WEEKLY CROP UPDATE
UNIVERSITY OF DELAWARE COOPERATIVE EXTENSION

Volume 24, Issue 12 **June 10, 2016**

Vegetable Crops

Vegetable Crop Insect Management – *Joanne Whalen, Extension IPM Specialist*; jwhalen@udel.edu

Cucumbers
Be sure to scout for cucumber beetles as well as aphids. Fresh market cucumbers are susceptible to bacterial wilt, so treatments should be applied before beetles feed extensively on cotyledons and the first true leaves. Although pickling cucumbers have a tolerance to wilt, a treatment may still be needed for machine-harvested pickling cucumbers when 5% of plants are infested with beetles and/or plants are showing fresh feeding injury. A treatment should be applied for aphids if 10 to 20 percent of the plants are infested with aphids with 5 or more aphids per leaf.

Melons
Continue to scout all melons for aphids, cucumber beetles, and spider mites. Although aphid populations are still relatively low in most fields we continue to see an increase in populations. Populations can quickly explode when temperatures increase. The treatment threshold for aphids is 20% infested plants with 5 or more aphids per leaf. We are also starting to find the first spider mites. The threshold for mites is 20-30% infested crowns with 1-2 mites per leaf. Cucumber beetles can continue to re-infest fields as we as hide under the plastic, so be sure to check carefully for beetles as well as their feeding damage. Multiple applications are often needed to achieve effective cucumber beetle control. When fields are blooming, be sure to consider pollinators when making an insecticide application and read all labels for requirements regarding pollinator protection.

Peppers
As soon as the first flowers can be found, be sure to consider a corn borer treatment. Depending on local corn borer trap catches, sprays should be applied on a 7 to 10-day schedule once pepper fruit is ¼ - ½ inch in diameter. Be sure to check local moth catches in your area by calling the Crop Pest Hotline (302-831-8851) or visiting our website at: http://agdev.anr.udel.edu/trap/trap.php .

Potatoes
Continue to scout fields for Colorado potato beetle (CPB) and leafhoppers. Adult CPB as well as the small and large larvae can now be found. A treatment should be considered for adults when you find 25 beetles per 50 plants and defoliation has reached the 10% level. Once larvae are detected, the threshold is 4 small larvae per plant or 1.5 large larvae per plant. As a general guideline, controls should be applied for leafhoppers if you find ½ to one adult per sweep and/or one nymph per every 10 leaves.

Snap Beans
Continue to sample all seedling stage fields for leafhopper and thrips activity. The thrips threshold is 5-6 per leaflet and the leafhopper threshold is 5 per sweep. If both insects are present, the threshold for each should be reduced by one third. As a general guideline, once corn borer catches reach 2 per night, fresh

market and processing snap beans in the bud to pin stages should be sprayed for corn borer. Sprays will be needed at the bud and pin stages on processing beans. After the pin spray on processing beans, the spray schedule will be determined by a combination of both moth catches and field scouting.
http://agdev.anr.udel.edu/trap/trap.php

http://extension.udel.edu/ag/insect-management/insect-trapping-program/ecb-and-cew-moth-catch-thresholds-for-processing-snap-beans/

Once pins are present on fresh market snap beans and corn borer trap catches are above 2 per night, a 7 to 10-day schedule should be maintained for corn borer control

Sweet Corn
Continue to sample seedling stage fields for cutworms and flea beetles. You should also sample whorl through pre-tassel stage corn for corn borers and corn earworms. A treatment should be applied if 15% of the plants are infested with larvae. The first silk sprays will be needed for corn earworm as soon as ear shanks are visible. Be sure to check both black light and pheromone trap catches since the spray schedules can quickly change. Trap catches are generally updated on Tuesday and Friday mornings (http://agdev.anr.udel.edu/trap/trap.php and http://extension.udel.edu/ag/insect-management/insect-trapping-program/action-thresholds-for-silk-stage-sweet-corn/). You can also call the Crop Pest Hotline for the most recent trap catches (302-831-8851).

Avoiding Blossom End Rot

– *Gordon Johnson, Extension Vegetable & Fruit Specialist;* gcjohn@udel.edu

Variable June weather often creates conditions favorable for blossom end rot in susceptible crops, with tomatoes and peppers being the most affected. In most years, there is a transition point in June where temperatures move from the moderate side to an extended hot period with temperatures in the 90s. This is also when many tomatoes and peppers have reached full plant size with high water demand and have large numbers of flowers and developing fruit with heavy calcium demand.

Blossom End Rot (BER) is a disorder where developing fruits do not have enough calcium for cell walls, cells do not form properly, and the fruit tissue at the blossom end collapses, turning dark in color. Calcium moves through cation exchange with water movement in the fruit, so the end of the fruit will be the last to accumulate calcium. Larger fruits and longer fruits are most susceptible. With fruits, the rapid cell division phase occurs early in the development of the fruit and if calcium accumulation in the fruit is inadequate during this period, BER may occur. While it may not be noticed until the fruit expands, the deficiency has already occurred and cells have already been negatively affected. We most commonly see signs of blossom end rot on fruits many days or weeks after the calcium deficiency has occurred.

Understanding blossom end rot also requires an understanding of how calcium moves from the soil into and through the plant. Calcium moves from the soil exchange sites into soil water and to plant roots by diffusion and mass flow. At plant roots, the calcium moves into the xylem (water conducting vessels), mostly from the area right behind root tips. In the xylem, calcium moves with the transpirational flow, the movement of water from roots, up the xylem, and out the leave through stomata. Calcium is taken up by the plant as a divalent cation, which means it has a charge of +2. It is attracted to negatively charged areas on the wall of the xylem, and for calcium to move, it must be exchanged off the xylem wall by other positively charged cations such as magnesium (Mg++), potassium (K+), ammonium (NH4+), or additional calcium cations (Ca++). This cation exchange of calcium in the xylem requires continuous movement of water into and up through the plant. It also requires a continuous supply of calcium from the soil.

In general, most soils have sufficient calcium to support proper plant growth. While proper liming will insure there is adequate calcium, it is not the lack of calcium in the soil that causes blossom end rot in most cases. It is the inadequate movement of calcium into plants that is the common culprit. Anything that

impacts root activity or effectiveness will limit calcium uptake. This would include dry soils, saturated soils (low oxygen limits root function), compaction, root pathogens, or root insect damage. In hot weather on black plastic mulch, roots can also be affected by high bed temperatures. Low pH can also be a contributing factor. Calcium availability decreases as pH drops, and below a pH of 5.2 free aluminum is released, directly interfering with calcium uptake. Again, proper liming will insure that this does not occur. Applying additional calcium as a soil amendment, above what is needed by normal liming, will not reduce blossom end rot.

In the plant, there is a "competition" for calcium by various plant parts that require calcium such as newly forming leaves and newly forming fruits. Those areas that transpire the most will receive more calcium. In general, fruits have much lower transpiration than leaves. In hot weather, transpiration increases through the leaves and fruits receive lower amounts of calcium. High humidity will reduce calcium movement into the fruit even more. Tissue tests will often show adequate levels of calcium in leaf samples; however, fruits may not be receiving adequate calcium. In addition, in hot weather, there is an increased risk of interruptions in water uptake, evidenced by plant wilting, when transpirational demand exceeds water uptake. When plants wilt, calcium uptake will be severely restricted. Therefore, excess heat and interruptions in the supply of water (inadequate irrigation and/or rainfall) will have a large impact on the potential for blossom end rot to occur. Proper irrigation is therefore critical to manage blossom end rot.

As a positive cation, there is "competition" for uptake of calcium with other positive cations. Therefore, if potassium, ammonium, or magnesium levels are too high in relation to calcium, they can reduce calcium uptake. To manage this, do not over-fertilize with potassium or magnesium and replace ammonium or urea sources of nitrogen with nitrate sources.

Applying additional soluble calcium through irrigation, especially drip systems, can reduce blossom end rot to some degree if applied prior to and through heat events and if irrigation is applied evenly in adequate amounts. Foliar applications are only partially effective when applied to very young developing fruit. Fruits do not absorb much calcium, especially once a waxy layer has developed, and calcium will not move from leaves into the fruit (there is little or no phloem transport). Foliar applications of 2-4 lb Calcium (Ca) per acre is recommended. Foliar calcium can be applied as calcium chloride at the rate of 5-10 lb per 100 gallons per acre, calcium nitrate at the rate of 10-15 lb per 100 gallons per acre, or chelated calcium at labeled rate.

In conclusion, the keys to controlling blossom end rot are making sure roots are actively growing and root systems are not compromised, soil pH is in the proper range, and irrigation is supplied in an even manner so that calcium uptake is not interrupted. Supplemental calcium fertilization will only marginally reduce blossom end rot if water is not managed properly.

Vegetable Disease Updates

– *Kate Everts, Vegetable Pathologist, University of Delaware and University of Maryland*; keverts@umd.edu

Late Blight Update

Late blight has been confirmed in both western Maryland, Garrett County on tomato and on the eastern shore in Accomack, VA on potato. The genotype of both outbreak strains is US23. This genotype is pathogenic on both tomato and potato. In our past experience, the strain has usually been sensitive to mefenoxam, which means Ridomil products are effective.

Cucurbit Downy Mildew Update

No downy mildew has been reported on any cucurbit crop in Maryland or Delaware. The closest outbreaks are on cucumber in Duplin County North Carolina. Downy mildew is present in Georgia on cantaloupes, acorn squash, yellow squash and cucumber. I don't think the threat of downy mildew in Maryland is imminent, but growers should scout their cucurbits frequently for symptoms. Follow the progress of the epidemic online at http://cdm.ipmpipe.org/.

New Disease on Potato - *Dickeya spp.* Update

Earlier this year, Nathan Kleczewski at the University of Delaware, alerted all to a "new" bacterial disease of potatoes that is similar to,

but more aggressive than black leg. He wrote an excellent article on the disease for the UD Weekly Crop Update on April 1 http://extension.udel.edu/weeklycropupdate/?p=8900. During the past two weeks, symptoms of black leg have shown up in potatoes in Delaware and Maryland. The potatoes were infected with the pathogen *Dickeya*.

Possible Tomato Ripening Problems in High Tunnels – *Jerry Brust, IPM Vegetable Specialist, University of Maryland*; jbrust@umd.edu

May was a very cool, cloudy and wet month, which is having all kinds of repercussions now and into the summer for field crops. Gordon Johnson and Kate Everts talked about some of these vegetable field problems last week. Most of the problems are disease related, but some are horticultural. These weather conditions have led to some problems in high tunnel tomatoes. In some high tunnels even though the tomato plants and tomato fruit look good with nice color, when the tomatoes are cut open, growers (or customers) find an internal whitening of the fruit (Fig. 1). This malady is different from grey wall because there are blotches of hard white corky tissue instead of collapsed dark tissue (common in grey wall) in the outer wall of the fruit. In addition the corky white tissue is not confined to the outer wall of the fruit but is found throughout the interior walls. Tomatoes look good on the outside but bad on the inside. The cause is lower levels of potassium (K+) than what is needed by the fruit to ripen properly. Tissue tests should show K+ levels at 3-3.5% or greater to avoid any fruit ripening problems.

For the month of May we had very few sunny or even partly sunny days, most were overcast. In the past when we have had very overcast skies for extended periods of time we have seen internal whitening problems in high tunnel tomatoes. This may seem odd, but anything that interferes with the ability of the plant to take up K+ at the critical time of fruit enlargement will result in ripening problems, especially when there is a heavy fruit load on the plant, which there is in high tunnels in May and June. However, other tomato high tunnels have not seen this problem. I think one thing that may have diminished the problem this year is the fact that May temperatures were not very warm. These somewhat cooler temperatures, I think, slowed the growth of tomatoes when there was not much sunshine in the high tunnels, reducing the problems with K+ uptake.

The thing to do now is to be sure to be feeding K+ through the drip each time you fertigate. This placement of K+ in the upper layer of soil where tomato roots are concentrated is exactly where the plant needs it for quick uptake and utilization. Some growers also use a foliar spray of potassium after flowering to move more K+ into the plant. This does help some in reducing ripening problems, but cannot substitute for the large amounts of K+ that are needed at fruit loading.

Figure 1. Internal whitening of tomato fruit found in high tunnel tomatoes this late spring.

Potato Late Blight Update #10: June 9, 2016 – *Nathan Kleczewski, Extension Specialist – Plant Pathology*; nkleczew@udel.edu

Green row: April 29th, 2016

Note- Late Blight was discovered in a commercial greenhouse in Western MD on 5/17/16. Race is US-23. Late blight was also reported in E Shore VA on 6/2/16. Race US-23. Dickeya has been confirmed in DE, in several fields of the cultivar Vivaldi. Symptoms in later planted potatoes will likely to become more pronounced soon with increasing temperature. For more information on Dickeya go to: http://extension.udel.edu/fieldcropdisease/2016/03/29/dickeya-blackleg-updates-and-considerations-for-2016-potato-crop/.

If you notice symptoms of black leg, please contact me or the Plant diagnostic clinic to have the disease confirmed.

	Townsend		Camden		Leipsic		Kenton	
Date	**DSV**	**Total DSV**	**DSV**	**Total DSV**	**DSV**	**Total DSV**	**DSV**	**Total DSV**
5/5-5/9	3	6	0	11	2	12	0	13
5/9-5/12	3	9	6	17	2	14	4	17
5/12-5/18	2	11	0	17	3	17	0	17
5/18-5/22	2	13	2	19	2	19	2	19
5/22-5/26	2	15	0	19	2	21	2	21
5/26-5/30	5	20	5	24	5	26	5	26
5/30-6/2	2	22	4	28	5	31	3	29
6/2-6/6	6	28	4	32	5	36	5	34
6/6-6/9	0	28	0	32	0	36	0	34

Notes: Season severity of **18 severity values** indicates the need for the first fungicide application. An accumulated severity of 7 after fungicide application identifies the need for a subsequent fungicide application.

You can personalize your late blight forecasts for specific fields, sign up for email or text alerts, and enter in management information at http://blight.eas.cornell.edu/blight/. Real time fungicide application timing tables for locations within Delaware can be accessed at http://blight.eas.cornell.edu/blight/DE

See the 2016 Commercial Vegetable Production Recommendations-Delaware for recommended fungicides.

Any suspect samples can be sent to the Plant Diagnostic Clinic or dropped off at your local extension office. Dr. Nathan Kleczewski can also be contacted at nkleczew@udel.edu or 302-300-6962.

The website USABlight tracks tomato and potato late blight across the nation and can be found here: http://usablight.org/. Information on scouting, symptomology, and management can also be found on this website.

MelCast Spray Advisory Program Has Begun for 2016 – *Kate Everts, Vegetable Pathologist, University of Delaware and University of Maryland*; keverts@umd.edu

Watermelon growth throughout Maryland and Delaware has been slow in 2016 due to cool May temperatures. However as our temperatures return to more normal levels, the crop has improved. We began our yearly dissemination of MelCast for watermelons this past week.

MelCast is a weather-based spray advisory program for watermelon developed at Purdue University. Melcast began for the 2016 watermelon production season on June 8. The program uses hours of leaf wetness and temperature during leaf wetness periods to determine when a fungicide should be applied. Weather information is used to calculate how favorable weather is to the development of gummy stem blight or anthracnose. The output of the program is an "environmental favorability unit" (EFI) for each day. The EFI values are added together. Once the threshold of 30 EFI is reached, a fungicide application is recommended. After the fungicide application, begin adding the EFI again from zero. If two weeks elapse and you have not accumulated 30 EFI, spray anyway. Also, add 2 EFI for each overhead irrigation event. We currently run MelCast for three locations in Delaware (Coverdale Crossroads, southeast of Laurel, and southwest of Laurel) and five locations in Maryland (Galestown, Hebron, Salisbury, Waldorf and Woodbine).

To use MelCast on your farm, please call Karen Adams (302-856-7303) or Sheila Oscar (410-742-8788) and give us your name and fax number or e-mail address. More details about how the program works are available at our Disease Forecasting Web page, which is at a new location this year: http://extension.umd.edu/mdvegetables/vegetable-plant-diseases/disease-forecasting.

Use EFI values for the location that is nearest to your farm. In addition, we post the MelCast Advisory online three times a week.

Fruit Crops

Section 18 Label for Brown Marmorated Stink Bug (BMSB) Management on Apples, Peaches and Nectarines Available Online – *Joanne Whalen, Extension IPM Specialist*; jwhalen@udel.edu

As indicated last week, our Section 18 request for the use of three bifenthrin products (Brigade WSB – FMC Corporation; Bifenture EC and Bifenture 10DF – both from United Phosphorus) to control BMSB on apples, peaches and nectarines was approved by EPA. This use expires on Oct 15, 2016. ***You must have a copy of the label in your possession before making an application***. You can access the Section 18 labels for Bifenture EC and DF formulations from United Phosphorus online at: https://cdn.extension.udel.edu/wp-content/uploads/sites/12/2016/06/10142749/Section-18-Bifenture-BMSB-DE-final-2016.pdf. Please contact either Chris Wade at the Delaware Department of Agriculture (Christopher.Wade@state.de.us) or Joanne Whalen (jwhalen@udel.edu) if you have any questions.

Orange Rust on Brambles – An Ongoing Saga – *Cassandra Swett, Assistant Professor and Extension Specialist – Berry Pathology, University of Maryland and Penn State University*; clswett@umd.edu

We all get a little rusty as we get older, but one thing that we don't want to see getting rusty is our brambles. There are several rust diseases that affect brambles. I'm just going to focus on orange rust, which is the most important rust disease in the Northeast.

We are definitely seeing a bit of orange rust this year, with the cool wet springs. You'll see this disease on blackberries, black raspberries and purple raspberries. Orange rust does not affect red raspberries.

Orange rust is an unusual fungus—it grows systemically throughout the whole plant. So once a plant is infected, it will stay infected the rest of its life, and be a persistent source of

inoculum for other plants. Over time, orange rust stunts and weakens plants so they will not bear fruit, but plants do not typically die. All in all, not a disease you want in your bramble field.

Orange rust stunting black raspberry plant. Note the "spindly" elongated shoots.

Orange rust is caused by two species: (1) *Arthuriomyces peckianus*, which is more common in the northeastern US. (2) *Gymnoconia nitens*, which is more common in southern states and primarily effects blackberry.

WHEN TO CONTROL ORANGE RUST: LIFE CYLE

Infection by orange rust occurs when it's **persistently wet (for more than 12 hrs in a day)** and **between 43°F and 72°F**. The fungus cannot infect if it's hot for most of the day or if it's very dry. Above 85°F the fungus cannot infect at all.

The life cycle of orange rust is much more complex than your typical fungal pathogen, so I'm just going to boil it down to the simple take homes:

First: In a new field, orange rust can come in on infected plants, or can spread from nearby brambles—either other fields or wild brambles.

Second: Rust overwinters on infected leaves on the soil surface and on old canes, so if rust gets established your field, it will likely persist at low levels through the life of the planting.

Third: There are two periods of infection that are important to control:

(1) about 3-4 weeks in the spring, around the time of shoot emergence, after the last frost, and
(2) about 3-6 weeks in the fall, from the time when primocane growth slows until first frost

Understand that these are estimates—what really determines infection is the weather—again, persistently wet and between 43 and 72°F

Fourth: It is important to protect both leaves and emerging shoots/buds. The time of year and history of the field can inform you about whether you need to protect leaves, buds or both.

In the spring--protect against leaf infections if you are detecting rust for the first time; if you have a history of rust in your field, also protect against emerging shoot/bud infections.

In the fall--protect only against emerging shoot/bud infections.

This has to do with the type(s) of spore present in your field:

→ If you HAVE NOT had rust in your field in recent years, you should not have the overwintering spores, which infect buds. You should only have spring spores, which only infect leaves.

→ If you HAVE had rust in your field in recent years, then you probably DO HAVE overwintering spores, which infect buds.

CONTROL METHODS

1. Scout and Remove Infected Plants in the Spring

Once a plant is infected, it must be removed. Otherwise it will continue to provide inoculum, allowing spread to other plants. It does not do much good to keep it, because after a couple of years the plant will stop yielding.

Spring is a critical time to scout for and remove orange rust-infected plants in the field, because this is the only time you will see the bright orange spores.

Scout early, as soon as new shoots start are emerging, after the last frost. Be particularly diligent when it's a wet spring—this year is a great example. The disease is easily identified as orange pustules on the underside of young leaves. You will not be able to detect orange rust after sporulation ends (early to June, onwards).

Scout for orange pustules on the underside of young leaves, early in the spring.

2. Chemical Control

Chemical control is an important compliment to removal. Once you remove all infected plants, you will want to spray to prevent the spores from infecting new plants.

When to spray

Weather can be a good indication that you need to spray—it has to be wet and between 43°F and 73°F to get infection. It is typically too cold between November and March and too hot between June and mid-August. In our region, the critical control periods for chemical protection are: (1) about 3-4 weeks in the **spring**, around the time of shoot emergence, after the last frost, **and (**2) about 3-6 weeks in the **fall**, from the time when primocane growth slows until first frost.

(1) Spring protection

Apply fungicides upon first discovery of the blisters, preferably before they burst open and release spores. If the field has a history of the disease, **sprays should be initiated before blisters appear**.

Direct this application to the foliage, since you are preventing leaf infections.

If you have had rust in previous years, ALSO do a spray directed to the base of the cane, to protect the developing buds from getting infected by overwintering spores.

(2) Fall protection

Apply fungicides if you detected rust in the field in the spring.

Direct towards the base of the cane, to protect the developing buds (both floricane and primocane); for floricane varieties—also spray the primocane shoots, to protect the buds on next year's floricane.

What to spray

Rally (formerly called Nova) (myclobutanil)
Pristine 38 WG (pyraclostrobin + boscalid)
Cabrio 20EG (pyraclostrobin).

Pest/Problem	Material	Rate/Acre	Comments
rust diseases (orange rust and late leaf rust), powdery mildew, raspberry leaf spot, Septoria leaf spot	See Raspberry Leaf Spot and Septoria Leaf Spot of Blackberry and Raspberry, page 115.		
	Rally 40WSP	2.5 oz.	Rally was formerly called Nova. For late leaf rust and powdery mildew, begin applications when disease first appears and repeat on a 10- to 14-day schedule. See Cabrio, Pristine, and Rally for Control of Orange Rust, page 114.
	Cabrio 20EG	14 oz.	See notes on Abound, Cabrio, and Pristine, pages 114-115. See Pristine 38WG (page 115) about Pristine mixing instructions.
	Abound	6.2-15.4 fl. oz.	
	Pristine 38WG	18.5-23 oz.	
	Quilt Xcel	14-21 fl. oz.	30-day PHI
	Tilt	6 fl. oz.	

Fungicide recommendations for orange rust control, from the 2016 Midwest Fruit Pest Management Guide, developed by the Midwest Fruit Workers Group. The page numbers refer to the Management Guide—a link to the guide is provided below, if you would like to get more information.

Frequency of sprays
Apply on a 10 to 14-day schedule – use the shorter interval in wet weather. Alternate Rally with Pristine and Cabrio to prevent fungicide resistance. Do not apply more than two sprays without alternating.

An example of a 14 day-interval program for, say northern MD, would be:

In the spring--Starting after the last frost, at shoot emergence:
April 10: Rally 40WSP (Nova)
April 24: Cabrio 20EG
May 8: Rally 40WSP

In the fall---When primocane growth slows, until the first frost:
September 20: Rally 40WSP
October 4: Pristine 38WG
October 18: Rally 40WSP
November 1: Cabrio 20EG

Note that with high disease pressure, you would want to spray on a 10-day interval over these same time periods.

Some notes on these fungicides:

→ Rally may have a bit better curative activity than the others because of its greater systemicity, which would make it the material of choice during or after a rainy period with inoculum already present. Do not apply more than 1.5 lbs (24 oz.) of Rally per year (label restriction)
→ Since Pristine has two active ingredients, it has the broadest spectrum of activity.

→ Avoid applying strobilurins (Cabrio or Pristine) more than three times each season, to prevent resistance development.

→ While Abound (azoxystrobin) is labeled for use on brambles, it does not have orange rust (or any other rust for that matter) on the label.

3. Resistant Cultivars

Red raspberries are all resistant. If you have persistent orange rust problems, this may be a good option.

Blackberry varieties reported to be resistant include: Choctaw, Commanche, Cherokee, Cheyenne

Susceptible blackberry cultivars include: Navaho, Ouachita, Chickasaw, Chester, Triple Crown. All black and purple raspberries are susceptible

Note: Triple Crown is reported as resistant in Kentucky trials, but it appears to be susceptible in our region.

4. Site Selection

Avoid planting near woodlots or riparian corridors that have wild brambles.

5. Clean Planting Material

Getting plant material from a clean source is critical to preventing establishment of orange rust in your field

RESOURCES

For additional information on orange rust and other bramble diseases:

Orange Rust on Brambles, by Mike Ellis. Ohioline.

http://ohioline.osu.edu/factsheet/plpath-fru-30

Midwest Fruit Pest Management Guide 2016. Produced by the Midwest Fruit Workers Group, out of Purdue University. Fungicide recommendations for bramble disease control.

https://ag.purdue.edu/hla/Hort/Documents/ID-465.pdf

Midwest Small Fruit Pest Management Handbook. Produced by Richard C. Funt, Michael A. Ellis, Celeste Welty, out of The Ohio State University. Comprehensive information on orange rust biology and cultural control.

http://pested.osu.edu/documents/CommStudy/2b%20Midwest%20Small%20Fruit%20Pest%20Mgmt..pdf

Mid-Atlantic Berry Guide. Produced out of Penn State.

http://extension.psu.edu/publications/agrs-097

Agronomic Crops

Agronomic Crop Insect Management

Joanne Whalen, Extension IPM Specialist; jwhalen@udel.edu

Alfalfa
Continue to sample for potato leafhoppers on a weekly basis. We continue to find the first nymphs as well as adults in fields. Although both life stages can damage alfalfa, the nymphs can cause damage very quickly. Once plants are yellow, yield loss has already occurred. The treatment thresholds are 20 per 100 sweeps on alfalfa 3 inches or less in height, 50 per 100 sweeps in 4-6 inch tall alfalfa and 100 per 100 sweeps in 7-11 inch tall alfalfa.

Field Corn
Continue to watch fields that are next to maturing small grains for true armyworms, cereal leaf beetles and native brown stink bugs

(I) True Armyworms (TAW) - Fields planted next to barley and wheat fields, especially untreated fields, should be scouted for armyworms moving from small grains into adjacent corn fields. Control will be difficult once larvae move deep in whorls. Remember, worms must be less than 1 inch long – some labels indicate that larvae need to be even smaller - to achieve effective control. The treatment threshold for true armyworms in corn is 25% infested plants with larvae less than one inch long.

(II) Cereal Leaf Beetles (CLB) - We continue to find a few fields with CLB adult feeding. Beetle adults can be found moving out of untreated small grains and feeding on the edge of corn fields. Although we do not have any firm thresholds for this insect on corn, as a general guideline controls may be needed if you find an average of 10 beetles per plant and 50% of the plants exhibit feeding damage. In the Midwest, it has been reported that the adult beetle is a vector of maize chlorotic mottle virus (MCMV) that causes corn lethal necrosis disease. Thresholds for beetle feeding would be much lower if this disease is an issue. We have not seen this virus in Delaware corn fields; however, please let us know if you suspect a problem.

(III) Native Brown and Green Stink Bugs –As indicated in past articles, sampling in wheat can give an indication for the potential for problems in nearby corn fields. Information from North Carolina indicated that if you capture 5 or more stink bugs in 20 sweeps in nearby wheat you should be vigilant for movement into corn. If you do not have a nearby wheat field, you will want to check weeds and forested areas near your corn, especially if you have weedy ditches nearby. These areas can provide holding places for stink bugs that can move in and out of fields. For more information on management of stinkbugs in field corn, please visit the following link: https://entomology.ces.ncsu.edu/2016/05/how-to-avoid-a-stink-bug-disaster-in-corn-2/?src=rss.

Soybeans
As soon as soybeans emerge, be sure to begin sampling fields for the following seedling stage insect pests:

(I) Grasshoppers: We continue to find grasshoppers present in emerged no-till full season fields. As barley is harvested and soybeans are planted, these fields will be especially susceptible to attack by grasshoppers which can cause stand loss. If stand reductions are occurring from plant emergence to the second trifoliate, a treatment should be applied. Although no precise thresholds are available, a treatment may be needed if you find one grasshopper per sweep and 30% defoliation from plant emergence through the pre-bloom stage.

(II) Bean Leaf Beetle: As a general guideline, a treatment may be needed for bean leaf beetle if you observe a 20 - 25% stand reduction and/or 2 beetles per plant from cotyledon to the second trifoliate stages. These treatment thresholds should be reduced if bean pod mottle virus is present in your area and/or you suspected virus the previous season.

(III) Thrips: Thrips can feed and reproduce on the leaves and buds of soybean seedlings. Their feeding creates bleached-out lesions along the leaf veins and gives a silvery/bronzed appearance to the leaf surface when damage is severe. These insects are very small (less than one tenth of an inch) and are torpedo shaped. While thrips always occur on seedling stage

soybeans, it is only during outbreak years that they cause concern. In particular, during dry weather and on earlier planted full-season soybeans, thrips populations can explode when plants are growing slowly. Under these circumstances thrips injury will occasionally kill seedlings. Other stressors, such as nutrient deficiencies and herbicide injury, can add to thrips damage and cause plant loss. Yellowing can occur from thrips but there are also a number of other factors that can cause yellowing so it is important to scout fields to identify what is causing the yellowing. Although no precise thresholds are available, as a general guideline, treatment may be needed if you find 4-8 thrips per leaflet and plant damage is observed.

As a reminder, OP insecticides (examples - dimethoate or Lorsban) cannot be combined with SU/ALS herbicides. Since other materials may also state restrictions regarding combinations of insecticide and herbicides, you should be sure to check all labels carefully before combining insecticides and herbicides.

Slugs can also still be found damaging soybeans, especially in fields with heavy cover crop residue. The slugs are able to survive under the cover crop and feed on the soybean seeds underground, especially if the seed slot is not closed, as well as on cotyledons as they are trying to emerge. ***If a field needs to be replanted, tillage before replanting is critical to help manage the slugs***. If a treatment with a bait product is needed, labeled products include Deadline MPs (the most common metaldehyde formulation labeled and available in Delaware), Iron Fist and Sluggo. Be sure to read all labels before making an application. If you plan to use Deadline MPs be sure to look at the new label since the maximum rate allowed per acre per application is lower on soybeans compared to corn and it can only be broadcast up to the V4 stage. http://www.cdms.net/ldat/ld2GN006.pdf

Postemergence Sprays for Cornfields with Palmer Amaranth

– *Mark VanGessel, Extension Weed Specialist*; mjv@udel.edu

I have seen Palmer amaranth seedlings emerging in corn fields that had no preemergence herbicides applied. There are Palmer amaranth plants in DE and MD that are resistant to glyphosate and ALS herbicides (Group 2). Fields with Palmer amaranth present, or fields where you suspect they are present, need to be treated with an effective herbicide (or herbicide combination) that will provide postemergence control as well as residual control. Some considerations include atrazine, Callisto, Capreno, Impact, Armezon, or Halex GT. If you applied Lumax, Lexar, or Acuron at planting be you may be limited in how much mesotrione (Callisto or Halex GT) you can apply postemergence; refer to the label for maximum use rate per season.

Other products such as Status, DiFlexx, or Liberty can provide effective postemergence control, but will not provide residual control.

Palmer amaranth plants look very similar to smooth and redroot pigweed. However, Palmer amaranth leaves, stems, and petioles do not have hairs (smooth and redroot pigweed do have fine hairs). Palmer amaranth's leaves have long petioles that are often as long, or longer, than the leaf blade. As a result, the leaves often droop. Occasionally, leaves will have a variegated "V" mark or watermark across the leaf blade.

Palmer amaranth seedling

Palmer amaranth on top and smooth pigweed on bottom, note presence of hairs on the smooth pigweed.

Harvest Aids for Small Grain – *Mark VanGessel, Extension Weed Specialist*; mjv@udel.edu

A number of glyphosate products such as Roundup and Touchdown are labeled as harvest aids for winter wheat and barley (but not malting barley). Check the label of other formulations of glyphosate to be sure the product you use is labeled as a harvest aid. Applications must be made after the hard-dough stage and at least 7 days prior to harvest. Use of 2,4-D (or products containing 2,4-D) is generally not recommended as a harvest aid due to its volatility, and potential damage to the crop during application. Be aware of the replant interval for 2,4-D as well.

I am not aware of any paraquat formulation labeled as harvest aid for small grains.

Postemergence Management of Glyphosate-Resistant Horseweed in Soybeans – *Mark VanGessel, Extension Weed Specialist*; mjv@udel.edu

Options for controlling horseweed resistant to glyphosate after the soybeans have emerged are very limited. Liberty Link soybeans are an exception, because Liberty 280 is quite effective on horseweed (be sure to keep your rates up and keep spray volume up to ensure good coverage).

For non-Liberty Link soybeans the options are very limited. I have had very inconsistent results trying to control horseweed with ALS products (such as FirstRate, Classic or Synchrony). Part of this is due to ALS resistant horseweed populations scattered around the region; and partly due to application to larger weeds or weeds "burnt off" and starting to recover. If you want to try either FirstRate or Synchrony on STS soybeans, use the highest rate allowed and full-adjuvant systems (refer to the labels). Horseweed plants are generally not very tolerant of shade and most soybeans will canopy over the horseweed and out-compete them. Additional glyphosate applications will provide some suppression of horseweed and sometimes the soybeans have a chance to outcompete them. It is always best to treat the horseweed soon after

they start regrowing from the burndown application.

Fungicide Efficacy Tables for Field Corn and Soybeans - *Nathan Kleczewski, Extension Specialist – Plant Pathology*; nkleczew@udel.edu

Three fungicide efficacy tables developed by groups of plant pathologist from across the US are included at the back of this issue of WCU:

Fungicide Efficacy for Control of Soybean Seedling Diseases

Foliar Fungicide Efficacy for Control of Foliar Soybean Disease

Fungicide Efficacy for Control of Corn Diseases

Announcements

Free Webinars in June, Sponsored by the Mid-Atlantic Women in Agriculture

6/22: Snap It, then App It - With digital and smart phone photography, everyone can be a photographer! And a good one at that! This webinar will review the leading photography apps available. Learn how to correct mistakes and make an ordinary snapshot a work of art suitable for your family or business.

To register:
http://www.eventbrite.com/e/wednesday-webinars-registration-11452674257

Webinars begin at noon EST. Duration is approximately 1 hour. For optimal performance we suggest using Internet Explorer as your web browser and connecting via Ethernet connection instead of wireless (wireless will work, but a hard line is more stable)

See website for more information and other upcoming topics: https://extension.umd.edu/womeninag/webinars

If you do not have access to high speed internet and would like to participate in one of the above webinars, contact Tracy Wootten at wootten@udel.edu.

2016 Horticulture Short Courses

For the complete list of 2016 courses go to:
http://extension.udel.edu/lawngarden/commercial-horticulture/2016-horticulture-short-courses/

Pest and Beneficial Insect Walks
June 22 4:00 -6:00 p.m.
University of Delaware Botanic Gardens
531 S College Avenue, Newark, DE
(Meet at the entrance to Fischer Greenhouse.)
Register with Carrie Murphy (302) 831-2506 or cjmurphy@udel.edu.

Cost: $15
Credits: 2 Pest., 2 ISA,1 CNP
Learn to identify insect and disease pests, as well as beneficial insects in the landscape at either the Sussex County Extension Office or the University of Delaware Botanic Gardens. Instructors: Nancy Gregory, Brian Kunkel, Carrie Murphy, Tracy Wootten, and Megan Pleasanton

Plant Identification - Herbaceous Plants
June, 29 4:30 – 5:30 p.m.
University of Delaware Botanic Gardens
531 S College Avenue, Newark, DE

Cost: $15
Credits: 1 Pest., 1 CNP
Learn to identify some of the great herbaceous plants used in the landscape. We will cover the common disease and insect pests of each and strategies for incorporating into the landscape. Meet at UDBG Herbaceous Garden. Instructors: Valann Budischak and Sue Barton

Register with Carrie Murphy (302) 831-2506 or cjmurphy@udel.edu.

Landscape Weed Walk
July 7 4:00-5:30 p.m.
University of Delaware Botanic Gardens
531 S College Avenue, Newark

Cost: $15
Credits: 1 Pest., 1 CNP
Learn to identify several common landscape weeds found in turf and flower beds during the spring. We will also discuss management. Meet at the entrance to Fischer Greenhouse. Instructors: Brian Kunkel and Susan Barton

Register with Carrie Murphy (302) 831-2506 or cjmurphy@udel.edu.

Disease and Insect Identification Workshop
July 13, 4-6 pm
Townsend Hall, 531 S College Avenue, Newark,
Room 012 Townsend Hall

Cost: $15
Credits: 2 Pest., 2 ISA,1 CNP
Learn what signs and symptoms the Extension Specialists use to identify pests and diseases! Tips and techniques will be shared. Fresh and preserved specimens will be available to look at using hand lenses and microscopes. Instructors: Nancy Gregory and Brian Kunkel

Register with Carrie Murphy (302) 831-2506 or cjmurphy@udel.edu.

2016 UD Weed Science Field Day

Wednesday, June 29 8:30 a.m.
University of Delaware
Carvel Research and Education Center
Route 9 (16483 County Seat Highway), Georgetown, DE

The 2016 Weed Science Field Day will be held **Wednesday**, **June 29** at the University of Delaware Research and Education Center, Route 9 (16483 County Seat Highway), Georgetown, DE.

The day will begin with **registration beginning at 8:30** at the Grove near the farm buildings and new office building on the north side of the road. We will start to view the plots at 8:45 am. Coffee, juices, and donuts will be provided. We will also provide sandwiches for lunch.

Pesticide credits and Certified Crop Advisor continuation credits will also be available.

Dr. Charlie Cahoon, VA Tech, will hold a field day on Tuesday, June 28th at the Painter Research Facility

Dr. Burkhard Schulz, Univ of MD, will hold a field day on Thursday, June 30th.

Weather Summary

Carvel Research and Education Center Georgetown, DE

Week of June 2 to June 8, 2016

Readings Taken from Midnight to Midnight

Rainfall:

0.01 inch: June 3
0.04 inch: June 5
0.06 inch: June 7

Air Temperature:

Highs ranged from 88°F on June 7 to 72°F on June 2.

Lows ranged from 71°F on June 6 to 54°F on June 8.

Soil Temperature:

76.2°F average

Additional Delaware weather data is available at http://www.deos.udel.edu/monthly_retrieval.html and http://www.rec.udel.edu/TopLevel/Weather.htm

Weekly Crop Update is compiled and edited by Emmalea Ernest, Associate Scientist – Vegetable Crops

Management of Soybean Seedling Diseases
Fungicide Efficacy for Control of Soybean Seedling Diseases – May 2015

The members of the Identification and Biology of Seedling Pathogens of Soybean project funded by the North Central Soybean Research Program and plant pathologists across the United States have developed the following ratings for how well fungicide seed treatments control seedling diseases of soybeans in the United States. Efficacy ratings for each fungicide active ingredient listed in the table were determined by field-testing the materials over multiple years and locations by the members of this group, and include ratings summarized from national fungicide trials published in Plant Disease Management Reports (and formerly Fungicide and Nematicide Tests) by the American Phytopathological Society at http://www.apsnet.org. Each rating is based on the fungicide's level of disease control, and does not necessarily reflect efficacy of fungicide active ingredient combinations and/or yield increases obtained from applying the active ingredient.

The list includes the most widely marketed products available. It is not intended to be a list of all labeled active ingredients and products. Additional active ingredients may be available, but have not been evaluated in a manner allowing a rating. Products listed are the most common products available as of the release date of the table; all available products may not be listed. Additional active ingredients may be included in some products for insect and nematode control, however; only active ingredients for pathogen control are listed and rated.

Many active ingredients and their products have specific use restrictions. Read and follow all use restrictions before applying any fungicide to seed, or before handling any fungicide-treated seed. This information is provided only as a guide. It is the applicator's and users legal responsibility to read and follow all current label directions. Reference in this publication to any specific commercial product, process, or service, or the use of any trade, firm, or corporation name is for general informational purposes only and does not constitute an endorsement, recommendation, or certification of any kind by members of the group, or by the North Central Soybean Research Program. Individuals using such products assume responsibility for their use in accordance with current directions of the manufacturer. Efficacy categories: E = Excellent; VG = Very Good; G = Good; F = Fair; P = Poor; NR = Not Recommended; NS = Not Specified on product label; U = Unknown efficacy or insufficient data to rank product. Please note: Efficacy ratings may be dependent on the rate of the fungicide product on seed. Contact your local Extension plant pathologist for recommended fungicide product rate information for your area.

Fungicide active ingredient	*Pythium* sp.[1.]	Phytophthora root rot	*Rhizoctonia* sp.	*Fusarium* sp.[1,2]	Sudden death syndrome (SDS) (*Fusarium virguliforme*)	*Phomopsis* sp.
Azoxystrobin	P	NS	E	G	NR	G
Carboxin	U	U	G	U	NR	U
Chloroneb	U	P	E	P	NR	P
Ethaboxam	E	E	U	U	U	U
Fludioxonil	NR	NR	G	F-E	NR	G
Fluopyram	NR	NR	NR	NR	VG	NR
Fluxapyroxad	U	U	E	G	NR	G
Ipconazole	P	NR	F-G	F-E	NR	G
Mefenoxam	E	E	NR	NR	NR	NR
Metalaxyl	E	E	NR	NR	NR	NR
PCNB	NR	NR	G	U	NR	G
Penflufen	NR	NR	G	G	NR	G
Prothioconazole	NR	NR	G	G	NR	G
Pyraclostrobin	P	NR	F	F	NR	F
Sedaxane	NS	NS	E	NS	NR	G
Thiabendazole	NS	NS	NS	NS	U	U
Trifloxystrobin	P	P	F-E	F-G	NR	G

[1.] Products may vary in efficacy against different *Fusarium* and *Pythium* species.
[2.] Listed seed treatments do not have efficacy against *Fusarium virguliforme*, causal agent of sudden death syndrome.

Fungicide(s)	
Product/Trade name	**Active ingredient**
Acceleron	DX-612 Fluxapyroxad DX-309 Metalaxyl DX-109 Pyraclostrobin
Allegiance FL	Metalaxyl
Allegiance LS	Metalaxyl
Apron XL LS	Mefenoxam
ApronMaxx RFC	Fludioxonil Mefenoxam
ApronMaxx RTA	Fludioxonil Mefenoxam
Catapult XL	Chloroneb Mefenoxam
CruiserMaxx	Fludioxonil Mefenoxam
CruiserMaxx Advanced or Cruiser Maxx Plus	Fludioxonil Mefenoxam
CruiserMaxx Advanced Vibrance	Fludioxonil Mefenoxam Sedaxane
Dynasty	Azoxystrobin
EverGol Energy SB	Metalaxyl Penflufen Prothioconazole
ILeVO	Fluopyram
Inovate Pro	Ipconazole Metalaxyl
Intego	Ethaboxam
Maxim 4FS	Fludioxonil
Mertect 340 F	Thiabendazole
Prevail	Carboxin Metalaxyl PCNB
Trilex 2000	Metalaxyl Trifloxystrobin
Vibrance	Sedaxane
Warden CX	Fludioxonil Mefenoxam Sedaxane
Warden RTA	Fludioxonil Mefenoxam

Management of Soybean Diseases
Foliar Fungicide Efficacy for Control of Foliar Soybean Diseases—April 2015

The North Central Regional Committee on Soybean Diseases (NCERA-137) has developed the following information on foliar fungicide efficacy for control of major foliar soybean diseases in the United States. Efficacy ratings for each fungicide listed in the table were determined by field-testing the materials over multiple years and locations by the members of the committee. Efficacy ratings are based upon level of disease control achieved by product, and are not necessarily reflective of yield increases obtained from product application. Efficacy depends upon proper application timing, rate, and application method to achieve optimum effectiveness of the fungicide as determined by labeled instructions and overall level of disease in the field at the time of application. Differences in efficacy among fungicide products were determined by direct comparisons among products in field tests and are based on a single application of the labeled rate as listed in the table, unless otherwise noted. **Table includes systemic fungicides available that have been tested over multiple years and locations. The table is not intended to be a list of all labeled products[1]**. Efficacy categories: NR=Not Recommended; P=Poor; F=Fair; G=Good; VG=Very Good; E=Excellent; NL = Not Labeled for use against this disease; U = Unknown efficacy or insufficient data to rank product efficacy.

Fungicide(s)				Aerial web blight	Anthracnose	Brown spot	Cercospora leaf blight[2]	Frogeye leaf spot[3]	*Phomopsis*/ *Diaporthe* (Pod and stem blight)	Soybean rust	White mold[4]	Harvest restriction[5]
Class	**Active ingredient (%)**	**Product/Trade name**	**Rate/ A (fl oz)**									
QoI Strobilurins Group 11	**Azoxystrobin 22.9%**	**Quadris 2.08 SC**	**6.0 - 15.5**	VG	VG	G	F	P	U	G-VG	P	14 days
	Fluoxastrobin 40.3%	**Aftershock 480 SC Evito 480 SC**	**2.0 – 5.7**	VG	G	G	F	P	U	U	NL	R5 (beginning seed) 30 days
	Picoxystrobin	**Aproach 2.08 SC**	**6.0 - 12.0**	VG	G	G	F	P	U	G	G[8]	14 days
	Pyraclostrobin 23.6%	**Headline 2.09 EC/SC**	**6.0 - 12.0**	VG	VG	G	F	P	U	VG	NL	21 days
DMI Triazoles Group 3	**Cyproconazole 8.9%**	**Alto 100SL**	**2.75 – 5.5**	U	U	VG	F	F	U	VG	NL	30 days
	Flutriafol 11.8%	**Topguard 1.04 SC**	**7.0 – 14.0**	U	VG	VG	F	VG	U	VG-E	F	21 days
	Propiconazole 41.8%	**Tilt 3.6 EC Multiple Generics[6]**	**2.0 - 4.0**	P	VG	G	NL	F	NL	VG	NL	R5 (beginning seed)
	Prothioconazole 41.0%	**Proline 480 SC[7]**	**5.0- 5.7**	NL	NL	NL	NL	G-VG	NL	VG	F	21 days
	Tetraconazole 20.5%	**Domark 230 ME Multiple Generics**	**4.0 – 5.0**	NL	VG	VG	F	G	U	VG-E	F	R5 (beginning seed)
MBC Thiophanates Group 1	**Thiophanate-methyl**	**Topsin-M Multiple Generics**	**10.0 – 20.0**	U	U	U	F	VG	U	G	F	21 days

Fungicide(s)				Aerial web blight	Anthracnose	Brown spot	Cercospora leaf blight	Frogeye leaf spot	*Phomopsis/ Diaporthe* (Pod and Stem blight)	Soybean rust	White mold	Harvest restriction
Class	**Active ingredient (%)**	**Product/Trade name**	**Rate/A (fl oz)**									
SDHI Carboximides Group 7	**Boscalid 70%**	**Endura 0.7 DF**	**3.5 – 11.0**	U	NL	VG	U	P	NL	NL	VG	21 days
Mixed mode of action	**Azoxystrobin 18.2% Difenoconazole 11.4%**	**Quadris Top 2.72 SC**	**8.0 – 14.0**	U	U	U	U	VG	U	VG	NL	14 days
	Azoxystrobin 7.0% Propiconazole 11.7%	**Avaris 1.66 SC Quilt 1.66 SC HM-0812 1.66 SC**	**14.0 – 20.5**	U	U	G	U	F	U	VG	NL	21 days
	Azoxystrobin 13.5% Propiconazole 11.7%	**Quilt Xcel 2.2 SE**	**10.5 - 21.0**	E	VG	G	F	F	U	VG	NL	R6
	Cyproconazole 7.17% Picoxystrobin 17.94%	**Aproach Prima 2.34 SC**	**5.0-6.8**	U	U	U	U	G	U	U	NL	14 days
	Fluoxastrobin 18.0% Tebuconazole 25.0%	**Evito T 3.99 F**	**4.0 -6.0**	U	F	VG	P-F	F	U	U	NL	30 days
	Flutriafol 19.3% Fluoxastrobin 14.84%	**Fortix**	**4.0-6.0**	U	U	U	U	G	U	U	U	R5 (beginning seed)
	Pyraclostrobin 28.58% Fluxapyroxad 14.33%	**Priaxor 4.17 SC**	**4.0 – 8.0**	E	VG	E	F	F	U	VG	P	21 days
	Pyraclostrobin 28.58% Fluxapyroxad 14.33% Tetraconazole 20.50%	**Priaxor D 4.17 SC 1.9 SC**	**4.0 (each com-ponent)**	U	U	U	U	G	U	U	U	21 days R5 (beginning seed)
	Trifloxystrobin 32.3% Prothioconazole 10.8%	**Stratego YLD 4.18 SC[8]**	**4.0 – 4.65**	VG	VG	VG	F	F	U	VG	NL	21 days

[1]Multiple fungicides are labeled for soybean rust only, powdery mildew, and Alternaria leaf spot, including tebuconazole (multiple products) and Laredo (myclobutanil). Contact fungicides such as chlorothalonil may also be labeled for use.

[2] Cercospora leaf blight efficacy relies on accurate application timing, and standard R3 application timings may not provide adequate disease control. Fungicide efficacy may improve with earlier or later applications. Fungicides with a solo or mixed QoI or MBC mode of action may not be effective in areas where QoI or MBC resistance has been detected in the fungal population that causes Cercospora leaf blight.

[3] In areas where QoI-fungicide resistant isolates of the frogeye leaf spot pathogen are <u>not</u> present, QoI fungicides may be more effective than indicated in this table

[4] White mold efficacy is based on R1-R2 application timing, and lower efficacy is obtained at R3 or later application timings, or if disease symptoms are already present at the time of application.

[5]Harvest restrictions are listed for soybean harvested for grain. Restrictions may vary for other types of soybean (edamame, etc.) and soybean for other uses such as forage or fodder.

[6]Multiple generic products containing this mode of action may also be labeled in some states.

[7]Proline has a supplemental label (2ee) for soybean, only for use on white mold in IL, IN, IA, MI, MN, NE, ND, OH, SD, WI. A separate 2ee for NY exists for white mold.
[8]Stratego YLD has a supplemental label (2ee) for white mold on soybean only in IL, IN, IA, MI, MN, NE, ND, OH, SD, WI.
[9] Rating is based on two applications of a 9 fl oz/A rate of Aproach at R1 and R3.

Many products have specific use restrictions about the amount of active ingredient that can be applied within a period of time or the amount of sequential applications that can occur. Please read and follow all specific use restrictions prior to fungicide use. This information is provided only as a guide. It is the responsibility of the pesticide applicator by law to read and follow all current label directions. Reference to products in this publication is not intended to be an endorsement to the exclusion of others that may be similar. Persons using such products assume responsibility for their use in accordance with current directions of the manufacturer. Members or participants in the NCERA-212 or NCERA-208 group assume no liability resulting from the use of these products.

Management of Corn Diseases
Fungicide Efficacy for Control of Corn Diseases—April 2015

The Corn Disease Working Group (CDWG) has developed the following information on fungicide efficacy for control of major corn diseases in the United States. Efficacy ratings for each fungicide listed in the table were determined by field testing the materials over multiple years and locations by the members of the committee. Efficacy ratings are based upon level of disease control achieved by product, and are not necessarily reflective of yield increases obtained from product application. Efficacy depends upon proper application timing, rate, and application method to achieve optimum effectiveness of the fungicide as determined by labeled instructions and overall level of disease in the field at the time of application. Differences in efficacy among fungicide products were determined by direct comparisons among products in field tests and are based on a *single application* of the labeled rate as listed in the table. **Table includes systemic fungicides available that have been tested over multiple years and locations. The table is not intended to be a list of all labeled products**[1]. Efficacy categories: NR=Not Recommended; P=Poor; F=Fair; G=Good; VG=Very Good; E=Excellent; NL = Not Labeled for use against this disease; U = Unknown efficacy or insufficient data to rank product

Fungicide(s)				Anthracnose leaf blight	Common rust	Eyespot	Gray leaf spot	Northern leaf blight	Southern rust	Harvest Restriction[2]
Class	Active ingredient (%)	Product/Trade name	Rate/A (fl oz)							
Qol Strobilurins Group 11	Azoxystrobin 22.9%	Quadris 2.08 SC Multiple Generics	6.0 - 15.5	VG	E	VG	E	G	G	7 days
	Pyraclostrobin 23.6%	Headline 2.09 EC/SC	6.0 - 12.0	VG	E	E	E	VG	E	7 days
	Picoxystrobin	Aproach 2.08 SC	3.0 – 12.0	VG	VG-E	VG	F-VG	VG	U	7 days
DMI Triazoles Group 3	Propiconazole 41.8%	Tilt 3.6 EC Multiple Generics	2.0 - 4.0	NL	VG	E	G	G	G	30 days
	Prothioconazole 41.0%	Proline 480 SC	5.7	U	VG	E	U	VG	G	14 days
	Tebuconazole 38.7%	Folicur 3.6 F Multiple Generics	4.0 - 6.0	NL	U	NL	U	VG	U	36 days
	Tetraconazole 20.5%	Domark 230 ME Multiple Generics	4.0 – 6.0	U	U	U	E	U	G	R3 (milk)
Mixed modes of action	Azoxystrobin 13.5% Propiconazole 11.7%	Quilt Xcel 2.2 SE Aframe Plus 2.2 SE	10.5 - 14.0	VG	VG-E	VG-E	E	VG	VG	30 days
	Cyproconazole 7.17% Picoxystrobin 17.94%	Aproach Prima 2.34 SC	3.4 – 6.8	U	U	U	E	VG	VG	30 days
	Flutriafol 19.3% Fluoxastrobin 14.84%	Fortix 3.22 SC	4.0 -6.0	U	U	U	E	VG	VG	R4 (dough)
	Pyraclostrobin 13.6% Metconazole 5.1%	Headline AMP 1.68 SC	10.0 - 14.4	U	E	E	E	VG	VG	20 days
	Pyraclostrobin 28.58% Fluxapyroxad 14.33%	Priaxor 4.17 SC	4.0 – 8.0	U	VG	U	VG	U	G	21 days
	Trifloxystrobin 32.3% Prothioconazole 10.8%	Stratego YLD 4.18 SC	4.0 - 5.0	VG	E	VG	E	VG	VG	14 days

[1]Additional fungicides are labeled for disease on corn, including contact fungicides such as chlorothalonil. Certain fungicides may be available for diseases not listed in the table, including Gibberella and Fusarium ear rot. Applications of Proline 480 SC for use on ear rots requires a FIFRA Section 2(ee) and is only approved for use in Illinois, Indiana, Iowa, Louisiana, Maryland, Michigan, Mississippi, North Dakota, Ohio, Pennsylvania, and Virginia.

[2]Harvest restrictions are listed for field corn harvested for grain. Restrictions may vary for other types of corn (sweet, seed or popcorn, etc.), and corn for other uses such as forage or fodder.

Many products have specific use restrictions about the amount of active ingredient that can be applied within a period of time or the amount of sequential applications that can occur. Please read and follow all specific use restrictions prior to fungicide use. This information is provided only as a guide. It is the responsibility of the pesticide applicator by law to read and follow all current label directions. Reference to products in this publication is not intended to be an endorsement to the exclusion of others that may be similar. Persons using such products assume responsibility for their use in accordance with current directions of the manufacturer. Members or participants in the CDWG assume no liability resulting from the use of these products.