The Ohio State University Extension

VegNet *The Vegetable and Fruit Crops Teams Newsletter*

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In this issue:

OSU South Centers Update at Piketon

from Thom Harker & Ryan Slaughter, Research Assistants OSU South Centers

Spraying of the hop yard continues for the prevention of downy mildew. Leaf samples collected from the hop yard are turning up aphids and two spotted spider mites. The insect pressure has not hit the economic threshold at this point, therefore, there has not been any insecticide applied to the yard at this time. Leaf samples were collected to get a base line of nutrients in the tomatoes, along with the first application of nitrogen and potassium being injected this week. The tomatoes are blooming with some small fruit set. Grass herbicide was applied to pumpkins and matted row strawberries.

Hop cones are nearing harvest stage
Photo by Thom Harker

2014 Upcoming Events

- **July 8–** Cover Crop Cocktail & Soil Health Field Night at OSU South Centers. Contact Charissa McGlothin at 740.289.2071 ext. 132 or mcglothin.4@osu.edu
- **July 15–** Bramble, Blueberry and Wine Grape Field Night, South Centers at OSU South Centers. For details contact Charissa McGlothin at 740.289.2071 ext. 132 or mcglothin.4@osu.edu
- **July 17–** Hops Field Night at Wooster, Ohio. Contact Charissa McGlothin at 740.289.2071 ext. 132 or mcglothin.4@osu.edu
- **July 31–** Pepper Field Night. More information to come.
- **August 12 –** Hops Workshop in Cleveland, Ohio. More information to come.
- **August 14 –** Hops Field Night at OSU South Centers in Piketon, Ohio. Contact Charissa McGlothin at 740.289.2071 ext. 132 or mcglothin.4@osu.edu

Fruit Disease Update

from Mike Ellis, Department of Plant Pathology, The Ohio State University

Last week's issue of Scaffolds contained an article about models for predicting when sprays for sooty blotch and flyspeck (SBFS) need to be initiated during summer. That article also contained brief comments on fungicide options. I have one correction and one addition to that article. First, I stated last week that the original SBFS model that was developed in North Carolina used 272 hours of accumulated wetting as the incubation period for SBFS, whereas the correct number is 273 hours. (I should have looked up the number rather relying on my memory.) Second, I should have included a link in last week's article to an excellent summary of SBFS models that was published by Dan Cooley and Jon Clements in Fruit Notes way back in 2009 (see http://umassfruitnotes.com/v74/a6.pdf). The remainder of this article focuses on additional factors to consider when the summer fungicide program must protect not only against SBFS, but also against bitter rot. Bitter rot is a summer fruit decay caused by *Colletotrichum* species. It is a very serious problem in regions that have hot humid summers, whereas it occurs only sporadically in northern New York and northern New England. The first bitter rot lesions usually show up on the sun-exposed sides of fruit, where they appear as tan spots that are slightly sunken compared with surrounding tissue.

Controlling bitter rot is complicated by at least three different factors. First, some fungicides that control SBFS have little or no activity against bitter rot. Fungicides used for SBFS that do not control bitter rot include Topsin M, Inspire Super, and the phosphite fungicides. Second, for those fungicides that can be effective against bitter rot (i.e., captan, ziram, strobilurins), low rates that are sufficient for controlling SBFS may be totally inadequate against bitter rot. Thus, although Topsin M at 1 lb/A plus Captan-80 at 2 lb/A will generally provide good control of SBFS, black rot, and white rot in the Hudson Valley, that combination

Article continued on pg. 3

may provide only marginal activity against bitter rot because Topsin M is ineffective and Captan-80 must be applied at 4 to 5 lb/A on a 14-day interval to control bitter rot when inoculum is present and weather favors spread of this disease. The third factor that complicates bitter rot control, in my opinion, is that heat stress may inactivate some of the natural defenses in healthy apple fruit and leaves the affected fruit highly susceptible to invasion by *Colletotrichum*. The relationship between heat stress and susceptibility to bitter rot
has not been proven, so the scenario presented below is conjecture based on my own field observations over the past 10–15 years. During that time, I have repeatedly noted that bitter rot often begins to appear in the Hudson Valley after we have experienced several days of sunny weather with high humidity and with maximum temperatures in the mid to upper 90's (i.e., typical "dog days" of summer). Usually, within 10–14 days of that weather scenario, I begin hearing reports of bitter rot appearing in Honeycrisp apples, and sometimes in other cultivars as well. Most of that initial bitter rot is on the sun-exposed surfaces of fruit. Fruit may also develop black rot lesions at the same time, and a few fruit may show distinctive symptoms of heat stress, wherein the "cooked" flesh collapses and ridges often appear on the fruit surface (Fig. 4).

The proportion of fruit affected by bitter rot following heat stress appears to be at least somewhat correlated with water stress at the time that we experienced the high temperatures. Decay incidence
is usually especially high in trees that were water-stressed when the heat wave occurred. In fact, we found that the very best fungicide programs that I could design failed to control bitter rot in water-stressed trees in a 2011 trial at the Hudson Valley Lab wherein the best treatments still had 25
to 35% of Honeycrisp fruit with bitter rot at harvest (Rosenberger et al., 2012). Following are my hypotheses to explain why heat and water stresses may contribute to bitter rot problems. First, trees with adequate soil moisture will continue to respire normally for a longer period as temperatures rise than will trees under drought stress. In the water-stressed trees, stomata will close sooner to conserve water. At that point, cooling from evapotranspiration ceases and fruit exposed to sunlight overheats. Work on the west coast has shown that temperatures just below the skin on sun-exposed fruit can be as much as 25°F higher than air temperatures. That means that, on a day when temperatures reach 100°F, internal fruit temperatures may exceed 125°F, especially if trees are already drought-stressed. Cells begin to die when temperatures approach 130°F. Fruit with cells that were killed directly by the heat develop sunburn and/or uneven growth (Fig. 4). However, I suspect that many fruit that never show sunburn or heat injury may still have been heated enough to inactivate natural defense systems that would otherwise help the trees resist infection by Colletotrichum and other fruit rot fungi. Those fruit with a compromised defense system are so susceptible to decay that even a good fungicide program cannot protect them. Until someone can investigate these hypotheses in controlled trials, we are left with a degree of uncertainty about how to control bitter rot on susceptible cultivars such as Honeycrisp.

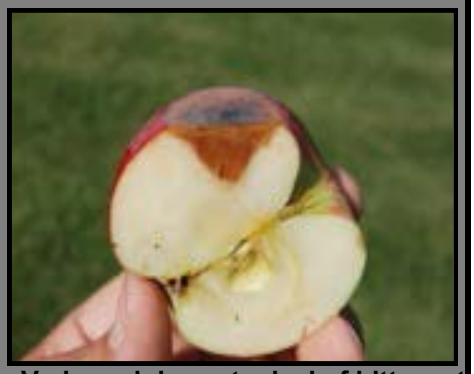
Nevertheless, I suggest the following approaches: 1. Observational evidence suggests that bitter rot can overwinter on infected fruit on the orchard floor, including fruit that are hand-thinned and then exposed to inoculum left from last year's crop. Thus, removing decayed fruit after harvest can be a critical component for controlling bitter rot in blocks that seem to have a perennial problem. Inoculum can also come from a wide variety of wild hosts, so allowing more space between apples and woodlots/hedgerows on the orchard perimeter may be helpful if other control measures prove ineffective. Increasing the space between wild hosts and the orchard can sometimes be accomplished by pushing back woodlots, whereas in other cases the first row of apple trees may need to be removed.

2. During summer, monitor the long-term weather forecasts with an eye for spotting predicted heat waves (90-plus-degree weather) at least 3 to 5 days before the heat arrives so that trickle irrigation can be activated to ensure that soil moisture is near saturation levels when the heat

wave arrives. ***Article continued on pg 4***
3. Before the heat arrives, apply a fungicide cover consisting of a strobilurin fungicide (e.g., Flint, Pristine, Merivon) in combination with captan at 4 to 5 lb/A. Applying the fungicide protection after the heat wave but before any rain occurs may work equally well. 4. I don't know if the various commercial products that are promoted for sunburn control will also help to prevent over-heating of fruit, thereby helping with bitter rot control. They may be worth trying, especially if they can be applied along with fungicides just ahead of predicted heat waves. In conclusion, we really need more field research on strategies for controlling bitter rot in northeastern United States. Until someone tackles this research problem, I can only suggest an integrated approach that combines sanitation (removing rotted fruit from beneath trees in the fall and/ or removing wild hosts from orchard perimeters), sustaining host defenses with irrigation ahead of hot weather (and perhaps application of sun-blocker materials), and applications of appropriate fungicides at doses needed for activity against bitter rot. In the meantime, those who never see bitter rot can be thankful that

Honeycrisp with small lesions and advanced decay

Orange sporulation on bitter rot lesion



V-shaped decay typical of bitter rot

North Central Update

from Timothy Malinich, Extension Educator, Agriculture and Natural Resources, Erie County

Crops-Apples about 1.5". Blueberry picking just underway on early varieties. Raspberries showing color (be sure to monitor for SWD). Blackberry primo canes look good after winter dieback; there are some blooms showing up on new growth. Caterpillars, as yet unidentified, on elderberry.
Weed Control-Summer annuals are becoming a problem in areas without weed control, or in where weed control products have failed. Heavy repeated rain, in excess of 2" in some spots, may have led to the failure of pre emergent herbicides. Summer annuals are being controlled by hand weeding, string trimming, and application of post emergent herbicides. Care should be taken to prevent drift onto crops. Also, some herbicides for fruit crops are labeled for non-bearing plants only so make sure you check the label prior to application. If you are considering trying an herbicide you are unfamiliar with, remember that the labels are readily accessible online so you can read through restrictions and applications prior to purchasing.
Yellow nutsedge is blooming. This tough to control week though it has seed, it spreads primarily by tubers on underground rhizomes. Cultivation seems only to propagate and spread the tubers to new areas. There are a couple of products listed for control in the Midwest Small Fruit & Grape Spray Guide, but, as mentioned before, read the label to make sure you can make the application.
This tent forming caterpillar, not yet identified, is on elderberry. Isolated colonies can be easily removed by hand. Apples crop shaping up nicely.

Southern Ohio Vegetable and Fruit Update

from Brad Bergefurd, Ohio State University Extension Educator, Ohio State University Extension Scioto County and OSU South Centers

Growing and field conditions were dry over the weekend, and early this week. However a storm front rolled through the area on July 1st bringing badly needed rainfall totals of ½ inch to 1 ½ inches across the area. Supplemental irrigation has been ran over the weekend in many areas, as temperatures approached and exceeded 90 degrees. Sweet corn harvest is being reported in full swing in Highland, Pike, Scioto, and Washington counties, with great yields and quality although some variety specific tip fill issues are being reported in Highland counties . Renovation of matted row strawberry fields has begun with supplemental overhead irrigation being applied. For more information on strawberry renovation see pages 30 and 31 of the Midwest Strawberry Production guide located at http://www.oardc.ohio-state.edu/fruitpathology/Bulletins/Strawberry%20book%20v2%20S.pdf.

Black raspberry and blueberry harvest is in full swing throughout the region. Blackberry harvest continues on rotatable cross arm trellis systems. Pinching and training of primocanes continues on standard trellis and rotatable cross arm trellis blackberry systems. Harvest of field cucumber, pickle, summer squash, zucchini, sweet onion, sweet corn, broccoli, cabbage, peas, turnips, red beets, tat-soi, mizuna, head and leaf lettuce, chives, basil, sweet corn, spinach, leeks, continues. Harvest of high tunnel tomato, cucumber, lettuce, spinach and herbs continue.

Watermelon and cantaloupe fruit are beginning to size up nicely, with estimated harvest to begin around the 2nd week of July. Weed pressure continues in all vegetable and fruit fields. Cultivation, hand hoeing, and pre and post emergent herbicide applications continue to be performed. Direct seeding and transplanting of all vegetable crops continues, with the last of the jack-o-lantern pumpkins seeded or transplanted this week. The first fall broccoli, cauliflower, and cabbage is being transplanted to the field this week. Seeding of cauliflower, broccoli, and cabbage for a fall planting continues. Staking and stringing of tomatoes, cucumbers and peppers continues. Ground continues to be worked, fertilizer spread, beds formed and plastic and drip lines installed.

Grass herbicides have been applied to pumpkins
Photo by Thom Harker

Second strings were applied to tomato this week
Photo by Thom Harker

Matted row strawberry renovation has begun
Photo by Brad Bergefurd

Cucumber & Melon Downy Mildew – Should Arrive Soon

from Sally Miller, Department of Plant Pathology

As of July 2, downy mildew has not been confirmed in Ohio or in the Great Lakes region. However, since we usually see the first symptoms of the disease on cucumber around the 4th of July, growers should start applying fungicides effective against downy mildew (see table below) on 5-7 day intervals. Use the shorter intervals in cooler, high moisture conditions. Stretch the interval if the weather becomes hot and dry, especially if the disease is not reported nearby. Always tank mix with chlorothalanil or mancozeb. Alternate products with different modes of action (FRAC codes).

Early season downy mildew risk for cucumbers and melons is highest in counties in approximately the northern third of Ohio.

Cucumber downy mildew
Photo by Sally Miller

Cantaloupe downy mildew
Photo by Sally Miller

Product	PHI (days)	FRAC Code	Comments
Chlorothalanil e.g. Bravo Weather Stik	0	M5	Protectant; tank mix with targeted fungicides below
Mancozeb e.g. Dithane or Manzate	5	M3	Protectant; tank mix with targeted fungicides below
Ranman	0	21	
Previcur Flex	2	28	
Tanos	3	11 + 27	Up to 2 days curative activity but low residual (3-5 days)
Gavel	5	22	Contains mancozeb; see label for worker safety re-quirements
Presidio	2	43	Possible resistance in some CDM populations
Curzate	3	27	Up to 2 days curative activity but low residual (3-5 days)
Zampro	0	40 + 45	

Phytophthora Blight Coming on Strong in Peppers and Cucurbits

from Sally Miller, Department of Plant Pathology

With the long period of rainy weather and warming temperatures, Phytophthora blight is appearing in peppers and cucurbits throughout Ohio. The pathogen moves from plant-plant and field-field in rainwater irrigation water, and runoff water. It survives in ponds, streams and rivers – we have tested several of these in Ohio and found them to be contaminated with *Phytophthora capsici,* the causal agent of Phytophthora blight. *Phytophthora* can survive several years in the absence of host plants.

In addition to peppers and cucurbits, tomatoes, eggplant, snap beans and certain weeds are susceptible to Phytophthora blight. There are no cucurbit varieties resistant to Phytophthora blight. Cucurbits should not be planted in fields with a history of Phytophthora blight until after at least 4 years in non-susceptible rotation crops. Pepper varieties with varying degrees of resistance to the root and crown rot phase include Paladin, Aristotle and Vanguard. These varieties are not resistant to foliar blight and fruit rot.

Phytophthora blight must be managed using an approach that integrates crop rotation, disease resistance (peppers), cultural practices to reduce water accumulation near plants, avoidance of *Phytophthora*-contaminated water, sanitation of tools and equipment, and fungicides. Recommended fungicides are listed in the 2014 Midwest Vegetable Production Guide for Commercial Growers. Keep in mind that fungicides alone will not control Phytophthora blight; and even with integration are not fully effective. Some *Phytophthora* populations have developed resistance to fungicides. Note that pre-harvest intervals (PHIs) vary from 0-5 days. Always follow a fungicide resistance management program (see labels).

Product	PHI (days)	Comments
Revus 2.09SC	0	Tank mixing with a copper fungicide (e.g. Kocide 3000) and non-ionic surfactant improves activity
Presidio 4SC	2	Tank mixing with a copper fungicide improves activity
Ranman 400SC	0	Tank mixing with a copper fungicide improves activity
Gavel 75DF	5	Tank mixing with a copper fungicide improves activity
Tanos 50WG		
Ridomil Gold + copper		Apply Ridomil Gold at or soon after planting and follow with two foliar sprays of Ridomil Gold + Copper; some *Phytophthora capsici* populations are insensitive to Ridomil. Not labeled for Phytophthora blight in cucurbits.
Zampro	0	
Forum 4.18SC	0	

Phytophthora blight lesion on pumpkin leaf (l); powdery white mold on cucumber fruit (r).

***Phytophthora* lesion on pepper leaf (l); middle plant killed by *Phytophthora* (r).**

Muck Crops Update, Northern Ohio

from Robert Holthouse, Food Safety Manager, Doug Walcher Farms, Holthouse Farms of Ohio

Pepper and squash. The squash fields have been hit hard by the heavy rains. The pepper crop is doing pretty good overall. In a few places, water damage or disease is starting to set in.

Summer squash doing well on plastic
Photo by Robert Holthouse

Summer squash near harvest
Photo by Robert Holthouse

Possible disease in bell peppers
Photo by Robert Holthouse

Zucchini squash near harvest
Photo by Robert Holthouse

Plant damage on summer squash
Photo by Robert Holthouse

Storm damage on summer squash
Photo by Robert Holthouse

Storm damage on pumpkins
Photo by Robert Holthouse

Possible disease in summer squash
Photo by Robert Holthouse

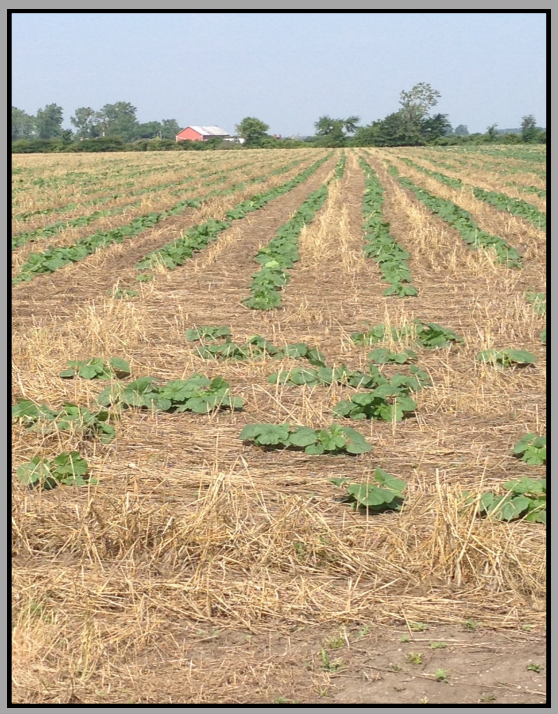
Wind damage on bell peppers
Photo by Robert Holthouse

Muck Crop Update, Northern Ohio

from Ken Holthouse, General Manager Sales, D.R. Walcher Farms

Weather continues to challenge us around north central Ohio. Good soil drainage helps, but low spots are drowned out. Phytophthera has taken its toll on summer squash plantings. Cucumbers are close to first picking - about 2 weeks later than normal. We have kept up sprays for both insects and disease between the rains. Due to weather, some plantings are getting delayed by one to three days. Crops are growing fast with the hot days and warm nights. Fall squash plants are beautiful with even stands. Side dressing was completed on schedule, and the plants have 'found' the nitrogen and are showing vigorous growth.

D.R. Walcher first pepper plants about 10 days from first pick
Photo by Ken Holthouse



D.R. Walcher Fall squash - growth and stand are healthy
Photo by Ken Holthouse

D.R. Walcher cabbage almost ready for harvest
Photo by Ken Holthouse

Wayne County IPM Scouting Program Update

from Rory Lewandowski, Extension Educator, Agriculture and Natural Resources, OSU Extension Wayne County

Wet weather conditions have continued and crops in low areas of fields are showing some wet soil related stresses. Bacterial disease incidence is increasing. Japanese beetles have shown up and are feeding on a number of vegetable and fruit crops.

Tomatoes: Bacterial diseases (bacterial spot and bacterial canker) in field grown tomatoes are showing up with more frequency. Early blight and septoria leaf spot are also being found in fields. In high tunnel tomatoes, scouts continue to find timber rot and botrytis. Variegated climbing cutworm damage to fruit has been observed in some high tunnels.

Sweet Corn: Some plantings are at silk stage this week. European corn borer moth catches in traps continues to be high and corn borer damage in sweet corn has ranged from 2 to 30%. Corn near or at silk is being sprayed to prevent corn borer damage. No corn earworm moths have been caught in traps yet.

Potatoes: Most are in bloom. Potato leaf hopper (PLH) counts have been low. Colorado potato beetle (CPB) pressure continues. Some low incidence of potato black leg, a bacterial disease has been found in one grower field Eggplant generally looks good but growers are experiencing heavy CPB numbers in some plantings.

Green/snap beans: They are ready to harvest in some fields and generally look good. There has been some light damage levels due to bean leaf beetle, grasshopper and Japanese beetle feeding.

Onions: They are forming bulbs and pushing up against plastic soil covers. Thrip damage has remained light.

Cabbage: Is forming heads and overall looking very good. Some fields have cabbage worms above threshold levels.

Winter squash & pumpkins: They are in bloom and vines are running. Angular leaf spot can be found along with light feeding damage by cucumber beetles and Japanese beetles. One of the bigger issues is weed control. The wet weather is preventing timely cultivation.

Zucchini and summer squash: They are ready to harvest in some fields. Similar to winter squash and pumpkins, angular leaf spot is present in many plantings.

Cucumbers: They are approaching harvest in some fields and the crop looks good.

Japanese beetles: They were found in numbers and feeding damage above threshold levels in some black raspberries and were also found in lower numbers in some grape vines.

Potato Black Leg
Photo by Chris Smedley

Potato Black Leg
Photo by Chris Smedley

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Submit Articles:

To submit an article to the VegNet newsletter please send the article and any photos to **Brad Bergefurd** at bergefurd.1@osu.edu or for questions regarding the newsletter call 740.289.2071 ext.132.

About the editor

Brad Bergefurd

Bergefurd is an Extension Educator, Agriculture and Horticulture Specialist with Ohio State University Extension, with statewide responsibilities for outreach and research to the agriculture and commercial fruit and vegetable industries Brad has offices at the OSU Piketon Research & Extension Center in Piketon and at OSU Extension Scioto County in Portsmouth.

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