VEGETABLE CROPS HOTLINE

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

Issue 617 - July 21, 2016

In This Issue

Pumpkin Disease Management Steps

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

I have received several calls about pumpkins recently. This article will outline a few steps growers should think about to prevent diseases in pumpkins.

Virus diseases – There are several virus diseases that affect pumpkins in the Midwest. The most important diseases include: papaya ring spot, watermelon mosaic and zucchini yellow mosaic virus. Aphids transmit all these diseases. Many of the aphids responsible are carried up from the south each year on winds. Therefore, aphids with virus are more common later in the summer; pumpkins planted later in the season are more likely to be affected with one of the virus diseases listed above. Plant pumpkins by about June 15 to avoid having the fruit set during the period of high virus disease pressure.

Powdery mildew – It is nearly impossible to find a pumpkin vine in August without powdery mildew. However, this disease does not have to affect production. The first decision a grower should make regarding powdery mildew of pumpkin is to choose, if at all possible, a variety with partial resistance to powdery mildew. Selected varieties with partial resistance are listed in the *Midwest Vegetable Production Guide,* mwveguide.org. Varieties that have partial resistance to powdery mildew may still require fungicides, however fewer fungicide applications will be required for disease control if the appropriate variety is chosen.

Fungicides should be applied for management of powdery mildew of pumpkin at about the 'bush stage' (Figure 1). The bush stage is the point where the pumpkin plant has grown up into an upright plant, shortly before vining starts. It is at this bush stage that high humidity inside the plant canopy favors powdery mildew development. (The fungus that causes powdery mildew requires high humidity, but not leaf wetness.)

Figure 1: Fungicides for management of powdery mildew should be applied when pumpkins have reach the 'bush' stage as seen here.

More information about fungicides for powdery mildew of pumpkin can be found at https://vegcropshotline.org/article/powdery-mildew-of-cucurbits/. Briefly, the following fungicides have proven effective: Aprovia Top®, Fontelis®, Luna Experience®, Inspire Super®, Merivon®, Quintec®, Procure, Rally®, Torino®. It is important to alternate the FRAC groups (aka, MOA groups) to avoid getting powdery mildew fungi that are resistant to these fungicides, but also for good control. The best treatments in my trials have been those that alternated fungicides of several different FRAC groups.

Downy mildew – Although the name of this disease is similar to powdery mildew, the disease is caused by an unrelated fungus-like organism. This fungus-like organism does not survive in the Midwest and must be blown in every year. Therefore, downy mildew is not observed in most years until August or September. Downy mildew causes an angular yellow lesion on the surface of the leaves and a dark, fussy appearing growth on the underside of the leaf (Figure 2 and 3). Watch the Hotline for updates to the occurrence of this disease around the eastern U.S. Do not apply expensive downy mildew products unless this disease has been observed close-by. As of this writing, downy mildew has not been observed in Indiana this year. More information about downy mildew of pumpkin can be found in this extension publication https://www.extension.purdue.edu/extmedia/BP/BP-140-W.pdf or this video https://www.youtube.com/watch?v=sz0vZ-t0gyg.

Figure 2: Downy mildew of pumpkin results in angular yellow lesions on the leaf surface. Downy mildew of cucurbits had not been reported in Indiana this season.

Figure 3: Downy mildew of pumpkin causes a 'fuzzy' fungus-like growth on the bottom of leaves under moist conditions.

Bacterial spot – This disease has become more important in the last several years. The bacterium that causes bacterial spot survives in crop residue and may be transmitted through seed or transplants. Crop rotations of 2 to 3 years out of cucurbits are important to manage this disease. However, many growers continue to have problems with bacterial spot even with good crop rotations. (Bacterial spot of tomato is a different disease caused by a different bacterium.)

The products I recommend for bacterial spot of pumpkin are copper mixed with a mancozeb product. Copper is a bacteriacide; mancozeb products allow more of the copper in copper based products to be available. These products should be applied 1) if the symptoms of bacterial spot are recognized on the seedling or young plant or 2) at the stage of the plant where fruit are about softball size. It is at about this stage that fruit are most susceptible to bacterial spot. As the fruit matures, the pores (known as stomates) in the surface of the fruit become blocked by a waxy type substance making the fruit less susceptible to bacterial spot.

Phytophthora blight – This disease affects many different crops including other cucurbits (See watermelon article in last Hotline issue) and solanaceous crops-especially pepper. The fungus-like organism that causes Phytophthora blight survives well in soil and spreads easily from leaf to leaf—a dangerous combination. (Yes, Phytophthora blight and downy mildew are caused by related fungus-like organisms and some of the same fungicides are effective against both.) A four-year crop rotation will help to reduce the severity of Phytophthora blight.

While Phytophthora blight of watermelon affects primarily fruit, this disease can affect fruit and vines of pumpkin plants. Thus, watermelon growers can wait until fruit set to start fungicide applications, pumpkin growers must worry about all stages of plant growth. This spring was relatively dry, therefore fungicide applications for Phytophthora blight may have been unnecessary. However, with the more recent wet weather, Phytophthora blight may become a problem. The fungus like organism that causes Phytophthora blight loves heavy rains and the pools and puddles that are left behind in poorly drained fields.

The fungicides that are effective against Phytophthora blight are the same as discussed https://vegcropshotline.org/article/phytophthora-fruit-rot-of-watermelon-2/. Also, see the *Midwest Vegetable Production Guide* at mwveguide.org.

The information above only outlines my ideas for disease management on a handful of pumpkin problems. Please contact me for more detailed information.

Squash Bugs

(Rick Foster, fosterre@purdue.edu, (765) 494-9572)

Squash bug is the most consistent insect pest of squash and pumpkins and is the most difficult to control. The key to management is early detection and control of the nymphs. The adults are extremely difficult to kill (Figure 1). Foliar insecticides should be applied to control the nymphs (Figure 2) when you have more than an average of one egg mass per plant. When you find egg masses, mark them with flags and check every day or two to see when they hatch. When many of the egg masses are hatching, that is the time to begin application. Since eggs are laid and hatch over an extended period of time, several applications may be required. Brigade®, Mustang Max® and Warrior® have provided excellent control.

Figure 1. Squash bug and its eggs (photo by John Obermeyer)

Figure 2. Squash bug nymphs (photo by John Obermeyer)

Evaluation of Strawberry Varieties for High Tunnel Production

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

We are familiar with strawberries grown as a perennial crop in Indiana. Bare root strawberry plants are set in the spring. Fruit is first harvested in the second year and the planting is renovated annually. Using this system, strawberry seasons last for three to four weeks from middle May through June. The

Figure 1. Strawberries grown inside a high tunnel at Southwest Purdue Agricultural Center. Photo was taken on April 16, 2016.

traditional system has been replaced with an annual plasticulture system in the southern United States ever since the 1980s. In the annual plasticulture system, strawberry plugs (rooted runner tips) are transplanted in plastic covered beds in late summer or fall. Fruit are harvested in spring in the next year. After the fruiting season, the plants are removed. The annual plasticulture system is favored in the south because it has a longer harvest period and produces strawberries with better quality. In Indiana, trials established to test the annual plasticulture system had limited success because of short fall season and harsh winter. However, this impression might be changed with the use of high tunnels. Studies have shown that high tunnels extended strawberry season, increased yield and improved berry quality. To test the feasibility of growing strawberries in high tunnels with the annual production system, a trial was conducted at Southwest Purdue Agricultural Center from August 27, 2015 to May 31, 2016 to test yield, quality and harvest period of ten strawberry varieties (Figure 1). In this article, we will discuss the findings of the trial.

Varieties tested in the trial include:

Albion	Benicia	Camarosa
Camino Real	Chandler	Festival
Radiance	San Andreas	Sweet Ann
Sweet Charlie		

Overall, the trial achieved great success. A total of 1,295 lbs of strawberries were harvested from 660 plants (66 plants of each variety) in a 30 × 96 high tunnel. For most of the varieties, peak harvest season started in middle April and lasted till the end of May. ‘Albion’, ‘San Andreas’ and ‘Sweet Ann’ are day-neutral varieties, they started to produce berries in middle October. But the yield in fall can hardly justify commercial production. The only exception might be ‘Albion’ that produced the most berries in October, November and December (0.17 lb/plant).

The top yielding variety in this trial was Radiance that produced 2.86 lb berries per plant, following by San Andreas (2.37 lb/plant), Chandler (2.17 lb/plant) and Benicia (2.08 lb/plant). ‘Camarosa’, ‘Sweet Ann’ and ‘Sweet Charlie’ had the lowest marketable yield (1.42 lb/plant, 1.62 lb/plant, and 1.69 lb/plant, respectively). ‘Radiance’ produced the most strawberries, it was also the variety that had the longest harvest period. A few ‘Radiance’ strawberry ripened in November, December and during the coldest period in January and February. Primary harvest took off in end April. In the spring, harvest of ‘Sweet Charlie’ and ‘Benicia’ started in early April, about 10 days earlier than other varieties.

We harvested some very large berries; individual berry weight reached 2.7 ounces. Average weight of berries ranged from 0.54 to 0.97 ounces according to varieties. ‘Sweet Ann’ produced the largest berries, followed by ‘Albion’ and ‘Radiance’. ‘Chandler’ and ‘Camarosa’ had the smallest-sized berries. During the peak harvest, ‘Festival’ and ‘Camarosa’ were the sweetest. ‘San Andreas’, ‘Radiance’ and ‘Festival’ had relatively firmer berries while fruit of ‘Chandler’ were much softer, easily being damaged through handling.

Varieties	Marketable yield (lb/plant)	Average fruit weight (oz.)
Albion	1.70	0.87
Benicia	2.08	0.70
Camarosa	1.42	0.56
Camino Real	1.89	0.76
Chandler	2.17	0.54
Festival	1.88	0.72
Radiance	2.86	0.86
San Andreas	2.37	0.72
Sweet Ann	1.62	0.97
Sweet Charlie	1.69	0.59

Unmarketable fruit of most of the varieties were less than 15% of the total yield except ‘Sweet Ann’ (21%) and ‘Camarosa’ (18%) in this trial. Most of the unmarketable berries were caused by gray mold. Other disease and pest problems we have encountered include powdery mildew, yellow stripped armyworms and two-

spotted spider mites.

Row covers are used for frost protection in the winter. Pollination was carried out by wind.

The 2015/2016 season was featured by warm fall and mild winter that was favorable for strawberry production. In the 2016/2017 season, we will continue to test this strawberry production system with the focus on developing ideal fertility plans.

For more information regarding production practices of the trial, please contact Wenjing Guan at guan40@purdue.edu or (812) 886-0198.

We acknowledge McNitt Growers for donating strawberry plugs for the trial.

Time to Dispose of Unwanted Pesticides

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

The Indiana Pesticide Clean Sweep Project is a great opportunity to legally dispose of unwanted chemicals. It is free of charge up to 250 pounds.

To dispose of pesticides, complete the Pesticide Clean Sweep Planning form (the form is attached with the newsletter) and mail, fax or e-mail the completed form to Kevin Neal at Purdue University. 175 South University Street, West Lafayette, IN 47907-2063, 765-494-4331 (fax) or nealk@purdue.edu no latter than Monday, August 1, 2016. Then bring your labeled, leak free and safe to transport containers to the collection site. Do NOT mix materials.

Pesticides will be accepted from 9:00 am to 3:00 pm local time at the following dates and locations:

- August 16 – Dubois County Fairgrounds/Huntingburg
- August 17 – Jackson County Fairgrounds/Brownstown
- August 18 – Jefferson County Fairgrounds/Madison
- August 23 – Newton County Fairgrounds/Kentland
- August 24 – Allen County Fairgrounds/Fort Wayne
- August 25 – Hendricks County Fairgrounds/Danville

More information about the project please refer to http://www.oisc.purdue.edu/pesticide/clean_sweep.html

Information provided by the Indiana State Chemist and Seed Commissioner's office.

Upcoming Events

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

High Tunnel Tour at SWPAC

Date: August 22, 2016 7:00 PM to 8:30 PM

Location: Southwest Purdue Agricultural Center, 4369 North Purdue Road, Vincennes, IN 47591

Please join us for a high tunnel tour at the Southwest Purdue Ag Center. You will learn about high tunnel tomato diseases and management, end of season field sanitation, potential of grafting in high tunnel tomato production, use of shade clothe and sprayer calibration. The tour is free, to register please call (812) 886-0198. For more information please contact Dan Egel at egel@purdue.edu or Wenjing Guan at guan40@purdue.edu.

Illinois Pumpkin Field Day

Date: August 31, 2016

Location: Ewing Demonstration Center, 16132 N. Ewing Rd; Ewing, IL 62836

For more information, contact Nathan Johanning at (618) 687-1727 or njohann@illinois.edu

Beginning Farmer Tours

Sept. 29, 2016: River Ridge Farm, Roann. Four-season vegetable farming, operating an on-farm store, and farm-to-school programs.

The tours are free, but registration is required. Registration at https://mdc.itap.purdue.edu/wk_group.asp?wk_group=BeginFarmer

For more information about the Beginning Farmer and Rancher program, or the farm tour schedule, contact Kevin Gibson at (765) 496-2161 or kgibson@purdue.edu.

Southwest Purdue Ag Center (SWPAC)

4369 N. Purdue Road Vincennes, IN 47591

Monday August 22, 2016

High Tunnel Tour

7:00 PM – 8:30 PM (EST)

Topics to be covered:

- High tunnel tomato diseases and management
- End of season field sanitation
- Potential of grafting in high tunnel tomato production
- Use of shade cloth
- Sprayer calibration

Tour is free, to register please call:

Southwest Purdue Ag Center

(812) 886-0198

For more information please contact:
Dan Egel (egel@purdue.edu) or Wenjing Guan (guan40@purdue.edu)

2016 PESTICIDE CLEAN SWEEP PLANNING FORM

I have the following pesticides (weed killers, insecticides, rodenticides, fungicides, miticides, etc.) to bring to the Indiana Pesticide Clean Sweep. I understand that there will be no charge for disposal of up to 250 pounds of pesticides per participant. I also understand that if there is not adequate demand for these disposal services, I will be contacted by the Office of Indiana State Chemist to be notified of the program cancellation.

Contact Name_____ Contact Phone # _____

Please indicate at which location you will be participating:

☐ **Huntingburg - August 16** ☐ **Brownstown - August 17**

☐ **Madison - August 18** ☐ **Kentland - August 23**

☐ **Fort Wayne - August 24** ☐ **Danville - August 25**

List of pesticide products to be disposed:

1. Trade Name _____

   Active Ingredient _____

   Check One: ☐Solid _____ Pounds ☐Liquid _____Gallons ☐Aerosol

2. Trade Name _____

   Active Ingredient _____

   Check One: ☐Solid _____ Pounds ☐Liquid _____Gallons ☐Aerosol

3. Trade Name _____

   Active Ingredient _____

   Check One: ☐Solid _____ Pounds ☐Liquid _____Gallons ☐Aerosol

4. Trade Name _____

   Active Ingredient _____

   Check One: ☐Solid _____ Pounds ☐Liquid _____Gallons ☐Aerosol

RETURN by August 1, 2016 to KEVIN NEAL, nealk@purdue.edu OR 765-494-4331 (fax).
Questions may be directed to Kevin at 765-494-1585.