - (Dan Egel)

- Downy mildew has been found on cucumbers in Porter County, Indiana. Also since the last *Hotline* issue (no. 526 - <http://www.btny.purdue.edu/pubs/vegcrop/VCH2010/VCH526.pdf>) some other interesting outbreaks of this disease around the Midwest have been reported. The location and hosts of downy mildew outbreaks of interest are: Dane County, WI-squash, watermelon; Berrien County, MI-cucumber (this county is on the Indiana border); Ingham County, MI-muskmelon; Saginaw County MI-watermelon, muskmelon, squash and cucumber. Cucumber growers in northern Indiana should strongly consider the appropriate fungicides. Since squash, muskmelon and watermelon have been reported as infected in nearby states, these growers should be on the look out for this disease. More information on cucurbit downy mildew can be found in issue no. 524 of the *Hotline* <http://www.btny.purdue.edu/pubs/vegcrop/VCH2010/VCH524.pdf>.



TWILIGHT VEGETABLE GROWERS MEETING AND TOUR - The location will be Sweet Corn Charlie's Farm located at 11003 C.R. 42, Millersburg, IN 46543 - this is 1 Mile East of Millersburg at the intersection of C.R. 42 and C.R. 43. The date for this event is Monday, August 23rd beginning at 6:00pm (eastern time). Private Applicator Recertification credit will also be given at the end of the meeting.

There will be several Purdue University specialists speaking at this meeting. **Liz Maynard** will discuss Brooks Meter use for the testing of melon fruit quality. **Dan Egel** will discuss dealing with crop diseases and spray program options. **Rick Foster** will address corn earworm and western bean cutworm management. **Ericka Soumare**, Purdue Extension Ag and Natural Resources Educator, will discuss pesticide recordkeeping. Registration is not required. If you will be receiving Private Applicator Recertification credit, please remember to bring your Pesticide Applicator card and \$10.00. For more information, you can call Ericka Soumare at the Elkhart County Extension office: 574-533-0554.



ANNIE'S PROJECT COMING TO FOUR INDIANA COUNTIES - Purdue Extension will offer a risk management course to farm women in four Indiana counties later this summer. The courses will be offered in Franklin, Kosciusko, Wayne/Union and Perry. The six courses will take place Aug. 19 and 26, and Sept. 2, 9, 16 and 23. Registration is \$75 per person and includes refreshments and resource material. Registration forms are due by Aug. 12 to Wayne County Extension office, 401 E. Main St., Richmond. For more information, visit the Purdue University Women in Agriculture website <http://www.extension.purdue.edu/wia/anniesproject.htm> or contact Stacy Herr, 765-973-9281, sherr@purdue.edu.



FEEDING INDIANA'S HUNGRY - Feeding Indiana's Hungry, Inc. is the statewide association of Feeding America (formerly America's Second Harvest) and serves 1,700 agencies like pantries, soup kitchens, after school programs, and senior centers in all 92 counties, providing emergency food assistance to Hoosiers in need. Growers who have any unutilized product and are willing to donate or sell the product at reduced prices should contact Emily Weikert-Bryant at 317-396-9355. Each grower will be placed in contact with the food bank serving his/her area to ensure that the produce stays in the community.



HEALTHY SOILS FIELD DAY - On August 31st, from 8 a.m. to 2 p.m., a Healthy Soils Field Day will be held at Churchill Farms, 2512 W. State Road 10, Lake Village, IN. Attendees will learn how to build soil tilth, reduce nutrient inputs, increase productivity, use cover crops and more. All are welcome. Lunch will be provided; please RSVP by August 25. Contact Rose Morgan, Newton County SWCD, 219-285-6802, ext. 3 or Dan Perkins, Jasper County SWCD, 219-866-8006, ext. 115 for more information or to RSVP.



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