

VEGETABLE CROPS HOTLINE

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

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BACTERIAL SPOT OF PUMPKINS - (Dan Egel) - For many growers, this disease has become the most important disease of pumpkins in Indiana. I have observed this disease in several pumpkins this year. Often the first indication of a problem is the blister-like or perhaps scab-like lesions on pumpkin fruit (Figure 1). Fruit



Figure 1: Bacterial spot of pumpkin causes scab-like lesions on pumpkins. (Photo by Dan Egel)

lesions start as small, watersoaked (1/16-1/4 inch across), round, tan scabs that occur in clusters, often on the "face" of the jack-o-lantern-that is, the top of the pumpkin as it sits in the field. As fruit mature, the spots enlarge and give rise to tan, raised "blisters". Secondary organisms may infect lesions on the fruit and may cause enlarged openings in addition to the lesions described above. Symptoms on leaves are not obvious and are unimportant except as a source of the bacterium and a symptom of the disease. The spots are small (1/8-1/16 inch across), angular, chlorotic lesions that turn necrotic

and may coalesce to form larger, irregularly shaped necrotic areas that can be mistaken for non-infectious disorders (Figure 2).



Figure 2: Bacterial spot also causes lesions on pumpkin leaves that start out as chlorotic lesions which become necrotic and may coalesce. (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 has reported to be carried in infested seed. The frequency of seed transmission is unknown.

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. Warm, rainy weather favors infection and spread.

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.

Last year, Actigard® was labeled for cucurbits. Among the labeled uses is the management of bacterial spot. I did not include Actigard® in the *Midwest Vegetable Production Guide for Commercial Growers* (ID-56) <<http://www.btny.purdue.edu/Pubs/ID/ID-56/>> because some research has indicated that Actigard® may cause yield loss. The Actigard® label warns against applications when plants are stressed for this reason. However, pumpkin growers who have had problems with bacterial spot may want to consider using Actigard® on some portion of their production. (For most growers, it is too late to consider Actigard® use for this season.)

Please note: Bacterial spot of pumpkins is not the same organism as bacterial spot of tomato and pepper. The bacterium from pumpkins cannot affect peppers or tomatoes and the bacterium from peppers or tomatoes cannot affect pumpkins.



TOMATO FRUIT SET - (*Liz Maynard*) - I've heard from several people that fruit set seems low on field-grown fresh market tomatoes this year. It is likely that the high temperatures of the past month are responsible. From July 1 to Aug. 11 the Throckmorton Purdue Ag Center weather station recorded 11 days with a high of 90 or above and 10 nights with a low of 70 or above. High temperatures interfere with tomato flower development at a number of growth stages. Some flower clusters may abort while still buds; others may bloom only to drop off with no fruit if pollination is unsuccessful.

I know of nothing that can be done during the season to reduce this blossom drop. Maintaining crop health by providing irrigation, nutrients, and pest and disease management as needed, will keep the plants in good condition so that when temperatures moderate and fruit does set it will develop properly.

Tomato fruit takes about 40 days from pollination to maturity. Fruit that sets now (mid-August) will be completing development in September. In some years September weather is warm and dry, very nice for tomatoes; in others it's cool, or cloudy and wet, promoting disease and poor fruit quality, or an early frost injures plants and fruit. In all years the daylight hours decrease, so the plant has less light to use in making sugars, acids, and other compounds necessary for good fruit quality. In short, there's a lot that can get in the way between a tomato flower now and a high quality tomato fruit in the fall. As growers make

decisions about when its time to call it quits on a tomato crop, their personal knowledge about the likelihood of harvesting marketable fruit in the fall from specific tomato varieties will be valuable.

Tomatoes are not the only crop to have fruit set affected by high temperatures. An earlier article this year discussed pumpkin fruit set. Bell peppers and snap beans also commonly drop buds and flowers under high temperatures. Snap beans take just 3 weeks to develop from flower to fruit, so pods that set after temperatures moderate should be ready to pick before fall weather slows them down. A split set can be a problem for machine-harvested beans, but in hand-harvested crops a second set can be harvested as long as the pickers are still available. Bell peppers developing in September run risks similar to tomatoes, but if picked at the green stage they will not take as long to harvest maturity.

Varieties of these crops vary in their ability to set fruit under high temperatures. Growers may find it worthwhile to trial some heat tolerant varieties on their farm and identify good alternatives to currently grown varieties that are less tolerant. We can't predict how hot any particular season will be, but average temperatures are increasing and all indications are that they will continue to do so. It makes sense to be prepared with varieties that can take the heat.



ANTHRACNOSE OF TOMATO - (*Dan Egel*) - Several diseases and disorders of tomatoes cause lesions on the surface of the fruit. The lesions caused by anthracnose start off as circular, depressed areas. The center of the lesion becomes tan and eventually black, often with concentric rings (Figure 1). Although the fruit may be infected when still young, the symptoms are usually exhibited when the tomato fruit are mature. Although anthracnose may cause symptoms on leaves and roots, these symptoms are rare in the Midwest and are not discussed here.



Figure 1: Symptoms of anthracnose include soft, depressed areas on the tomato fruit, often with dark centers. (*Photo by Dan Egel*)

The dark area of the lesion usually has microsclerotia, resistant spore structures that enable the fungus to overwinter. Rains can cause these fungal structures to splash up on tomato fruit and cause more infections next year. Warm, rainy weather favors the disease. This may explain why many growers have observed symptoms of anthracnose this year.

Crop rotations out of tomato and related crops help reduce the severity of the disease. Because the fungus has a relatively wide host range, control weeds that might be hosts of the fungus. Staking tomatoes so that they do not come into contact with the soil may reduce fruit infection. Avoid waiting to harvest over ripe fruit, as these fruit are more likely to have symptoms of anthracnose. Several fungicides are labeled for anthracnose and are listed in the *Midwest Vegetable Production Guide for Commercial Growers* (ID-56). It makes sense to use fungicides for anthracnose that also have activity against such common diseases as early blight and Septoria leaf blight. Contact fungicides that fit this description include chlorothalonil products (e.g., Bravo®, Echo®, Equus®) or mancozeb (e.g., Dithane®, Manzate® and Penncozeb®). Systemic products include Cabrio®, Amistar®/Quadris®, Revus Top® and Tanos®.



DOWNY MILDEW OF CUCURBITS UPDATE - (Dan Egel)
 - Downy mildew of cucurbits does not overwinter in Indiana and must 'blow in' from another location, such as down south. This year, the only county (so far) to report downy mildew in Indiana is La Porte County in northern Indiana on cucumber. The fungus that causes downy mildew of cucumbers may cause downy mildew on other cucurbit crops, however, to date the nearest cucurbit other than cucumber to be reported is muskmelon in Leelanau County in northern Michigan and squash, muskmelon and watermelon on eastern Michigan (Saginaw County).



IVGA DIRECTORIES IN THE MAIL - Members of the Indiana Vegetable Growers' Association should soon receive copies of the 2010 Membership Directory and the 2010 Directory of Wholesale Vegetable Producers. The wholesale directory is also available online at <<http://www.ivga.org>>. Included in the mailing is the Indiana Agricultural and Horticultural Employer Checklist developed by Mid American Ag and Hort Services in partnership with the USDA Risk Management Agency. An online version of the checklist with live

links to forms and additional resources is available at <<http://www.midamservices.org>>. Single copies of the employer checklist may be requested by calling Liz Maynard at 219-531-4200 ext 4206.



PHOTOGRAPHS IN THE MIDWEST VEGETABLE PRODUCTION GUIDE - This year, for the first time, color photographs of common or emerging pests was placed in the back of the *Midwest Vegetable Production Guide for Commercial Growers* (ID-56). These photographs are of disease, insect and production disorders that are considered important to Indiana vegetable producers (Figure 1). The photographs, which are available in the print or on-line version, are meant to serve as a resource for growers and other agriculture workers. It will soon be time to produce the 2011 version of the ID-56. I am asking for input - have these photographs been useful to you? The inclusion of photographs is expensive and time consuming. So please let me know if you want these photographs included in future versions of the ID-56. Unless I get sufficient input, I may leave the photographs out. While you are at it, please drop me a line about any other aspect of the ID-56 that you have opinions about. Please contact Dan Egel at 812-886-0198 or egel@purdue.edu.



Figure 1. (Left) Bacterial spot of tomato causes small necrotic lesions on leaves that are often accompanied by chlorosis. (Right) Lesions on fruit are often scabby in appearance. See page 87 for management options.



Figure 2. Bacterial spot lesions on pumpkin are light colored with water-soaked margins. The cut open pumpkin shown here has a secondarily infected lesion that has rotted through the fruit. See page 74 for management options.



Figure 3. Gummy stem blight on watermelon often turns leaf petioles light brown and produces dark brown, irregular leaf lesions. See page 76 for management options.

Figure 1: An example of color photographs included in the ID-56 for 2010. If these photographs have been useful to you, please contact Dan Egel.



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