

VEGETABLE CROPS HOTLINE

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

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TOMATO DISEASE PRIMER - (Dan Egel) - With the recent warm, wet weather, many vegetable growers will likely begin to see an increase in tomato diseases. Since I covered a few bacterial diseases in *Vegetable Crops Hotline* issue 503, the discussion below is about fungal diseases.

Early blight - The leaf spots caused by this disease are roughly circular and up to 1/2 inch in diameter (Figure 1). The spots contain dark concentric rings in a target-like pattern. The spots first occur on the older leaves and progress upwards. Fruit spots (less common) may occur at the stem end. Such spots are usually brown-black and up to 1 inch in diameter.

Early blight can be managed by rotating away from tomatoes or potatoes for 3 to 4 years. Fall tillage can help get rid of crop residue, which might harbor the disease. Most growers find that protective fungicides are critical to managing early blight.

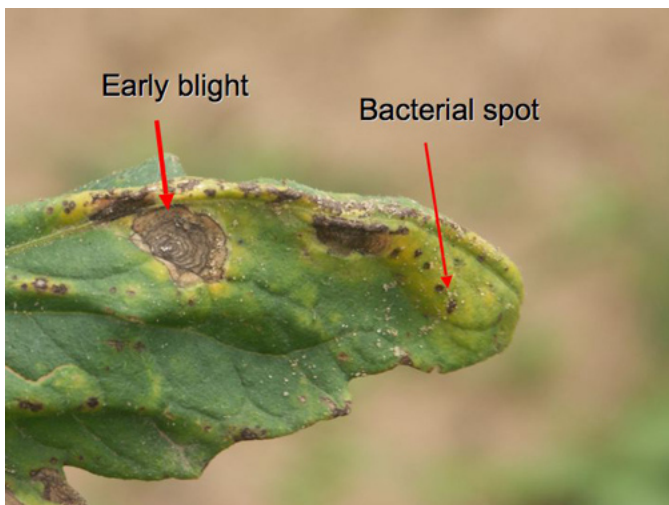


Figure 1: This leaf has lesions of early blight and bacterial spot. (Photo by Dan Egel)

Septoria leaf spot - Spots on leaves are circular with chocolate brown margins and gray centers (Figure 2). As the spots enlarge (up to 1/8 inch in diameter), pinpoint fungal structures may be observed within each lesion. These are the reproductive structures of the causal fungus. As in early blight, the spots start on the older leaves first.

Manage Septoria leaf spot in the same fashion as early blight.



Figure 2: Lesions of Septoria leaf spot tend to be round with a dark necrotic margin and a light gray center. (Photo by Dan Egel)

White mold of tomatoes - Tomato plants with white mold often begin to wilt (Figure 3A, page 2). Upon further investigation, one might notice a white, cottony growth of the fungus and small dark bodies about as large as a pea on the outside or inside of the stem (Figure 3B, page 2).

The small dark bodies described above, sclerotia, can survive years in the soil. Under appropriate conditions sclerotia can grow into small mushrooms. The spores from the mushroom may cause infection on a susceptible plant during moist, cool conditions (60 to 70 F).

This disease affects a wide range of crops including tomato, potato, cucumber, watermelon, beans, etc. Due to the wide host range and the length of time the fungus may survive in the soil, managing this disease can be difficult. Greenhouse growers can steam heat soil. Growers who have observed this problem in a particular field may want to avoid the field in the future. Sweet corn would be an acceptable rotational crop. I am not aware of any fungicides registered for use against the disease.



Figure 3: White mold of tomato may cause the plants to wilt and die (A). Pea sized fungal structures (B) may be found on or in the stem. (Photo by Dan Egel)

Leaf mold on greenhouse tomato - This disease may be recognized by the yellow areas on the leaves or the fungus that may be observed on the underside of the leaf (Figure 4A and B). This disease is often observed in greenhouses. This is due to the high humidity and leaf wetness in a greenhouse. In addition, greenhouse tomatoes are often grown year after year without crop rotation. Greenhouse floors should be kept clean and disinfested between crops. Pruning vines to increase air flow will help to keep plants dry and lessen the impact of leaf mold. To further dry out the air, the greenhouse should be ventilated at dusk.



Figure 4: Leaf mold of tomatoes causes yellowing of leaves (A) and a thick fungal growth (B) on the underside of the leaf. (Photo by Dan Egel)

Some seed catalogs may list resistance to leaf mold. However, there are many races of the fungus so this is not always reliable.

There are some fungicides that are labeled for this disease. Check the label to see if the fungicide you want to use is labeled for the greenhouse.

For more information on disease control, please refer to the *Midwest Vegetable Production Guide for Commercial*

Growers (ID-56) <www.btny.purdue.edu/Pubs/ID/ID-56/>. These publications are also available in hard copy by contacting your county educator or Dan Egel at (812) 886-0198. Additional information including extension publications is available at <www.ag.purdue.edu/btny/Extension/Pages/VegetablePathology.aspx>.



SPIDERMITES ON MUSKMELON AND WATERMELON - (Rick Foster and Dan Egel) - Vegetable growers who have survived our very wet spring, may not be expecting spider mites. These pests typically cause damage in hot, dry weather. However, one of us has observed a spider mite infestation in northern Knox County. The grower had mowed the rye strips, which may have added to the problem. Spider mites often move from a fencerow or rye strip into a field.

Two-spotted spider mites sometimes will affect muskmelons or cucumbers, but are most commonly a problem on watermelons. Mites cause damage by sucking sap from the underside of leaves (Figure 1). In hot, dry weather, mites can rapidly increase in numbers, as much as 70X in a week. In addition, hot, dry weather causes the mites to eat more and dry soil conditions provides the mites with more concentrated food, resulting in more rapid reproduction. Watermelon plants that are not irrigated are particularly susceptible to mites, because the mites increase faster and eat more and the plants may already be drought stressed.



Figure 1: Mite damage on watermelon leaf. (Photo by Jerry Brust)

Mite feeding can cause plants to be defoliated within a couple of weeks or can cause fruit to be of such poor quality that they are unmarketable (Figure 2). In some cases, mites will also feed on the rind, giving it a sandpaper-like texture.

To monitor for mites, you can either use a 10X hand lens and look for the mites on the underside of leaves or shake leaves over a white sheet of paper and watching the mites crawl on the paper. Look first on the edges of fields. If there is a gravel road next to the field that produces dust that lands on the plants, look there first since dust increases mite populations. Be aware that mite



Figure 2: Severe mite damage to watermelons. (Photo by Jerry Brust)

populations are frequently localized, so you may not need to treat the entire field. If you don't treat the whole field, be sure to spray at least 100 feet beyond the existing infestation to make sure that you contain the mites. We don't have specific threshold for spraying mites on watermelons. Stressed plants on non-irrigated land will be able to tolerate far fewer mites than healthy plants on irrigated land.

There are several miticide choices listed in the *Midwest Vegetable Production Guide for Commercial Growers (ID-56)* <www.btny.purdue.edu/Pubs/ID/ID-56/>. I believe that the best choice if you have a serious infestation is Agri-Mek®. It has consistently given good to excellent control. We have seen excellent results with one of our newer miticides, Oberon®.



DOWNY MILDEW OF CUCURBITS - (Dan Egel) - This disease affects all cucurbits including cucumber, muskmelon, squash, pumpkin, watermelon and zucchini. Downy mildew can be recognized by the yellow, often angular lesions on the surface of the leaves. The key symptom of this disease is the dark 'fuzz' that is present on the underside of leaves under moist conditions. Severely affected plants may be defoliated and thus yield and quality of the fruit may suffer.

The fungus that causes downy mildew of cucurbits does not overwinter in Indiana. The organism must be blown in on wind currents. Historically, the fungus overwinters in states of the Gulf Coast where green tissue of cucurbits is available for infection year around.

This year downy mildew has been reported in Florida, Texas, Georgia, Alabama, Louisiana, North and South Carolina, Virginia and California (See Figure 1). Three plots have been recently planted in Indiana and will be scouted weekly for this disease. Cucurbit growers should follow the epidemic using this link - <www.ces.ncsu.edu/depts/pp/cucurbit/> or by reading the *Vegetable Crops Hotline*. All growers should scout their fields for symptoms of downy mildew and contact Dan Egel if symptoms are suspected. A publication that describes downy mildew of pumpkins including color photo-

graphs may be found here <www.ces.purdue.edu/ext-media/BP/BP-140-W.pdf>. It is a good idea to become familiar with what fungicides are labeled for downy mildew. Growers may consult the *Midwest Vegetable Production Guide for Commercial Growers 2009 (ID-56)* <www.btny.purdue.edu/Pubs/ID/ID-56/> or the *BP-134 and BP-135* <www.btny.purdue.edu/Pubs/#vegetables>. Since most of the fungicides that are effective against downy mildew are very specialized, it does not make economic sense to apply these products unless the disease has been observed near by. Contact Dan Egel with any questions or a copy of the publications listed above.



Figure 1: Areas of the Eastern US that have reported downy mildew of cucurbits as of 25 June. Areas in red have had downy mildew reported in the last 7 days; areas in green have had the downy mildew reported more than 7 days ago. For more details, visit the Internet link listed in the accompanying article.



ARE CORN BORERS MAKING A COMEBACK? - (Rick Foster) - European corn borers can be a problem in a lot of vegetable crops, including sweet corn, tomato, pepper, potato, and snap bean. In the last 10-12 years, corn borer numbers have declined significantly because of the widespread adoption of transgenic field corn that contains BT genes that produce proteins that kill corn borers. This year corn borer numbers are higher than we have seen in recent years. If you have become a little complacent about monitoring for corn borers in your crops, you should probably take a little closer look this year. Populations are not overwhelmingly high compared to the pre-BT corn days, but they are higher than we have seen lately. Recommendations for control options for each crop are available in the *Midwest Vegetable Production Guide for Commercial Growers 2009 (ID-56)* <www.btny.purdue.edu/Pubs/ID/ID-56/>.



CHANGES TO WPS TRAINING - (Fred Whitford and Dan Egel) - Many growers have grown accustomed to Santiago Tijeriana from Transition Resources conducting EPA Worker Protection Standard (WPS) employee training. Santiago was a tremendous asset to the agricul-

tural community across Indiana. However, the funding for this work no longer exists; free employee training through Transition Resources will not be provided.

Within the next few weeks many of you will be hiring employees to work the fields. Remember the training requirements under the WPS regulations: every employee working in areas that were previously treated with any pesticide must be trained within a five-year period as a worker. Those employees handling pesticides are to be trained as handlers.

Many of your employees may have a WPS card indicating that they were trained as a worker or handler. Check the expiration date to make sure the card is still valid.

Growers will more than likely have to do their own WPS training for employees not previously trained. Gemplers and other agricultural suppliers sell DVDs for training workers and handlers. Employers must show the appropriate DVD, and follow up the session with a question and answer period. Only growers who have a private applicator permit or a commercial pesticide certification can do the training.

North Dakota State University has also put the videos on-line. Use the University of Idaho video for training field workers, use the Iowa State University video for training greenhouse and nursery workers, and the Michigan State University video for handlers. Follow up these with the Washington State University video on protection from pesticide exposure and the Montana tape for handlers on label instructions. These last two videos are optional. The website is <www.ag.ndsu.nodak.edu/aginfo/pesticid/wps.htm#video>. This will work on most high-speed Internet connections, but will not work with dial-up.

You can also download from the North Dakota State University website the EPA approved worker and handler training booklets. Cover this material with your employees, and you have met your WPS training requirements.

With any training, be sure to record who was trained so that when the Office of Indiana State Chemist checks, you will have the records to show that employees did receive the WPS training. For more information, contact Fred Whitford with Purdue Extension at (765) 494-1284 or Joe Becovitz with the State Chemist at (765) 494-1589.



5TH NATIONAL SMALL FARM CONFERENCE - (*Announcement*) - "Roadmap to Success for Small Farmers and Ranchers", September 15-17, 2009 at the Hilton Springfield and the Prairie Capital Convention Center, Springfield, Illinois.

The conference registration fee is (\$250). After August 25, the registration fee will be \$300.

You can register for the conference online at <www.conferences.uiuc.edu/smallfarm> or you can pay by check, money order, or purchase order. Fax registration to University of Illinois Conferences and Institutes at (217) 333-9561.

Reservations should be made directly with the hotel (217) 789-1530 or 800-445-8667 and must be received by August 25.

For more information, contact Deborah Cavanaugh-Grant, Conference Chair, cvnghgrn@illinois.edu, (217) 968-5512.

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