VEGETABLE CROPS HOTLINE

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

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In This Issue

Second Downy Mildew Report in Indiana

(Dan Egel, egel@purdue.edu, (812) 886-0198)

Figure 1. Downy mildew of pumpkin causes yellow, angular lesions as viewed from the top of the leaf.

Downy mildew was observed on pumpkins in Daviess, Knox and Washington County. Evenings and mornings with heavy dews and fogs may help the disease to spread. Whether to apply fungicides for this disease will depend in part on when growers plan to harvest. In addition to the cucurbit downy mildew outbreaks reported in the last issue of the *Vegetable Crops Hotline*, the disease has also been reported in White County Illinois, directly west of Evansville, IN. Photos of downy mildew lesions on the top (Figure 1) and bottom (Figure 2) of pumpkins leaves.

Figure 2. During or shortly after moist conditions, downy mildew of pumpkin will cause a fuzzy-like fungal growth on the underside of the leaf.

Plectosporium blight of Pumpkin

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This disease appears to be more important each year. It is not clear to me why. This article reviews Plectosporium of pumpkin, sometimes called white speck.

I would rank Plectosporium blight behind powdery mildew, bacterial leaf spot and Phytophthora blight in economic damage caused. The occurrence of this disease is usually sporadic. However, when it occurs, it can cause yield loss if left uncontrolled. Plectosporium blight can be recognized from the light tan spindle shaped lesions on stems and leaf petioles (Figure 1).

Lesions on leaves may be dimple like. Lesions may also occur on the fruit (Figure 2), although these symptoms are less common. Yield loss is most often caused by lesions on the stem adjacent to the fruit—the pumpkin handle (botanically known as the peduncle). Yellow squash and zucchini squash are also affected. When lesions occur in large numbers they can give a light gray or white appearance to the foliage. Usually, the lesions affect only the

appearance of the foliage or fruit. Infrequently, the lesions can become so severe on young plants that individual leaves or vines may wilt. This disease may be managed through a combination of cultural and fungicide treatments. Crop rotations of 3-4 years and fall tillage will help keep the crop residue to a minimum. A regular contact fungicide program will also help to keep Plectosporium blight in check. My understanding has been that any fungicide program that includes products labeled for Plectosporium on pumpkin will be effective. However, given the disease severity growers have experienced recently, I especially recommend group 11 products: Flint®, Cabrio®, Pristine®, Merivon® and Quardis® including Quadris Top®.

Figure 1. Plectosporium blight on pumpkin stem.

Figure 2. Plectosporium blight on pumpkin fruit and handle.

When to Stop Spraying

(Dan Egel, egel@purdue.edu, (812) 886-0198)

This is an update of the article *When to Stop Spraying Fungicide* published in issue 666 on Sep. 12, 2019.

Many vegetable growers are closing in on the final harvest. Several growers have asked me about fungicide applications late in the season. In this article, I want to address when to stop. To limit the scope of this article, I will concentrate on tomato, cantaloupe and watermelon crops. These are crops where the fruit is consumed, not the foliage.

For most vegetable crops, there is no need to apply a fungicide shortly before the final harvest. Foliage needs to be protected to preserve fruit quality. A plant with reduced foliage will produce a smaller fruit and/or fruit that have fewer sugars and other desirable compounds. I don't know how much foliage needs to be reduced to affect fruit size or quality. However, I do know that for many foliar diseases, symptoms will not be obvious for a week to 10 days. It will take even longer for the foliar disease to significantly reduce foliage. Therefore, for many diseases, it doesn't make much sense to spend good money for a fungicide on a crop that is 2 to 3 weeks before the final harvest.

Examples of diseases that affect foliage, but not fruit directly include: powdery mildew of cantaloupe or tomato, early blight of tomato, Septoria leaf blight of tomato, gummy stem blight of watermelon or cantaloupe, Alternaria leaf blight of cantaloupe and downy mildew of cucurbits. With some rare exceptions, these diseases reduce yield or fruit quality by affecting foliage, not by attacking fruit directly. Alternaria leaf blight of cantaloupe and downy mildew of cucurbits affect leaves only—not even the stems.

Diseases that affect fruit directly may need fungicide applications closer to harvest. A disease that can cause a lesion directly on a fruit can ruin the marketability of the fruit or even cause the fruit to begin to rot in transit. However, most fungicides will remain active in or on the plant for 6 to 7 days even during the most conducive weather. Therefore, an application of a fungicide to protect fruit from direct infection from disease is probably not necessary within 7 days of the final harvest.

Examples of diseases that may affect fruit directly include:

- Anthracnose of watermelon-this disease can cause loss of foliage, but also lesions on the fruit. An infection on the day before harvest could, theoretically, cause a lesion in transit. During weather that is conducive to disease, it makes sense to keep a fungicide on the plant surfaces during the last several days before harvest. Growers that are using the **MELCAST** system will be able better judge when the

weather is conducive for anthracnose.

- Phytophthora blight-this disease affects foliage as well as fruit. As with anthracnose above, a lesion that develops before harvest could start to rot the fruit in transit. Specialized fungicides applied 7 to 10 days before final harvest should protect the fruit.
- Bacterial spot or speck of tomato-lesions of these diseases that occur on the fruit can ruin marketability. Applications of a copper product should help to protect the fruit during the last week or so. Warm, wet weather shortens the disease cycle and increases the likelihood of infection.
- Bacterial spot of pumpkin-this disease can cause pimple-like lesions that may ruin marketability. However, the disease affects fruit during the first 14 days or so after pollination. After this period, infection is much less likely due to changes in fruit maturity. Therefore, copper applications during the last weeks before harvest make little sense.

Another factor to consider in late fungicide applications is the amount of the disease in the field. Fungicides work to protect green healthy tissue. Fungicides will not cause lesions to disappear. Therefore, when deciding whether to make a late season fungicide application, realize that one is attempting to protect the green, healthy portions of the field.

Pre-harvest Interval (PHI) – when applying fungicides close to the final harvest or any harvest keep in mind the PHI. Often growers will need to change what fungicide is used when vegetables reach harvest stage. For example, cantaloupe growers may decide to use a fungicide with the active ingredient mancozeb PHI 5 days early in the season (examples include, Dithane®, Manzate®, Penncozeb®, Roper®). As harvest grows near, however, a fungicide with the active ingredient chlorothalonil might be used since it has a 0-day PHI (examples of products with chlorothalonil include Bravo®, Equus®, Initiate®). The PHI for each crop can be found in the fungicide label with the appropriate crop grouping.

Finally, one should be realistic about applying fungicides late in the season. Which fruit have a realistic chance of maturing before the season is over. For many growers, a late season application of a fungicide is not useful.

I am glad to discuss any special circumstances about deciding when to make the final fungicide application.

Using Low Tunnel is Promising to Increase Yield of Annual Plasticulture Strawberry Production

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198)

Strawberries are primarily grown in matted row system in Indiana, in which bare-root strawberry plants are set in the spring. Runners are established. Fruit is first harvested in the second year and plantings are renovated each year for 2-3 seasons. Growers in the southern part of the state expressed interest in growing strawberries in plasticulture system, in which plants are set on raised beds covered with plastic mulch. Strawberries may be planted in fall with plug plants, or in summer with bare-root plants. Runners are removed. Fruit is harvested the following year from mother plants.

Using plug plants is more feasible for large-scale production as plants can be set with a transplanter and water wheel. However, plug plants are typically not available until the end of Aug. The growing window is often short in the fall so that it is difficult for the plants to develop enough branch crowns. As a result, yield in the following spring is often unsatisfactory; hard to justify production cost.

We have been testing the plasticulture strawberry production system at the Southwest Purdue Ag Center in Vincennes, IN thanks to supporting from a Purdue AgSEED grant and a Rice grant. In order to increase heat accumulation, we used high tunnel and low tunnel systems. Although we are far from coming to a conclusion about the production system, our preliminary studies did show promising results. In this article, I will discuss the results of using low tunnels to increase strawberry yield.

The experiment was conducted in 2019-2020 season with ten strawberry cultivars. Plug plants were planted on Sep. 10. Low tunnels were installed in half of the field with a mechanical transplanter low tunnel layer on Oct. 10 . The low tunnel layer set hoops 4.5’ apart, and covered with 1 mil perforated clear plastic (Figure 1). The low tunnel plastic was removed on Jan. 2. The field was covered with floating row covers for a short period in Nov., and for most of the time in Jan. and Feb (Figure 2). In spring, floating row covers were also used to protect flowers against the freeze damage in Apr. and May. Harvest started around May 10, and lasted for about a month.

Figure 1. Low tunnels were installed with a mechanical transplanter low tunnel layer.

Figure 2. Floating row covers were used for cold protection.

The highest yield cultivar was Liz under low tunnels (0.84 lb/plant) (Figure 3), followed by Camarosa under low tunnels (0.77 lb/plant). Chandler under low tunnels had the third-highest yield (0.61 lb/plant). The other cultivars grown under low tunnels had significantly lower yields compared to the top-yielding cultivars.

Figure 3. Cultivar Liz growing with (top) and without (bottom) low tunnel. Photo was taken on Jan 2 after low tunnel was removed.

Without low tunnels, most cultivars had lower yield compared with the same cultivar with low tunnels, except 'Beauty' (a day-neutral cultivar) that yielded higher without low tunnels; and 'Radiance' that yielded similar with and without low tunnels. The yield was generally very low without low tunnels (ranged from 0.27 -0.59 lbs/plant), and no significant difference among cultivars.

The past strawberry production season was full of challenges. It was no exception for our trial. Deer visited the field shortly after planting. Although low tunnels effectively stopped the damage, deer had cleaned most leaves of the newly planted plug plants prior to setup of the low tunnels. This damage dramatically delayed plant growth in Sep. An unusually cold event happened in middle Nov. that dragged temperatures to single digits at SWPAC. In April and May, we encountered late frosts. Although the frost damage was minimized by using floating row covers, a small percentage of primary flowers were killed when temperatures dropped below 30°F on April 16.

After harvest, the plants may be kept for another year for a second-year harvest. But labor required to remove runners from summer to fall in the second year can be overwhelming. As runner removing has to be conducted by hand at this stage, it may not be feasible for large-scale production. In addition, weeds in row middles, and pest control in the summer can also be challenges.

Double cropping, use the same plastic for a second crop, is an alternative approach. Since planting the second crop may not be possible until the end of June; pumpkin, winter squash, and brassica crops (broccoli, cauliflower, cabbage, etc.) are the most promising second crop. In our trials, we planted kabocha squash on the same plastic after strawberry on July 1. Things are looking great at this point. We are expecting to harvest the squash in another month.

Figure 4. Winter squash was planted after strawberry on the same plastic.

The experiment is continuing in the 2020-2021 season at SWPAC. Hopefully, after a few seasons, we will have a solid

idea of the feasibility of the production system, and generate economic data to help growers make decisions. Please stay tuned for the additional update of strawberry research at SWAPC.

Video High Tunnel Strawberry Production

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This video guides you for a tour of strawberry production in high tunnels in Indiana. Additional videos addressing specific production practices will be available in the future. Please stay tuned for the update of plasticulture strawberry research from Purdue.

https://mediaspace.itap.purdue.edu/media/high+tunnel+strawberry/1_n3pniv7r

Cooler, Wetter Conditions Expected Over Next Several Weeks

(Beth Hall, hall556@purdue.edu)

After the last several weeks of predominantly dry conditions, the national climate outlooks are finally showing confidence that temperatures should start shifting to cooler than normal and precipitation will be wetter than normal (Figure 1). Hurricane Laura will definitely help the precipitation side of that prediction with current tracks having the strongest rainfall amounts in the southern counties. Expect the rest of this week to stay on the warmer side, but by next week, temperatures should seem much more pleasant. From August 30th through September 7th (the period when the national Climate Prediction Center is showing confidence for these conditions), the normal amount of precipitation is between 1.25 and 1.50 inches. Average high temperatures are normally between 75°F (northern counties) and 85°F (southern counties). Therefore, keep these climatologically normal conditions in mind when interpreting the climate outlooks for below-normal temperatures and above-normal precipitation.

The probability of a La Niña developing has been increasing for the fall with moderate confidence it will continue through the winter. La Niñas can be a major driving factor for seasonal outlooks for various parts of the U.S., but not so much for the Midwest. Here, those correlations are weaker. This tends to confuse the various computer models that are run to predict the climate outlook for fall and winter in Indiana, leaving little-to-no guidance on temperature or precipitation for the next month (September) or 3-month period (September through November). Even the date of the first hard frost (*i.e.,* minimum temperature at or below 28°F) does not seem to be impacted by the strength of a La Niña, El Niño, or Neutral phase.

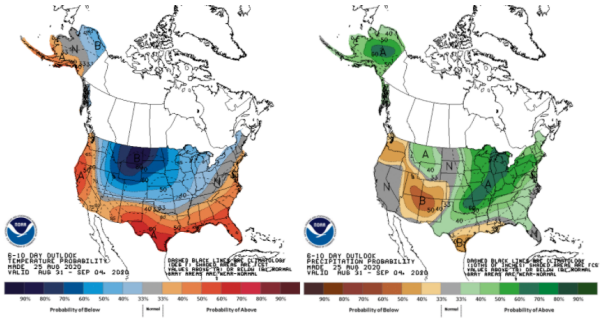

Figure 1. The national Climate Prediction Center's 6-10-day climate outlook for August 31 – September 4, 2020 where shading indicates probability of above- or below-normal temperature (left) and precipitation (right).

Upcoming Virtual Field Days

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Many things changed this year. It is unfortunate we are not able to meet in person, but there are no shortage of great opportunities for learning. And even more, as the distance may not be an issue when field days become virtual.

I hope you have enjoyed the Purdue Small Farm Education Field Day and Webinar Series, and the on-going Great Lakes Vegetable Producer's Network. In the coming weeks, there are more virtual field days that you may be interested:

2020 Pumpkin Field Day organized by the University of Illinois Extension will take place on Sep. 3. You can participate either in virtual or in-person (Belleville Research Center, 2036 Charles Lane, Belleville, IL 62221). Both tour options are free but need to pre-register. More information and registration of this event is available at https://extension.illinois.edu/events/2020-09-03-2020-pumpkin-field-day

The 4th Annual Midwest Mechanical Weed Control Field day will be virtual as well. Organizer Sam Hitchcock Tilton and participating farmers will share tips and insight into mechanical cultivation. The event will include four episodes, take place 12:30 -1:15 pm CDT on Sep. 11, Sep. 18 and Sep. 25. More information about this event and registration is at https://thelandconnection.org/event/mwc-2020/#:~:text=The%20Midwest%20Mechanical%20Weed%20Control,move%20into%20a%20digital%20state.

A virtual commercial fruit & vegetable research field day organized by Kansas State University is on Aug. 31. The field day will have video reports of several research projects, post harvest handling, and produce safety. More information about this event is available at

https://kcsaac.engg.ksu.edu/files/kcsaac/2020%20Commercial%20Veg%20Field%20Day%20Flyer.pdf

A vegetable and root crop virtual field day organized by Michigan State University is planned on Sep. 16. The virtual field day will feature research on many root crops. Detailed information about this event and registration is available at https://www.canr.msu.edu/events/oceana-research-tour-virtual-field-day

Answer to Question from Last Issue (8-13-2020)

(Jeanine Arana, jcordone@purdue.edu, (765) 588-7787)

Question: What happened to these fruit?

Answer: Hail damage. A storm that happened in middle July brought hail to parts of Indiana. Hail hit small fruit, and damage became pronounced as fruit grow. More information about the damage to vegetable crops can be found in the article Hail Damage published in *Vegetable Crops Hotline* Issue 678.

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