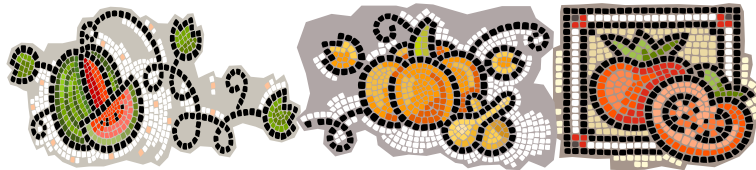


VEGETABLE CROPS HOTLINE

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

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FUSARIUM CROWN ROT OF TOMATO - (Dan Egel) - Fusarium crown and root rot was observed in a greenhouse in northern Indiana. Several of the tomato plants, which were grown in the soil, exhibited wilting and collapse. Upon closer examination, the internal stem tissue (the vascular tissue) was discolored. In addition, the root system was poorly developed and had some root rot associated with it.

While there are numerous causes of tomato plant wilt, a vascular discoloration associated with the wilting suggests a vascular pathogen such as either Fusarium or Verticillium wilt of tomato or Fusarium crown and root rot (see Figure 1). A few key differences in these

diseases are shown in Table 1. An official diagnosis is important to differentiate between the diseases. Note that resistant cultivars can be used to manage Fusarium and Verticillium wilt, but not Fusarium crown and root rot.



Figure 1: The brown discoloration of this tomato stem is a typical symptom of Fusarium crown and root rot. (Photo by Liz Maynard)

Table 1: A comparison of the symptoms of three tomato wilt diseases.

Disease	Symptoms		Management
	Foliage	Stem Discoloration	
Fusarium crown and root rot	Lower leaves turn yellow, then brown. Entire plants may collapse.	Prominent, close to crown.	Avoid affected fields, fumigate or steam soils, crop rotation with small grains.
Fusarium wilt	One-sided wilt and yellowing of foliage.	Prominent, throughout plant.	Use resistant cultivars, use nitrate fertilizers rather than ammoniacal ones. Root knot nematode can cause a breakdown in host resistance.
Verticillium wilt	Yellowing of leaf tips, wilt of shoot tips, perhaps entire plant.	May be subtle, close to crown.	Use resistant cultivars, fumigate or steam soil. Avoid problem fields. Rotate with small grains.



CORN EARWORMS - (*Rick Foster*) - Corn earworms continue to fly throughout the state. In some cases, the pheromone trap catches are quite high. See <http://extension.entm.purdue.edu/veg/commercial/> for trap catches in your area. To reiterate what I said in the last newsletter, the early sweet corn that is silking before any of the field corn in your region is most attractive to the moths as a place to lay eggs. As a result, it is probably a good idea to spray your silking sweet corn if any moths are being caught in traps during this early portion of the season.



ONION THRIPS - (*Rick Foster*) - Onion thrips can be a serious problem on both onions and cabbage. Thrips are very small, elongate insects that damage onions by scraping the green tissue from the leaves, inhibiting bulb growth and damage cabbage by feeding on tissue several layers deep within the head, causing cosmetic damage and contamination. Onion thrips can build up to very large numbers in the heads of small grains. As the small grains dry down or are harvested, the thrips will migrate in mass to nearby onion and cabbage fields. One general recommendation is to not plant onions or cabbage near small grains. If you have, you should inspect those crops for the presence of thrips when the grains start to dry down. See the *Midwest Vegetable Production Guide* <http://www.btny.purdue.edu/Pubs/ID/ID-56/> for insecticide recommendations. Thrips control is generally difficult because they like to hide in tight places, so using lots of water and high pressure will help to move the insecticide to the location of the thrips.



HORNWORMS - (*Rick Foster*) - Tomato and tobacco hornworms are beginning to appear on tomatoes. The larvae are fairly small right now but they will grow rapidly during this warm weather. Hornworms can do a lot of damage in a relatively short period of time. Tomato and pepper growers should be scouting their fields on a weekly basis to look for hornworms and other insect problems. Hornworms often are a spotty problem, so the entire field may not need to be sprayed. Fortunately, hornworms are relatively easy to kill with insecticides. As the season progresses, you will see some hornworms that have been parasitized by a tiny wasp. The bright white cocoons from the wasp are visible on the outside of the hornworm. Parasitized larvae will not do any more damage and the wasps that emerge will attack other hornworms. Usually the parasites don't appear early enough in the season to prevent most of the damage.



FLEA BEETLES - (*Rick Foster*) - Many crops are attacked by one or more species of flea beetles. Flea beetles are small beetles that jump like fleas with their enlarged hind legs. They feed by chewing small holes in the leaves. When populations are high, the holes are so numerous that they connect, giving the appearance of larger holes. Eggplant is the vegetable crop most commonly attacked by flea beetles, but virtually all crops are susceptible. Flea beetles are easy to control with Sevin[®], pyrethroids, or a number of other insecticides.



WEED MANAGEMENT IN ESTABLISHED CROPS - (*Liz Maynard*) - Over the next few weeks in northern Indiana, weeds in the warm season crops will enter the exponential growth phase when they seem to grow a foot overnight. It is worth the time to get weeds out of the crop and keep them out until the crop is harvested.

Aside from competing for water and nutrients and shading the crop, weeds can also promote other troubles. They may be reservoirs of viruses and harbor aphids that transmit the viruses to the crop. Tall weeds create a more humid environment by reducing air movement and creating shade; this may increase the period of leaf wetness for a crop, thereby promoting disease. Tall weeds can also interfere with sprayer booms and/or with the spray pattern, reducing uniformity of coverage for insecticides and fungicides.

If mechanical control, including cultivation, hoeing, and handweeding are the methods of choice, the equipment and operators will make a big difference in success of the effort. Be sure that all cutting surfaces are sharp and adjusted properly. If possible, cultivate when weeds are small, even before they emerge, so that a shallow cultivation will be effective. Avoid deeper cultivation that will expose buried weed seeds to conditions that will stimulate them to germinate. Of course, larger weeds will require deeper cultivation for control. If that is the case, be prepared to manage the next flush of weeds. Be careful not to cut through crop roots with deeper cultivations. Take the time to sharpen hand tools. Train employees how to use tools effectively, if they don't already know. If the weeds have 'taken over,' removing weeds near the crop row should be a priority because they have the biggest negative effect on the crop. Mowing weeds between rows is also an option to reduce competition and make it easier to manage the crop.

If herbicides are part of your toolbox, choose carefully to match herbicides permitted on your crop with weeds that are present or expected. If grasses are in a crop, consider using one of the postemergence grass

herbicides sethoxydim (e.g. Poast®) or clethodim (e.g. Select®). These can be applied over the top of broadleaf crops for which they are labeled without injuring the crop. Check the *Midwest Vegetable Production Guide* and product labels for crops they can be used on. Be aware that these grass herbicides do not control nutsedge.

Herbicides that control emerged broadleaves and may be applied over the top of a vegetable crop are few. Matching the material to the weeds present as well as the crop becomes especially important. For instance, Sandea®, which is labeled postemergence on some of cucurbits, is not effective against emerged lambsquarters but will control pigweeds. The table on page 39 of the 2011 *Midwest Vegetable Production Guide* <http://www.btny.purdue.edu/Pubs/ID/ID-56/herbEffect.pdf> indicates effectiveness of postemergence herbicides against various weeds. The herbicide label provides additional information. To identify unknown weeds, consult one of the online weed identification guides linked on the *Purdue Fruit and Vegetable Connection* weed management page at http://www.hort.purdue.edu/fruitveg/veg/weed_management.shtml. County Extension offices may also provide assistance with weed identification, or contact me.

Some postemergent herbicides are available for use between rows of the crop as a directed spray, or applied with a shielded or hooded sprayer. Glyphosate products may be used between rows for most vegetables if applied with a hooded or shielded sprayer, or for some crops a wiper applicator. It is important to avoid any contact of glyphosate with the crop. For crops on plastic mulch, avoid spraying glyphosate on the mulch because if a crop leaf contacts the mulch it may absorb the herbicide. Preharvest intervals apply for some crops. The advantage of glyphosate is that it will control both grasses and broadleaves and thorough coverage of weeds is not essential because it is systemic. The disadvantage is the potential for systemic crop injury if the spray contacts the crop. Also, in fields with a long history of reliance on glyphosate there may be populations of weeds that are not well controlled.

Aim® (carfentrazone) is also labeled on many vegetables for application in row middles with a hooded sprayer. Aim® controls many emerged broadleaf weeds. It is a contact herbicide so thorough coverage of weeds is important. It will work best on small weeds.

Weed Pharm® (acetic acid) is a nonselective contact herbicide that may be used between crop rows with a hooded or shielded sprayer. It will kill many small weeds when applied properly. Thorough coverage of leaves is essential for good control. Weed Pharm® has been approved for use in certified organic production; check with your certifier to determine whether it is acceptable to them.

For full season crops, application of a preemergent herbicide between rows after emerged weeds are controlled may be warranted. This will reduce the population of later emerging weeds, possibly eliminating need for additional cultivation. It will also make it easier to prevent weed seed production. For example, in cucurbits, tomatoes and peppers, Sandea®, and trifluralin products may be used in this manner; Curbit® may be used on cucurbits only. If you plan to establish cover crops, be aware that the herbicides may reduce cover crop germination or establishment. An article in the June 3, 2011, *Purdue Pest and Crop Newsletter* addressed this issue for herbicides used on corn and soybeans and may be found at <http://extension.entm.purdue.edu/pestcrop/2011/issue9/index.html#cover>. Weed control may not be the most urgent task on your list, but investment in effective weed control now can pay off in crop yield and quality this year and in reduced weed pressure in future years.



LEAFY GREENS MARKETING AGREEMENT - (*Gene McAvoy, University of Florida*) - A Marketing Agreement for leafy greens has been proposed by the USDA Agricultural Marketing Service (AMS). The idea is to regulate the handling of leafy green vegetables with a view toward food safety and minimizing microbial contamination. Leafy greens include lettuce, spinach and cabbage. There is an opportunity to file written exceptions to the proposed marketing agreement no. 970, docket no. AO-FV-09-0138; AMS-FV-09-0029; FV09-970-1. The program would be open to operations of all sizes and locations. The National Leafy Green Marketing Agreement would authorize the development and implementation of handling regulations to reflect U.S. Food and Drug Administration (FDA) Good Agricultural Practices (GAPs) and U.S. Department of Agriculture (USDA) Good Handling Practices (GHPs). The proposed regulation found at <http://www.ams.usda.gov/AMSV1.0/LeafyGreensAgreement> provides complete details about the voluntary program, governance structure, board representation, technical review committee make up and its administration by the National Leafy Green Marketing Agreement board with USDA oversight. All interested parties, including small and organic operations, are encouraged to submit comments concerning USDA's Recommended Decision to establish the National Leafy Green Marketing Agreement. Comments are due by July 28, 2011.

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