

VEGETABLE CROPS HOTLINE

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

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IN THIS ISSUE

- ASPARAGUS RUST
- THE CALM BEFORE THE STORM - CORN EARWORMS
- INSECTICIDES IN HIGH TUNNELS
- GUMMY STEM BLIGHT vs. ANTHRACNOSE ON WATERMELON
- OBSERVATIONS FROM THE PUMPKIN VARIETY TRIAL AT PINNEY-PURDUE
- DOWNY MILDEW UPDATE
- PHYTOPHTHORA BLIGHT
- INDIANA PESTICIDE CLEAN SWEEP PROJECT

ASPARAGUS RUST - (Liz Maynard and Dan Egel) - This disease was observed in northern Indiana recently. Rust can be a serious disease of asparagus. There are a few cultural and chemical control measures that will help minimize disease loss.

Rust is often first noticed in the spring or early summer as red-brown lesions on ferns (Figure 1). Spores from these lesions are blown to healthy ferns and the disease can spread rapidly. Ferns may dieback or become weakened. Later in the season, the lesions turn black due to the production of overwintering spores (Figure 2). Only 3 hours of surface moisture is needed for infection. Warm days and cool nights are optimal for the establishment and spread of asparagus rust.



Figure 1: Asparagus rust causes red-brown lesions on the ferns. (Photo by Liz Maynard)



Figure 2: Lesions of asparagus rust turn dark with the production of overwintering spores. (Photo by Liz Maynard)

Since the dark rust spores can overwinter in asparagus residue, removal of crop residue prior to emergence of the spears in the spring will help to reduce the amount of disease. Volunteer asparagus plants should be removed because they may be a source of spores. Several fungicides that may be used for asparagus rust are listed in the *Midwest Vegetable Production Guide for Commercial Growers 2009* (ID-56) <www.btny.purdue.edu/Pubs/ID/ID-56/>. The systemic fungicides Folicur®/Monsoon®/Tebuzol® and Rally® should be particularly useful. There are no asparagus varieties with resistance to rust.

THE CALM BEFORE THE STORM - CORN EARWORMS - (Rick Foster) - Corn earworm activity has been very low for several weeks throughout the state. This is a normal lull after the overwintering generation has emerged and before either the second generation starts flying or migrants begin coming in from the South. This is a good time for growers to save money by reducing their insecticide applications on sweet corn. But don't worry. I fully anticipate that soon, possibly before the next edition of this newsletter comes out in two weeks, we will start to see moth catches in our pheromone traps increase. To keep track of trap catches around the state, please visit my website at <<http://extension.entm.purdue.edu/topics/vegetable.php>>.

INSECTICIDES IN HIGH TUNNELS - (*Rick Foster*) - With the increased popularity of high tunnels for vegetable production, I am receiving an increasing number of calls about what insecticides can be used in those situations. Generally speaking, the use of insecticides in high tunnels must be considered the same as using them in greenhouses. Insecticide labels may contain statements prohibiting their use in greenhouses, but those statements are often difficult to find on the label. For 2010, we will prepare some detailed lists of available insecticides to include in *Midwest Vegetable Production Guide for Commercial Growers* (ID-56) <www.btny.purdue.edu/Pubs/ID/ID-56/>. For now, the best information I've found comes from Dr. Luis Canas (a Purdue Entomology graduate) at Ohio State University. You can look for guidance in his publications at <http://ohioline.osu.edu/b672/pdf/Green_Insect.pdf>. One thing that I found interesting from this publication is that some of the insecticide formulations normally used on ornamentals, particularly in the greenhouse, have greenhouse tomatoes on the label. As an example, the insecticide Talus (active ingredient: buprofezin) is labeled for use on leafhoppers, mealybugs, and whiteflies on greenhouse grown tomatoes. It is not labeled for use on field grown tomatoes. This is a very effective insecticide, especially against whiteflies. The bottom line is that if you are treating vegetables in a greenhouse or high tunnel, you need to carefully read the label to make sure the insecticide you want to use is legal to use in those locations. Hopefully, we will have a summary of available insecticides for you soon.

GUMMY STEM BLIGHT VS. ANTHRACNOSE ON WATERMELON- (*Dan Egel*) - Two foliar diseases have been observed this year in watermelon fields in southwestern Indiana. Gummy stem blight is a common sight to watermelon growers each year. Anthracnose, however, is less common on watermelon in Indiana. The latter disease appears to be more common this year than in the past. Below I have written a comparison of these diseases to better help in management.

- ❖ Gummy stem blight lesions on the watermelon leaves are often dark and rounded with ridges visible inside the lesions (Figure 1). Lesions on stems appear brown and appear water-soaked (Figure 2). Both leaf and stem lesions may have dark fungal structures (pycnidia) that are visible with a 10X hand lens. Fruit lesions caused by this fungus are properly called black rot and I have not observed such lesions on watermelon in Indiana.
- Anthracnose lesions on watermelon leaves are often smaller than gummy stem blight lesions and are pointed or jagged in appearance (Figure 3). Lesions of anthracnose on stems are a light brown and spindle shaped (Figure 4). When one finds an area in the field where anthracnose lesions on leaves are common, the base

of watermelon fruit should be inspected for lesions. Such lesions will appear first as small, slightly raised watersoaked spots (Figure 5). Larger lesions will appear crater-like and may have a salmon cast to them due to the presence of spores of the fungus. Even small fruit lesions can expand post harvest and create problems in shipping.



Figure 1: Lesions of gummy stem blight of watermelon tend to be dark and rounded. (Photo by Dan Egel)



Figure 2: Stems or petioles of watermelon infected with gummy stem blight may appear brown and water-soaked. (Photo by Dan Egel)



Figure 3: Anthracnose lesions on watermelon leaves are pointed or jagged in appearance. (Photo by Dan Egel)



Figure 4: The spindle shaped stem lesion shown above is typical of anthracnose of watermelon. (Photo by Dan Egel)



Figure 5: Anthracnose can cause fruit lesions on watermelon. (Photo by Dan Egel)

The fungi which cause both gummy stem blight and anthracnose survive on crop residue. Therefore, crop rotation and fall tillage are important for disease management. In addition, both diseases may be seed transmitted. Therefore, inspection of transplants and proper greenhouse sanitation is critical. Both diseases can be managed with *MELCAST* (BP-67) <www.btny.purdue.edu/Pubs/#vegetables>. However, if either disease has become serious, growers should return to a calendar based schedule such as every 7 days.

- ❖ The bedrock of fungicide management for gummy stem blight are the contact fungicides chlorothalonil (e.g., Bravo®, Echo®, Equus®) and mancozeb (e.g., Dithane®, Manzate®, Penncozeb®). The systemic fungicide Pristine® has been effective in the past, however, strains of the gummy stem blight fungus resistant to the active ingredients in Pristine® have been found in Knox County. Similarly, many of the same strains are resistant to the active ingredient in Amistar®/Quadris® and Cabrio® (See *Vegetable Crops Hotline* issue 503 for more details). The systemic fungicides Folicur®/Monsoon® and Switch® are labeled for gummy stem blight

and should be effective.

- Anthracnose can also be managed with the contact fungicides listed above. Amistar®/Quadris®, Pristine® and Cabrio® can all be used for management of this disease. Tanos® is also labeled for anthracnose. However, Folicur® and Switch® are not labeled for anthracnose.

All systemic fungicides should be alternated with fungicides of a different mode of action. Table 25 in the *Vegetable Production Guide for Commercial Growers 2009* (ID-56) <www.btny.purdue.edu/Pubs/ID/ID-56/> lists many fungicides and their mode of action. *BP-134-W* <www.btny.purdue.edu/Pubs/#vegetables> will also be useful in managing these two diseases. It may be a good idea to always tank mix a contact fungicide with each systemic applied for anthracnose and gummy stem blight. Many growers have had question about the use of the pesticide Oxidate®. Do not apply Oxidate® as a substitute for any of the products listed above unless one is growing produce organically.

Both anthracnose and gummy stem blight can be serious diseases. Growers should take the time to learn about the two diseases as described above.

OBSERVATIONS FROM THE PUMPKIN VARIETY TRIAL AT PINNEY-PURDUE - (Liz Maynard) - Fruit set has begun in the pumpkin variety trial at Pinney-Purdue in the past week. The trial was seeded on June 5. Some plants that are just beginning to vine have multiple developing fruit (Figure 1). There are one or two fruit on the main stem, as well as one or more fruit on branches. With so many fruit developing simultaneously on what is still a fairly small plant, the pumpkin size will probably be smaller than normal. It is likely that the cooler-than-usual temperatures have promoted female flower formation and slowed vegetative growth. If plants remain healthy, it is likely that a later set will occur when the plants are larger; those fruit may reach a more typical size.



Figure 1: Multiple young fruit on a pumpkin plant beginning to vine. How many can you find? (Photo by Liz Maynard)

No powdery mildew is visible just walking through the plot, but by looking at the undersides of older leaves, it's possible to see the first spots here and there in the field (Figure 2). Refer to issue No. 510 of the *Vegetable Crops Hotline* for more information on this disease and control recommendations.

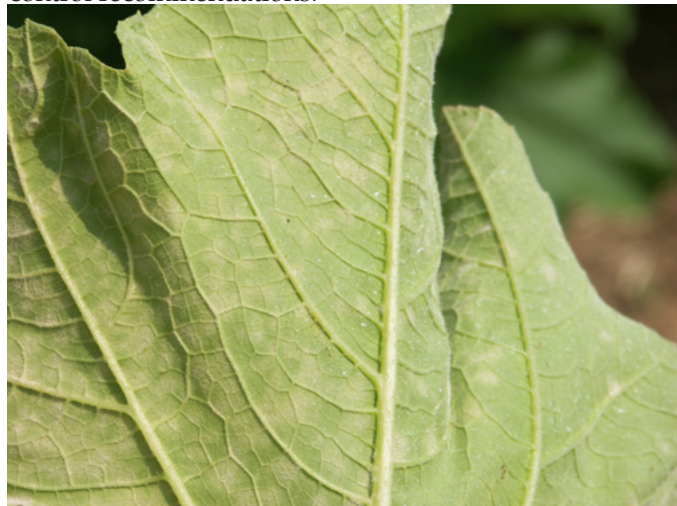


Figure 2: Powdery mildew is not visible on this plant until a lower leaf is turned over. (Photo by Dan Egel)

If the bacteria that causes bacterial fruit spot of pumpkins is present, it will often attack fruit when it is young such as shown here. Fruit needs to be protected during the early stages of development with fixed copper applications. See BP-135-W for more detail on management recommendations for this disease and others.

The pumpkin plots have been treated with insecticide for the past two weeks, and close scouting revealed very few insect pests this week. In nearby unsprayed summer squash plots, striped cucumber beetles and corn rootworm beetles are feeding in flowers, and squash bugs are present.

The pre-emergence herbicide followed by two cultivations has provided reasonable weed control (Figure 3).



Figure 3: Just before the second cultivation, giant ragweed and ivyleaf morning-glory that escaped control from the pre-emergence herbicide Strategy and first cultivation are the main problem. (Photo by Liz Maynard)

Hand hoeing is being done this week to remove weeds (mostly ivyleaf morning-glory and giant ragweed) that survived those measures, and also the recently emerged morning-glory (Figure 4) and any other weeds close to pumpkins vines where the cultivator can't reach. If weed populations were heavier, one of the post emergence herbicides for between row applications listed in the *Midwest Vegetable Production Guide for Commercial Growers* (ID-56) <www.btny.purdue.edu/Pubs/ID/ID-56/> could be used. If grass weeds were a problem, a post emergence grass herbicide could be used.



Figure 4: Recently emerged ivyleaf morning-glory is a key weed to control at this time. (Photo by Liz Maynard)

DOWNY MILDEW UPDATE - (Dan Egel) - Downy mildew has been confirmed on cucumber in Hancock County in extreme western Illinois. While this recent outbreak is some distance away from any cucurbit grower in Indiana, this source is west of our production. Prevailing winds may move the spores of downy mildew closer with time. Although this outbreak has been reported on cucumber, it is possible that this strain of the fungus may affect other cucurbits as well. There are also outbreaks of downy mildew in Ohio and Michigan, which potentially threaten cucurbit production in northern Indiana (Figure 1). For more information see <<http://www.ces.ncsu.edu/depts/pp/cucurbit/>>.

As discussed in earlier issues of the *Vegetable Crops Hotline*, (509, 510) the most effective fungicides for downy mildew of cucurbit are quite expensive and have a narrow range of activity. Therefore, it may not be prudent to begin such applications until the source of downy mildew is much closer. The value of one's production will be a factor in making this decision. It may be wise to always include a contact fungicide with a wide range of activities in each fungicide application.



Figure 1: Areas of the Eastern US that have reported downy mildew of cucurbits as of 23 July.

Red-downy mildew reported less than 7 days ago.

Green-downy mildew reported more than 7 days ago.

Blue-downy mildew no longer found.

White-downy mildew scouted for but not found.

For more details, visit the Internet link listed in the accompanying article.

PHYTOPHTHORA BLIGHT - (Dan Egel) – Heavy rains this spring and summer have increased the number of reports of Phytophthora blight this season. This disease has a wide host range, but in Indiana it is most frequently reported on pumpkin and pepper.

Often the symptom one notices of this disease is the appearance of clusters of dying plants in the field. The outbreaks are almost always in low-lying areas in the field where plant surfaces tend to remain wet for extended periods of time whether the moisture is in the form of rain or dew. Pumpkins or squash in areas of the field where water tends to stand are especially likely to become infected.

Pumpkin fruit are especially prone to infection at the top of the pumpkin, close to where the fruit is attached to the stem. The depression in the fruit surrounding the stem attachment serves as a reservoir for moisture and provides a very favorable setting for infection by spores of the *Phytophthora* fungus. The spores can be produced on other parts of the plant or on fruit of other plants (the fluffy white mold associated with the fruit rot contains millions of spores! Figure 1).



Figure 1: The white *Phytophthora* fungus can be seen on the edge of this lesion of an infected squash fruit. (Photo by Dan Egel)

Pepper plants with *Phytophthora* blight also tend to be in low-lying areas (Figure 2). Lesions on the stem may girdle the plant causing death (Figure 3 - page 6).

Management options - Avoid poorly drained fields, especially those with a history of the disease. The use of raised beds can help control this disease in some crops. Limit irrigation as much as possible. Fumigation has been effective in some cases.

Reservoirs or rivers can be contaminated with *Phytophthora* from the run off of nearby fields. If such waters are used for overhead irrigation, *Phytophthora* blight may result.



Figure 2: Pepper plants in a low area of the field are dead due to *Phytophthora* blight. (Photo by Dan Egel)



Figure 3: Pepper plants may be killed by a *Phytophthora* lesion that girdles the stem. (Photo by Dan Egel)

Fungicides can be used to lessen the impact of *Phytophthora* infection, but it is an uphill battle. Contact fungicides may offer moderate protection if used as part of a season long program against *Phytophthora* blight and other diseases. Contact fungicides include chlorothalonil (e.g., Bravo®, Echo®, Equus®). However, systemic fungicides will have more impact against this disease. Systemic fungicides include dimethomorph (e.g., Acrobat®, Forum®), cyazofamid (Ranman®) and fluopicolide (Presidio®). No fungicide will provide adequate control without also using the cultural controls discussed here.

Phytophthora blight is difficult to deal with, and must be managed with all available resources over a period of time. Do everything you can to avoid an early

season outbreak that may jeopardize your other crops, and don't rely only on fungicides for control. In some cases, it may make sense to plow under a field or part of a field with *Phytophthora* blight to protect nearby fields.

INDIANA PESTICIDE CLEAN SWEEP PROJECT - (*Announcement*) – An Indiana Pesticide Clean Sweep Project designed to collect and dispose of suspended, canceled, banned, unusable, opened, unopened or just unwanted pesticides (week killers, insecticides, rodenticides, fungicides, miticides, etc.) is being sponsored by the Office of Indiana State Chemist (OISC). This disposal service is free of charge up to 250 pounds per participant. Over 250 pounds there will be a \$2.00 per pound charge. This is a great opportunity for you to legally dispose of unwanted products at little or no cost.

All public and private schools, golf courses, nurseries, cities, towns, municipalities and county units of government or others receiving this notice are eligible to participate.

The time is set for 9:00am to 3:00pm (EST). The dates and locations are:

- August 04, 2009 – Wells County Fairgrounds, Bluffton, IN
- August 06, 2009 – Hamilton County Fairgrounds, Noblesville, IN
- August 11, 2009 – Dubois County Fairgrounds, Huntingburg, IN
- August 13, 2009 – Parke County Fairgrounds, Rockville, IN

For a Pesticide Clean Sweep Planning Form call 1-800-893-6673 or go to <www.isco.purdue.edu>.

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