VEGETABLE CROPS HOTLINE

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

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In This Issue

Southern Rust of Sweet Corn

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

Southern rust of corn is normally a disease of tropical areas. During summer months, however, the fungus which causes southern rust, *Puccinia polysora*, often moves into southern areas of the U.S. This summer, southern rust has been observed in at least 11 Indiana counties.

Symptoms of southern rust include raised structures called pustules. If rubbed with a finger, the spores in rust pustules will come off leaving a stain on one's hand. Southern rust develops rust pustules primarily on the upper leaf surface (Figure 1). Common rust typically has rust pustules on both upper and lower leaf surfaces. In severe cases, southern blight can cause rust pustules on ear husks and leaf sheaths. Late in the summer, dark pustules may be formed which are called telia. It is possible to confuse southern rust with other diseases, therefore, a confirmation by the Purdue University Plant and Pest Laboratory is advised.

Figure 1. Southern blight causes red-orange pustules primarily on the upper surface of sweet corn. (Photo by Kiersten Wise)

The fungus that causes southern rust requires a living host plant to survive. Thus, the fungus does not overwinter in Indiana and instead must be blown into the state. When conditions favor rust development, the disease may become severe in a short period. A new rust pustule can develop from an infection in just 9 days and each rust pustule can produce rust spores for about 8 days.

Infection by the southern rust fungus can take place after about 6 hours of leaf wetness. Therefore, dew can often provide sufficient leaf wetness. Southern rust is favored by high relative humidity and temperatures around 80 °F.

Young leaves are more susceptible than mature leaves, so the development stage at the onset of southern rust will affect disease development. Other factors affecting disease severity are the susceptibility of the hybrid and the length of time weather conditions favor disease development.

Southern rust can cause yield loss since the causal fungus competes with the plant for nutrients. Rust pustules also rupture the leafs surface which may cause water loss. In severe cases, yield losses of up to 45% have been recorded.

While a few field corn hybrids possess resistance genes to southern rust, sweet corn hybrids are almost universally susceptible. Foliar fungicides can be effective at slowing the progress of southern rust. For field corn, fungicide applications when southern rust is detected after the milk stage are seldom economically beneficial. Therefore, late planted sweet corn is more likely to require fungicide applications.

Fungicide information for sweet corn may be found in the Midwest Vegetable Production Guide for Commercial Growers (ID-56) mwveguide.org. Recommended products for rust on sweet corn includes: Headline 2.09 EC/SC®, Quilt Xcel 2.2SE® and Priaxor 4.17SC®. Always consult the label before each fungicide application.

Most sweet corn production is well enough along that, in my opinion, fungicides will not be required for southern blight management. However, it makes sense to scout fields for southern rust as well as other diseases.

Much of the information in this article came from the following publication from the Crop Protection Network: Southern Rust, CPN-2009 <http://cropprotectionnetwork.org/corn/southern-rust-cpn-2009/>. The progress of southern rust may be followed at the following website: http://ext.ipipe.org/ipipePublic/index.php#post=22.

Southern Blight of Pepper and Tomato

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

Southern blight of pepper and tomato thrives under hot, dry conditions. Usually, such conditions are more likely in August. Production under tunnels may contribute to the dry conditions that influences southern blight. This article will discuss the symptoms, biology and management of southern blight of tomato.

Southern blight has a wide host range affecting many vegetable, field and ornamental crops. Tomato is the most important host. The disease is caused by the fungus *Sclerotium rolfsii*. This fungus is related to the one that causes white mold.The first symptom one is likely to observe of southern blight is plant wilt. At the base of the plant, one is likely to notice a canker with sclerotia that may be as large as a sesame seed (Figure 1). These sclerotia are survival structures for the fungus and allow the disease to occur in the same location years later. The sclerotia for southern blight are round, about the size of a sesame seed and usually occur near the base of the plant. Sclerotia of white mold are irregular in shape, are pea-size and may occur several feet up the plant. The fungus that causes southern blight also lives off of organic matter without being parasitic (saprophytic).

Figure 1. Southern blight canker at the base of a pepper plant. Tomatoes can also be affected by this disease.

Control of this disease can be difficult. The best crops for rotation are grass plants such as corn and small grains. Deep plowing the residue may help reduce the severity of the disease. Fungicides are not available to manage this disease. The use of high calcium levels and ammonium type fertilizers has been reported to help in management.

Fertilizer Compatibility

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

When mixing fertilizers, it is important to check fertilizer compatibility before application. If incompatible fertilizers are mixed, they form insoluble precipitations that can clog drip emitters and damage sprayers used to apply foliar fertilizers (Figure 1.). This article discusses a few scenarios for which special attention should be paid on the solubility of mixed fertilizers.

Figure 1. Fertilizers form insoluble precipitations that clog drip emitters.

Scenario 1. A grower is using 20-20-20, a complete fertilizer to fertigate tomatoes. To prevent blossom end rot, he decided to add calcium nitrate in his fertigation program. However, problems may be caused by the application of these two fertilizers. The reason is that calcium from calcium nitrate and phosphate from ammonium phosphate in the complete fertilizer may form calcium phosphate, which is insoluble in water.

Scenario 2. A soil test indicates that tomato plants are low in magnesium. Epson salt (magnesium sulfate) is recommended to correct magnesium deficiency. The grower should avoid applying Epson salt together with complete fertilizers because magnesium from Epson salt forms an insoluble compund when it meets phosphate in the complete fertilizer. In both cases, calcium nitrate and magnesium sulfate should be applied separately with the complete fertilizers.

Scenario 3. The grower wants to apply both calcium nitrate and magnesium sulfate through drip to add calcium and magnesium during the season. These two fertilizers also should not be applied together because calcium nitrate and magnesium sulfate form calcium sulfate, which has a low solubility.

Scenario 4. A grower wants to foliar apply a high phosphorus fertilizer at blooming stage to increase flowering and help fruit set. He also wants to apply a foliar micronutrient fertilizer solution because plant tissue test indicates plants are low in Boron and Zinc. However, several cations (such as Boron, Zinc, Copper, Iron etc.) in the foliar fertilizer solution are insoluble with phosphate, especially if they are not in a chelated form. The high phosphorus

fertilizer should not be applied together with the foliar nutrient solution.

It is impossible to list all the incompatible fertilizers. The best approach is to conduct a jar test before mixing fertilizers. When doing a jar test, the fertilizers should be mixed in the same concentration as intended to be used. If you see the mixed solution has a milky appearance, the fertilizers should not be mixed and applied together.

Fall Broccoli Production in High Tunnels

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

A fall broccoli trial was conducted in a high tunnel at Southwest Purdue Ag Center in 2016 to test the potential of growing broccoli in high tunnels after tomatoes. This article describes what we found from the trial.

Broccoli is a cool-season, frost-tolerant crop. The harvest portion of broccoli is the compact, slightly dome-shaped head that is comprised by numerous immature flower buds. Broccoli that forms a single large head and thick stalks requires 50-70 days to harvest. Vegetative growth occurs over a wide range of temperatures, but high-quality head development requires temperatures in the range of 54-68 ºF. If temperatures are below 41ºF, plant growth is significantly reduced. In Indiana, fall production of broccoli in an open-field can be challenging because of the relatively long growing season. But with increased heat accumulation in high tunnels, it is possible to have a second crop of broccoli following tomatoes.

Broccoli can be transplanted or direct seeded. But for the high tunnel production in the fall, it is better to start with transplants to shorten the season and achieve a uniform crop. Growing seedlings should start no later than August to ensure head formation before temperatures drop below 50 ºF. Transplants are ready 4-5 weeks after seeding. Optimal seed germination temperature for broccoli is around 85 ºF, higher than many other cool-season vegetables. If a greenhouse is not available for growing transplants in the summer, broccoli seeds can be successfully germinated under a shade cloth in July and August.

Caterpillar damage was the major challenge we encountered during the period of growing transplants. The culprits hide on the underside of leaves. They were are hard to be detect until significant damage was observed. Products with the active ingredient Bt are fairly effective in controlling them. More information about caterpillars in crucifers can be found in Rick Foster's article https://vegcropshotline.org/article/caterpillars-in-crucifers/. Seedlings were transplanted on 2 Sep. (seeds were planted on 1 Aug.) on beds with plastic mulch and drip tape in our trial. During the period of plant establishment, we encountered severe damage caused by ants. They feed on the stems at the soil line, causing newly planted broccoli to wilt and die.

Figure 1. Caterpillar damage on broccoli seedlings.

Figure 2. Ants feed on the stems of the young broccoli plants.

Plants started to form heads in middle October. First harvest of the earliest variety in our trial 'Blue Wind' was on Oct. 25. Central heads were harvested when they were about 6 inches in diameter with a stem about 8 to 10 inches long. If broccoli is harvested too late, the heads start to loosen and separate, and the individual flowers start to open. Harvesting the central head stimulates the growth of side shoots. Heads forming on the side shoots are smaller and less compact. Field grown broccoli is normally harvested once for the central head. Relatively warmer temperatures in high tunnels allow formation of some nice secondary heads. We harvested these secondary heads between the middle and the end of November. Among eight varieties we evaluated in the trial, variety Green Magic had the highest yield. In average, each plant of Green Magic produced one central head and two secondary heads.

Figure 3. Broccoli ready to harvest.

In the trial, we had two rows of plants grown on a 4’ wide bed. In-row plant spacing was 18’’ apart. In a 30’ × 96’ high tunnel, it is possible to grow 600 to 700 plants with this spacing. A yield of 500 to 900 lbs of high-quality broccoli can be expected.

Upcoming Events

Southwest Purdue Ag Center High Tunnel Tour

Date: Thursday, August 10, 7 p.m.- 9 p.m. (EDT)

Location: Southwest Purdue Agricultural Center, 4669 North Purdue Road, Vincennes, IN, 47591

Registration: Visit http://tinyurl.com/yc5lqvez or call (812) 886-0198

For more information, contact: Wenjing Guan at guan40@purdue.edu or Dan Egel at egel@purdue.edu

During the evening event at Southwest Purdue Agricultural Center, attendees will see demonstrations of soil solarization, end-of-season clearance of soil covers, sprayers used for small-scale plots, and an innovative season-long low tunnel system for growing tomato and pepper. Attendees will also learn how to ID tomato diseases by walking in the field with a plant pathologist. You are also welcome to bring your own disease samples for identification. A NRCS representative will share the insights about high tunnel cost-share program. We will also discuss issues relating to how to choose, locate and make pre-construction decisions for a high tunnel.

Southwest Purdue Ag Center (SWPAC)

4369 N. Purdue Road Vincennes, IN 47591

Thursday August 10, 2017

High Tunnel Tour

7:00 PM – 9:00 PM (EST)

In the tour, you will see demonstrations of

- Soil solarization
- End-of-season clearance of soil covers
- Sprayers used for small-scale plots
- An innovative season-long low tunnel system for growing tomato and pepper

You will also learn how to ID tomato diseases by walking in the field with a plant pathologist. You are welcome to bring your own disease samples for identification.

A NRCS representative will share the insights about high tunnel cost-share program. We will also discuss issues regarding how to choose, locate and make pre-construction decisions for a high tunnel.

Tour is free, to register please visit http://tinyurl.com/yc5lqvez
or call (812) 886-0198
For more information please contact:
Dan Egel (egel@purdue.edu) or Wenjing Guan (guan40@purdue.edu)

The program is co-sponsored with the Dept. of Recreation, Park & Tourism Studies at Indiana University.
Funded in part by the Indiana Dept. of Agriculture and a USDA Specialty Crops Block Grant.

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Pinney Purdue Vegetable and High Tunnel Field Day

Date: Tuesday, Aug. 15, 5 p.m. – 8:30 p.m. (CDT)

Location: Pinney Purdue Agricultural Center, 11402 South County Line Road, Wanatah, IN 46390

Registration: Visit http://tinyurl.com/yc5lqvez or call (219) 386-5232

For more information, contact: vegcrops@purdue.edu or (219) 386-5232.

The Vegetable and High Tunnel Field Day at Pinney Purdue Agricultural Center will feature tours of tomato production in moveable high tunnels, using both conventional and organic management systems. The event also will include walking tours of sweet corn and pumpkin variety trials, an overview of research findings about the opportunities available through high tunnels, and information about the NRCS EQIP Seasonal High Tunnel Initiative. Attendees will also learn about pollinators; low-cost high tunnel structures for the home gardener; irrigation in high tunnels; and ideas for using fresh produce in meals and snacks. Dinner and sweet corn variety tasting will follow the tours. Growers who would like to donate corn for tasting may contact Lyndsay Ploehn at 219-465-3555 or lploehn@purdue.edu. Indiana private applicator recertification credits (PARP) are available for a $10 fee. The event is co-sponsored by Purdue and Indiana Universities.

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Pinney Purdue Vegetable and High Tunnel Field Day
Tuesday, August 15, 2017, 5:00 pm – 8:30 pm Central Time

Join us for presentations, plot tours, supper, and sweet corn tasting.

High Tunnels
Why High Tunnels?
Tomato Variety Performance
Irrigation
NRCS EQIP High Tunnel Initiative

Home Gardens
Sweet Corn and Pumpkins in Gardens
Pollinators
Common Tomato Insects and Diseases
Low-cost Hoophouses for Home Gardeners

Sweet Corn
Sweet Corn Variety Trial
Sweet Corn Tasting*

Pumpkins
Powdery Mildew Resistant Pumpkin Varieties
Underseeded Cover Crops
Pollinators & Pumpkins

Recipes for Fresh Produce

To register, visit http://tinyurl.com/yc51qvez or call 219-386-5232.

For more information: vegcrops@purdue.edu

Dept. of Horticulture and Landscape Architecture
Purdue University

Indiana Private Applicator Recertification (PARP) credit available; $10 fee.

*Growers who would like to donate corn for tasting, please contact Lyndsay Ploehn at 219-465-3555 or lploehn@purdue.edu.

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Organic Vegetable Seed Production & Varietal Selection Workshop

Date: August 22, 2017, 9:00 am – 3:00 pm.

Location: Daniel Turf Center, 1340 Cherry Ln, West Lafayette, IN, 47907.

Registration: http://tinyurl.com/y7da7dsh

Topics include Seed biology fundamentals; Harvesting, processing, and storing seed; Population size and isolation requirements; Managing pathogens during seed production and after harvest; On-farm variety trialing and participatory breeding techniques. Registration fee is $15 including workshop and lunch.

Beginning Farmer Tours and Workshops

Join Purdue's beginning farmer team for farm tours in 2017.

September 11. Tour Little Prairie Farms, a small acreage vegetable farm near Brookston, IN, and the Purdue Student Farm near West Lafayette to learn about farming practices and tools for small acreage farms.

September 27. Full Hand Farm is a diverse vegetable farm located near Noblesville, IN. The tour will include information on the use of high tunnels in vegetable production.

October 2. Aficionado Farms produces organically grown produce, herbs, and flowers near Elberfeld, IN. Learn about their farm and Farm to School programs.

More information about these tours are available at http://www.cvent.com/events/beginning-farmer-tours-and-workshops/event-summary-0f7526f0380a432788708b2f2edcf1e7.aspx

Join Purdue's Beginning Farmer team for farm tours in 2017!

August 26. Goat Milk Stuff is a dairy goat farm located near Scottsburg, IN that produced soaps, candies, and cheeses. The tour will include information on agricultural tourism and value-added products.

September 11. Two tours for the price of one! Tour Little Prairie Farms, a small acreage vegetable farm near Brookston, IN, and the Purdue Student Farm near West Lafayette to learn about farming practices and tools for small acreage farms.

September 27. Full Hand Farm is a diverse vegetable farm located near Noblesville, IN. The tour will include information on the use of high tunnels in vegetable production.

October 2. Aficionado Farms produces organically grown produce, herbs, and flowers near Elberfeld, IN. Learn about their farm and Farm to School programs.

October 14. Blue Yonder Organic Farm is a Veteran owned and operated farm near North Salem producing pastured poultry, sheep, and other products. Learn about poultry production and organic certification.

October 28. Freedom Valley Farm is an organically managed farm located near Freedom, IN. The tour will include information on winter markets and developing business plans.

Registration Now Open!

It is the policy of the Purdue University Cooperative Extension Service that all persons have equal opportunity and access to its educational programs, services, activities, and facilities without regard to race, religion, color, sex, age, national origin or ancestry, marital status, parental status, sexual orientation, disability or status as a veteran. Purdue University is an Affirmative Action institution. This material may be available in alternative formats.

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