VEGETABLE CROPS HOTLINE

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

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No. 498
August 22, 2008

<http://www.btny.purdue.edu/pubs/vegcrop>

IN THIS ISSUE

DOWNY MILDEW OF CUCURBITS - *(Dan Egel)* - ***(The following article has been modified from a Vegetable Crops Hotline – BULLETIN, August 13, 2008.)*** This disease has been observed in Hancock County on a susceptible variety of slicing cucumber. The diseased plants were observed in a downy mildew sentinel plot that is part of a national effort to track and understand downy mildew. This is the first report of downy mildew in Indiana this year.

Although several other cucurbit species were growing in close proximity to the diseased plants, so far downy mildew has not spread from the susceptible variety of slicing cucumber. This may mean that the race of the downy mildew present in Hancock County reported here only affects cucumber.

The progress of the downy mildew of cucurbit disease can be followed nationally at this link <**www.ces.ncsu.edu/depts/pp/cucurbit/**>.

The outbreak reported here is of more importance to cucurbit growers who have crops that will be grown into the fall than those growers who will finish harvest in the next few weeks. All cucurbit growers in Indiana should strongly consider the management options described below. And please continue to let me know of any additional outbreaks.

Symptoms - Downy mildew is primarily a leaf disease. Often, the first symptoms one observes are yellow, angular or square looking spots on leaves. The underside of the leaves may be covered with a black fuzzy looking growth--this is the fungus that causes the disease. Leaves may eventually turn brown and crinkle. The leaves may turn upwards as they dry. Severe outbreaks may result in the rapid death of vines.

Disease cycle - The fungus that causes downy mildew has not been reported to over winter in Indiana; it "blows" in from southern states (or from greenhouses in Canada). Thus, we do not usually observe downy mildew until August or September.

Downy mildew requires a period of leaf wetness and high humidity for successful infection. Heavy dews can provide adequate moisture to get this disease going. Although the fungal spores may land in your field, there has to be leaf wetness for the disease to cause problems. The optimum temperature for downy mildew is 59 to 68˚F. The cool weather and heavy dews much of Indiana has experienced recently are perfect for downy mildew.

Control - Consult the Midwest Vegetable Production Guide for Commercial Growers <**www.btny.purdue.edu/Pubs/ID/ID-56/**> for control measures. Briefly, contact fungicides such as chlorothalonil (e.g., Bravo®, Echo®, Equus®) or mancozeb (e.g., Dithane®, Manzate®, Penncozeb®) can be used against downy mildews. Recent data indicates that Curzate®, Previcur Flex®, Ranman®, and Tanos® have been effective systemic fungicides against downy mildew. Systemic fungicides will be more effective than contact fungicides. Please consult the label for important application and resistance management instruction. The weather-based disease-forecasting program MELCAST was not designed for downy mildew. Therefore, if downy mildew threatens, apply fungicides on a regular 5 to 7-day schedule.

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TOMATO FRUIT DISORDERS - *(slightly modified by Liz Maynard from previous articles by Chris Gunter (VCH 379 and 396) and Liz Maynard (VCH 382))* - Harvest time is approaching for tomatoes in Indiana and once the fruit starts coming off the vines you can examine fruit quality. There are several fruit disorders that are the result of infection of the plant or fruit by various fungi or bacteria. There are also fruit disorders that do not result from infection by an organism; they result from some condition, which occurred during the season that changes the fruit quality. This article will focus on these types of physiological disorders. The disorders discussed here are catface, growth cracks, yellow shoulder, blotchy ripening and blossom end rot.

Catface generally appears as a misshaped fruit with scars and holes appearing in the blossom end of the fruit (Figure 1). It may also appear as an enlargement or perforation of the blossom scar, though the fruit shape is normal. Exposure of the flower buds to cold temperatures prior to anthesis has been linked to an increase in the appearance of catface. Large-fruited varieties tend to be more susceptible to this disorder. In some heirloom

Figure 1: Tomato fruit with mild to severe catfacing. *(Photo by Liz Maynard)*

varieties, nearly all fruit is 'catfaced' and it does not detract from marketability of the fruit. Variety selection is the most practical way to limit this problem.

Growth cracks appear as splitting of the outer layer or epidermis of the fruit in either concentric circles around the stem end or radial cracking from the stem end towards the blossom end of the fruit (Figure 2). Cracks usually appear towards fruit maturity at the

Figure 2: Radial growth cracks on tomato fruit. *(Photo by Liz Maynard)*

mature green stage or in less susceptible varieties at the red ripe stage. The earlier the growth crack develops, the larger it is likely to be once the fruit is harvested. Rapidly growing fruit and fruit exposed to the sun tend to crack more readily. Also cracking is more severe under hot, dry conditions followed by rainfall. Selecting crack-resistant cultivars as well as careful management of water availability (through irrigation management and the use of plastic mulch) is the best defense against growth cracks.

Yellow shoulder disorder appears as areas under the skin of ripe fruit that range from internal white tissue to distinct yellow or green sections (Figure 3). The disorder involves abnormal fruit development and is not a delay in fruit ripening. The disorder appears to be related to potassium availability in the soil. Adequate potassium fertility early on in fruit development is important in controlling the appearance of the disorder. Selecting varieties that have reduced susceptibility to the disorder is also advised. In fresh market tomatoes the disorder is often seen on fruit exposed to bright sun and high temperatures. This can happen when leaves providing shade to the fruit die from disease, so maintaining healthy foliage is important.

Figure 3: Tomato fruit exposed to sun when leaves die due to disease often develop yellow shoulders. *(Photo by Liz Maynard)*

'Blotchy ripening' is used to describe a disorder in which fruit develops green or white patches that remain hard after the fruit has ripened (Figure 4). The wall and internal tissue in the affected area are whitish. The discolored areas are not necessarily on the shoulders. Like yellow shoulder, this problem appears to involve abnormal fruit development and is associated with a variety of environmental and nutritional factors. Inadequate potassium, excess nitrogen, low light conditions and cool weather have been associated with the problem.

Figure 4: Tomato fruit with blotchy ripening. *(Photo by Liz Maynard)*

Blossom end rot is a physiological disorder caused by a deficient supply of calcium to the developing fruit. It is a common problem on tomatoes, but can also occur on peppers, eggplants, and melons. Blossom end rot

appears first as a small darkened or water soaked area around the blossom end of the fruit. This spot darkens, enlarges and dries out as fruit matures (Figure 5). This area is an open wound on the fruit surface that may be invaded by secondary decay causing organisms. This disorder is caused by a combination of both cultural and climatic factors including nitrogen, calcium and soil moisture. Prevention is the best way to avoid losses from blossom end rot.

Figure 5: Tomato fruit with blossom end rot. *(Photo by Liz Maynard)*

Avoid excessive nitrogen, which promotes vegetative growth that will compete with the developing fruit for an adequate supply of calcium. Remember that the calcium necessary for plant growth moves to the roots in the soil water. It is transported from the roots to the leaves and fruit through the xylem. Any interruption of water supply to the roots, for example during hot dry weather, can cause a temporary calcium deficiency in the developing fruit. Low pH can also cause calcium to be less available, maintain pH between 6.0 and 6.8. Be aware that foliar applications of a calcium containing products, which are frequently advocated, may be of little value because calcium has poor absorption and remobilization to the fruit where it is needed.

Proper water management, fertility, disease control and variety selection are key factors in reducing losses due to these physiological disorders of tomato fruit. By maintaining crop health prior to and during fruit development, the highest quality fruit can be produced. High quality fruit can be assured of commanding premium prices in the market place and are always in demand. It is probably too late to correct problems this year, but it is not too early to think about what to do differently next year. A first step is to commit to a well-planned soil fertility program based on a current soil test and reliable recommendations for nutrient inputs.

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Bacterial Spot of Pumpkins - (*Dan Egel*) – I have observed bacterial spot of pumpkin in several pumpkin fields across the state. Often the first indication of a problem is the blister-like lesions on pumpkin fruit (Figure 1). Fruit lesions start as small (1/16-1/4 inch across), round, tan scabs that occur in clusters, often on the "face" of the jack-o-lantern. The scab-like lesions begin as tiny watersoaked spots on developing fruit. As fruit mature, the spots enlarge and give rise to tan, raised "blisters". Symptoms on leaves are not obvious and are

Figure 1: Bacterial spot on a pumpkin fruit. One of the lesions has a secondary infection and a brown rot can be seen developing inside the fruit. *(Photo by Dan Egel)*

unimportant except as a symptom of the disease. The spots are small (1/8-1/16 inch across), angular, necrotic lesions that coalesce to form larger, irregularly shaped necrotic areas that can be mistaken for a non-infectious disorder (Figure 2). Lesions may have a white to light brown coloring.

Figure 2: Lesions of bacterial spot of pumpkin on the leaf. *(Photo by Dan Egel)*

Details regarding the bacterial spot disease cycle are still uncertain. The disease appears to be much worse in fields that have not been rotated from pumpkins adequately-3 years or more between pumpkin crops is recommended. The bacteria that cause the disease may be carried in infested seed.

Like most bacterial diseases, the disease probably spreads by splash dispersal during rain or irrigation events. Long distance spread (one mile or more) is unlikely.

Fruit infection probably occurs during early fruit development. Symptoms develop on infected fruit in 7 to 14 days.

No host resistance has been identified. Therefore, growers must rely on a combination of cultural and chemical methods to reduce the disease threat. Since it is possible that the bacteria can be carried in seed, growers are advised not to save their own seed. If fields are transplanted, then transplant production facilities and transplant materials should be sanitized with commercial disinfectants.

Early season copper applications may also be used to reduce the amount of infection. Apply copper when fruit is about softball sized. When there is no longer any fruit of this stage that is likely to mature in time for harvest, copper applications may be discontinued. If symptoms are confirmed on the leaves before fruit are present, copper applications may be started at this time.

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Free Online Course - *(Liz Maynard)* - There will be a free online course about Good Agricultural Practices, August 26 - Sept. 15. Implementing Good Agricultural Practices is a 3-week web-based course offered through the National GAPs Program at Cornell University. It is a pilot course, meaning it contains all the course content but asks for your feedback and evaluation so that they can fine-tune the course material. The course will require about 5 to 10 hours of your time over the two-week period. The value of the course is $150. Seats for this section of the course are paid for by a grant from the United States Department of Agriculture that also was used to develop the course content, so it will not cost you to participate.

If you have the time, this is an excellent opportunity to receive state of the art training about GAPS at no cost. To register, go to the registration page at <**www.ecornell.com/gaps**>, check the Add to Cart checkbox and click the button. Once you register, you will be sent a letter to sign, then you will be notified that your registration is complete. If you have any questions about this course, contact Betsy Bihn at (315) 787-2625 or e-mail her at: **eab38@cornell.edu**.

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Upcoming Events

Pumpkin and Sweet Corn Twilight Meeting - Tuesday, Sept. 9, 2008, 5:00 to 8:30 p.m. CDT. Pinney-Purdue Ag Center, Wanatah, IN. Pinney-Purdue is 5 ½ miles east of Valparaiso or 1 mile west of Wanatah on US Highway 30 then north ½ mile on Porter/LaPorte County Line Road.

The program will include a tour of sweet corn and pumpkin variety trials and discussion about insect, disease and weed management by Extension Specialists Rick Foster, Dan Egel and Liz Maynard. Approval for Indiana Private Applicator Recertification Credit and Commercial Applicator Continuing Credit Hours is anticipated. A catered meal will follow the field tour, with the opportunity to taste sweet corn varieties (weather permitting).

Registration is $5.00 (or $15.00, with PARP credit), payable at the meeting. Please preregister for the evening meal by **September 2, 2008**, by calling (219) 785-5674 or emailing **emaynard@purdue.edu** with name and number attending.

A flyer will be posted at **<www.hort.purdue.edu/fruitveg/>.**

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