WEEKLY CROP UPDATE
UNIVERSITY OF DELAWARE COOPERATIVE EXTENSION

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Vegetable Crops

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

Asparagus
Asparagus beetles adults can be found laying eggs and feeding on spears. As a general guideline, a treatment is recommended if 2% of the spears are infested with eggs. Since adults also feed on the spears, a treatment is recommended if 5% of the plants are infested with adults

Cabbage
Continue to scout for diamondback and imported cabbageworm larvae. A treatment should be applied when 5% of the plants are infested and before larvae move to the hearts of the plants.

Melons
As soon as plants are set in the field, be sure to scout for aphids and cucumber beetles. Aphids can be found in some of the earliest transplanted fields. When sampling for aphids be sure to watch for beneficial insects as well since they can help to crash aphid populations. As a general guideline, a treatment should be applied for aphids when 20% of the plants are infested, with at least 5 aphids per leaf and before significant leaf curling occurs.

Potatoes
The first emerged adults can be found in fields where at planting insecticides were not applied. A treatment should not be needed for adults until 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.

Sweet Corn
Be sure to scout emerged fields for cutworms and flea beetles. As a general guideline, treatments should be applied for cutworms if you find 3% cut plants or 10% leaf feeding. In order to get an accurate estimate of flea beetle populations, fields should be scouted mid-day when beetles are active. A treatment will be needed if 5% of the plants are infested with beetles.

Controlled Release vs Slow Release Fertilizer Products in Vegetable Crops – *Gordon Johnson, Extension Vegetable & Fruit Specialist;* gcjohn@udel.edu

There has been considerable work on controlled release fertilizer over the years and many of the different technologies have shown potential for use with vegetable crops. Controlled released fertilizer is most useful with nutrients that are subject to leaching losses, particularly nitrogen.

Controlled released fertilizers should not be confused with slow release fertilizers. With slow released fertilizers, release pattern over time is not easily predicted and may be affected by moisture, temperature, and microbial activity. Historically slow released fertilizers have included organic sources that require decomposition and mineralization such as

manures, composts, waste products from plant or animal sources, and plant residues.

There are also slow release mineral based fertilizers such as magnesium ammonium phosphate (an N, P and Mg source), clinoptilolite (a natural Zeolite that can be reacted with NH_4 which is held tightly and reacts as a slow release N source), rock phosphate (a P source), greensand (a K source), limestone (Ca and Mg source), glass frits (fritted trace elements in a fused glass form), and elemental sulfur. These materials are released upon weathering and dissolution (sulfur is converted to sulfate by microbial action).

An older technology that produces slow release N fertilizer is when urea is combined with an aldehyde. These fertilizers are in liquid or dry forms and include UreaForm (UF), Methylene Urea (MU), Triazone, and IBDU. Longevity depends on length of chemical chain and microbial activity needed to release the N. An exception is IBDU where N is released by hydrolysis at a slow rate and granule size controls longevity. Liquid forms of these products are very useful for foliar fertilization as they have much less injury potential than salt based N sources.

Another older slow release fertilizer technology is sulfur coated urea. This technology was developed at the TVA and commercialized in the 70s. Liquid sulfur coats urea prill then hardens (prills are often then coated with wax. Breakdown and release of the N in sulfur coated urea is by both physical and microbial action and the size of coat determines the release rate.

In contrast to slow release fertilizers, controlled released fertilizers have a predictable release pattern over time that is commonly temperature based. Controlled release fertilizers that are currently used are based on diffusion coatings (polymer and resin coated products). These coatings include thermoset resins, where a fertilizer prill is surrounded by a hardened shell from resins added in multiple layers (such as Original Osmocote), thermoplastics where the prill surrounded by plastic shell with additives to create pores or wicks (such as Nutricote); and reactive layer coatings where a thin polyurethane shell is produced when 2 chemicals react as they are sprayed on the fertilizer prill (such as ESN).

Polymer coatings can be used on most fertilizers and are common in the nursery and greenhouse industries with complete fertilizer products applied to potted plants. Coated product technologies have advanced over the years to give more precise release properties. However, release will still be dependent on the type of coating, the thickness of the coating, as well as temperature and moisture. Controlled release fertilizers are commonly rated as to how long they take to release nutrients in days (70 day, 90 day, 120 day formulations for example). They can also be mixed with a small amount of regular soluble fertilizer to give an initial nutrient charge.

Coast of reactive layer coated urea has decreased over the last decade and this provides an economical opportunity to provide controlled released nitrogen to vegetable crops. These fertilizers increase plant nitrogen-use efficiency by reducing N applied. Use of these products also eliminates need to sidedress or fertigate, giving fuel and time savings. From an environmental perspective there is reduced nitrate contamination from leaching due to the release pattern of the coated fertilizer.

Controlled released fertilizer research in Delaware on vegetable crops has shown equivalent yields to conventional fertilizer in multiple application with the controlled release fertilizer placed before planting (thus eliminating applications). In some cases reduced rates were needed and there was reduced N leaching. Controlled released fertilizers were tested on squash, melons, watermelons, tomatoes, peppers, and strawberries with good results.

Research on the use of ESN polymer coated urea by Cornell on Long Island showed that reduced rates of N could be used on potatoes and sweet corn with equivalent yields. Recommendations from these studies were not to use straight controlled release but to blend with conventional N sources to provide 75-80% of the total N as controlled release. Overall they were able to reduce total N rates/acre by up to 20% in these vegetable crops.

Because controlled released N fertilizers are more expensive, for the economics to work out they need to be used at 10-25% reduced rates. Research has shown that this is possible on many vegetable crops.

Potato Late Blight Update #1: May 5, 2016 – *Nathan Kleczewski, Extension Specialist – Plant Pathology*; nkleczew@udel.edu

Green row: April 29th, 2016

	Townsend		Camden		Leipsic		Kenton	
Date	**DSV**	**Total DSV**	**DSV**	**Total DSV**	**DSV**	**Total DSV**	**DSV**	**Total DSV**
4/29-5/5	3	3	11	11	10	10	13	13

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.

Orondis, A New Fungicide from Syngenta – *Andy Wyenandt, Specialist in Vegetable Pathology, Rutgers University*; wyenandt@aesop.rutgers.edu

Syngenta Crop Protection released Orondis, a new fungicide with a new mode-of-action for use in vegetable production this past winter. Because of its registration date, Orondis was not included the 2016 Mid-Atlantic Commercial Vegetable Production Guide. Orondis (oxathiapiproplin, U15) targets the oxysterol binding protein that is a part of the cell wall. The active ingredient inhibits growth of the fungus as well as sporangia production and zoospore germination. Orondis has a low solubility (i.e., locally systemic), is translaminar; and will protect new growth. Orondis is currently sold as a co-pack with either mefenoxam (Orondis Gold), chlorothalonil (Orondis Opti), or mandipropamid (Orondis Ultra). Growers will be required to tank mix Orondis with its partner during 2016 season. In 2017, the partners will be formulated together. Importantly, Orondis will not receive an individual label in the US. Orondis has different use rates and restricted seasonal use. The label needs to be followed accordingly to help manage resistance development. Simply, if Orondis is applied via drip system, it cannot be used as a foliar spray (and visa-versa). If Orondis is applied as a foliar application it cannot be used via the drip. Thus, growers planning on using Orondis need to plan ahead of time and accordingly! The rates for Orondis and it counterpart will differ by crop, pathogen, and desired use (drip vs. foliar).

Orondis Products:

Orondis Gold 200 (oxathiapiprolin [OXTP] + mefenoxam, U15 + 4) -- Growers using Orondis

Gold will need refer to the Orondis Gold 200 (OXTP) label and the Orondis Gold B (mefenoxam) label.

Orondis Gold 200 targets damping-off caused pythium and/or phytophthora in cucurbits, fruiting vegetables, and leafy vegetables (excluding brassica's).

Orondis Opti (OXTP + chlorothalonil, U15 + M5) -- Growers using Orondis Opti will need to refer to the Orondis Opti A (OTXP) label and the Orondis Opti B (chlorothalonil) label

Orondis Opti targets alternaria and downy mildew in Brassicas; alternaria, gummy stem blight, and downy mildew in cucurbits; early blight, late blight, botrytis, leaf mold, and anthracnose in tomato to name a few. See label for more specifics.

Orondis Ultra (OXTP + mandipropamid, U15 + 40) – Growers using Orondis Ultra will need to refer to the Orondis Ultra A (OXTP) label and the Orondis Ultra B (mandipropamid) label. See labels for more specifics.

Orondis Ultra targets phytopthora blight and buckeye rot in fruiting vegetables; downy mildew and phytophthora in cucurbits; downy mildew in brassica's and onions to name a few. See labels for more specifics.

Fruit Crops

It's That Gray Mold Time of Year and Fungicide Resistance Issues Abound – *Cassandra Swett, Assistant Professor and Extension Specialist – Berry Pathology, University of Maryland and Penn State University*; clswett@umd.edu, https://twitter.com/berry_pathology

Strawberries are blooming, the rain is falling and it's warming into the 60s and 70'—and as a plant pathologist, all I see is Botrytis spores dancing about the farm.

We have already started to see Botrytis popping up on stem tissue and flower petals. Scouting for the pathogen in your fields will help inform you whether you need to spray. Preventing early flower and stem infections is critical to preventing Botrytis fruit rot.

To scout, look for grey fuzzy spores on dead tissue, especially near the base of the crown and on dead flowers under or touching the plastic — the warmer temperatures with the plastic mulch encourage spore formation, even when it's cool.

Between the rains, fungicides are our main arsenal to protect plants against gray mold, especially during bloom.

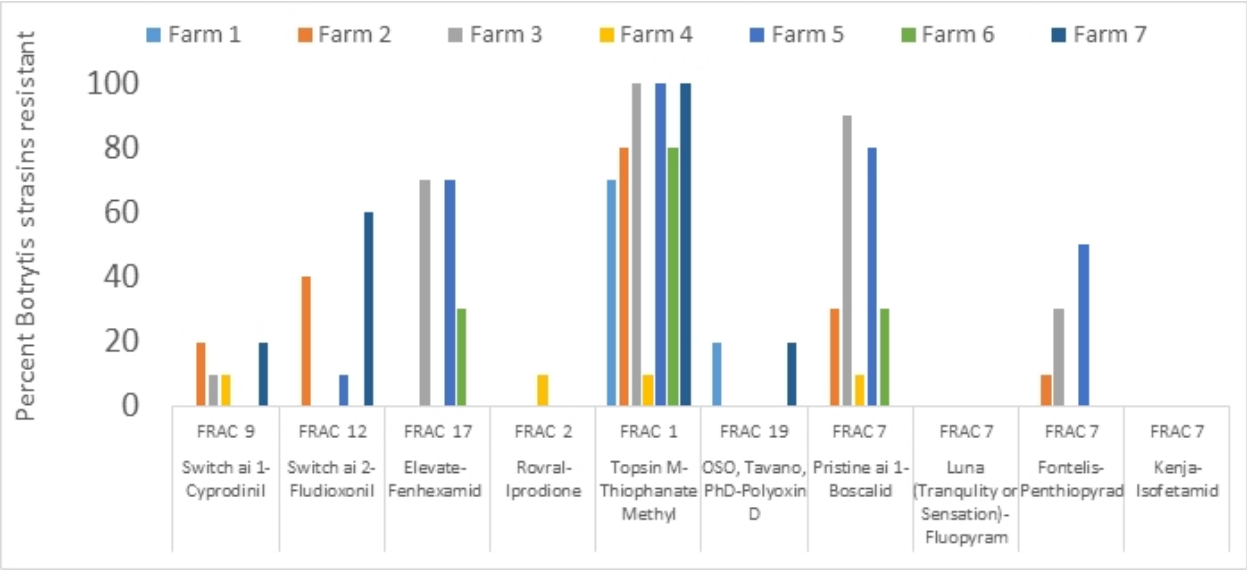
A large number of farms in the Mid-Atlantic region are experiencing problems with Botrytis strains (aka, individuals) that are resistant to one or more fungicides. The current status of fungicide resistance in the Mid-Atlantic is shown in the graph below, based on seven Maryland Farms (tests run by Clemson, from March – April 2016).

Some main issues of concern are:

1. The increase in strains resistant to BOTH compounds in Switch

2. Elevated resistance

3. Resistance to boscalid, which has been the more reliable of the two compounds in Pristine (most Botrytis stains are already resistant to the other Pristine product—pyraclostrobin, a strobilurin).



This figure shows the percentage of Botrytis strains (aka, individuals) that are resistant to each fungicide, on each farm. Data courtesy of Dr. Guido Schnabel, Clemson University.

It is important to give these recommendations serious consideration:

1. Limit the number of times fungicides in the same class are applied in one year.

2. It is recommended that all strobilurin (FRAC group 11, QoI) products not be used for Botrytis control. That's Abound, Azaka, Cabrio, Pristine, Merivon and Quadris Top. On most farms throughout the east, these products are not effective against Botrytis, and are currently only recommended to control Anthracnose. To control both pathogens, this means that you need to combine a Botrytis-effective compound (like Captevate) with an Anthracnose-effective product (like Cabrio).

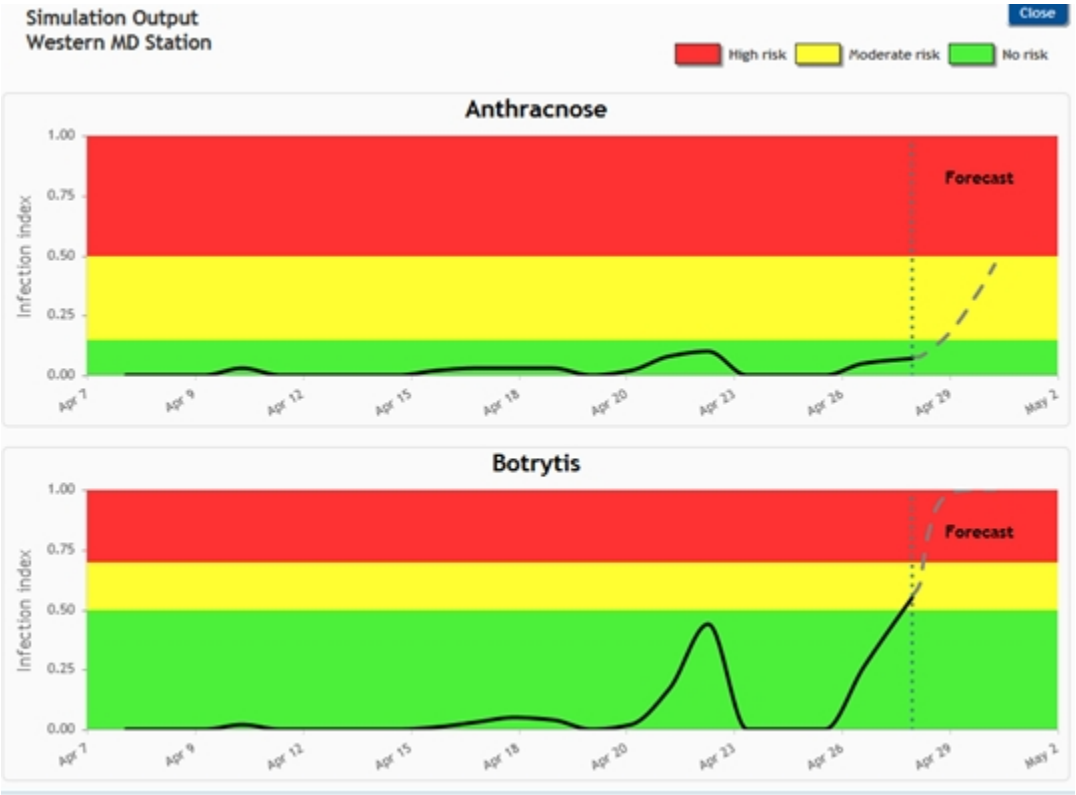
3. Tank mix broad spectrum fungicides such as captan or Thiram with Topsin M — Topsin M no longer has Botrytis activity (as shown in the graph), but is helpful for several early season foliar diseases.

4. Resistance profiles vary from farm to farm. Sample gray mold populations for their resistance through Clemson University. For instructions on how to submit samples see the link below. Contact your local extension agent or extension specialist for assistance in sample submission.
http://www.clemson.edu/extension/horticulture/fruit_vegetable/peach/diseases/gm_collection_instructions.pdf#new

5. The current recommendation is to rely on captan and thiram as your main protectants.

ONLY add FRAC 7, 9, 17 or 19 to this base protectant ONLY IF you have high risk situations. High risk occurs when plants remain wet for at least 12 hours, with temperatures above 65°F.

For now, you can estimate risk based on weather monitoring. We are currently working to bring a Botrytis and Anthracnose fruit rot risk evaluation tool to the Mid-Atlantic. This tool, called the Strawberry Advisory System, will provide text and/or email alerts to risk events. An example of a risk monitoring is shown below for the Western Maryland Experiment station, from April 7 to April 28, with a two day forecast from April 29-30. We are currently testing this system in Western Maryland, and plan to expand to grower field trials next year in Maryland, Pennsylvania and Virginia.



SAS-based risk evaluation for Botrytis and Anthracnose fruit rot.

Changes in fungicide efficacy are currently being incorporated into the Mid-Atlantic Berry Guide. For this spring, we recommend that you refer to the Southeast strawberry IPM guide for the most current fungicide resistance management recommendations. Take particular note of changes on pages 8 and 20. http://www.smallfruits.org/SmallFruitsRegGuide/Guides/2016/2016SEStrawberryIPMGuide.pdf

It's been a bumpy spring for strawberries. At least it sounds like we are out of the frost and freeze events. There's always a silver lining.

Agronomic Crops

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

Alfalfa

Be sure to check for alfalfa weevil adults and larvae within a week of cutting, especially if populations were above threshold before cutting. Feeding from both stages can hold back re-growth. After cutting, there needs to be enough "stubble" heat to control the weevils with a cutting. A stubble treatment will be needed if you find 2 or more weevils per stem and the population levels remain steady.

Field Corn

Be sure to watch for both cutworms and slugs feeding in newly emerged corn fields. We can find damage from slugs and cutworms, especially in no-till fields. As a general guideline, a treatment is recommended for cutworms if you find 10% leaf feeding or 3% cut plants. If cutworms are feeding below the soil surface, it will be important to treat as late in the day as possible, direct sprays to the base of the plants and use at least 30 gallons of water per acre. For cutworms, fields should be sampled through the 5-leaf stage for damage. With the current cool, rainy weather, we have seen a significant increase in slug damage. If slugs are damaging plants, you will be able to see "slime trails" on the leaves. Materials available for slug management include Deadline M-Ps (the main metadelhyde product available), Sluggo (iron phosphate) and IronFist (sodium ferric FDTA).

Small Grains
Aphids, grass sawflies, true armyworms and cereal leaf beetles can be found in fields throughout the state.

Cereal Leaf Beetle - We have seen a significant increase in cereal leaf beetle populations, especially in fields with a history of problems. Economic damage can occur in both barley and wheat. Research from Virginia and North Carolina indicates that the greatest damage from cereal leaf beetle can occur between flowering and the soft dough stage. For more information on monitoring and management, please visit the following link:

http://extension.udel.edu/factsheets/cereal-leaf-beetle-control-in-small-grains/

Armyworms and Grass Sawfly – Low levels of true armyworm moths can be found in our light traps. Although armyworm can attack both wheat and barley, they can quickly cause significant losses in barley. As a reminder, both overwintering and migratory moth populations are responsible for our infestations. As indicated in previous newsletters, trap counts in Kentucky have been lower than their rolling 5-year averages (http://www.uky.edu/Ag/IPMPrinceton/counts/taw/tawgraph.htm). For more information on monitoring and management, please visit the following link:

http://extension.udel.edu/factsheets/grass-sawfly-and-true-armyworm-management-in-small-grains/

Aphids - With the current weather conditions, you will also need to watch for aphids feeding in the heads of small grains. The treatment threshold is 15-25 aphids per head with low beneficial insect activity. A ratio of one predator to every 50 to 100 aphids is often sufficient to achieve biological control. However, with the current cooler temperatures, aphids reproduce rapidly whereas their natural enemies reproduce slowly and lag behind. If the crop is approaching the hard-dough stage and there is good beneficial insect activity, no control should be needed.

Native Brown Stink Bugs - We continue to see an increase in the number of native brown stink bugs in barley and wheat. In years past, we have seen native brown stink bugs in barley and wheat but so far we have not felt that we have seen any losses. Research from the South in the early 1980s showed that the milk stage of development is most susceptible to damage from stink bugs by reducing grain weight and germination. Additional information indicates that wheat may be susceptible to native stink bug feeding from the milk through soft dough stages. Once wheat reaches the hard dough stage the likelihood of damage from stink bug is diminished greatly. Thresholds in the South for native stink bugs in wheat range from one per head to one per 5 to 10 heads.

New Aphid Species – Although not known to occur in the Mid-Atlantic Region, there is a new aphid species occurring in small grains in the south — so far it has been found in Alabama and South Carolina. The range of expansion has been slow but you should be aware of it as you are scouting small grains. For more information, please visit the following link:

https://kentuckypestnews.wordpress.com/2016/05/03/new-cereal-aphid-sipha-maydis-expands-range-of-distribution/

If you think you are finding this aphid species, it is important that you contact Steve Hauss at the Delaware Department of Agriculture by email (stephen.hauss@state.de.us) or call (302) 698-4500 for official confirmation since this would be a new detection in Delaware.

Banded Wing Fly
Each year I receive questions about an adult fly that can be easily found in no-till fields. The fly is the banded wing/picture-wing fly and is present in fields due to the heavy covers in many fields (http://bugguide.net/node/view/564782). Adult flies are generally attracted to rotting plant material and larvae develop on decaying organic material.

Flowering Has Started in Wheat – Keep an Eye Out for Fusarium Head Blight

– *Nathan Kleczewski, Extension Specialist – Plant Pathology*; nkleczew@udel.edu

Wheat in southern parts of Maryland and Delaware, as well as some early flowering varieties, began flowering the latter half of last

week. Many fields are now breaking boot or at full head. As a general rule of thumb, expect flowering to start about 3-5 days after full head emergence, depending on temperature. Flowering occurs when 50% of the main tillers have started to produce yellow anthers from the center of the heads.

Hundreds of replicated university trials conducted over multiple states and seasons have shown that the application of Caramba, Prosaro, and Proline at flowering reduce fusarium head blight (FHB) severity by 50% AND DON by 45% relative to untreated, inoculated checks (Figure 1). That means that if you have an FHB outbreak and 20% of your heads are infected, resulting in 5 ppm DON, these products may bring down your levels to 10% severity and 2.75 ppm DON. The use of moderately resistant varieties will further reduce disease and DON, on average, 45%. In the same scenario, the MR variety would start with 11% infected tillers and 2.75 ppm DON. The application of a fungicide to this variety would potentially reduce infected tillers to 5.5% and DON to 1.23 ppm.

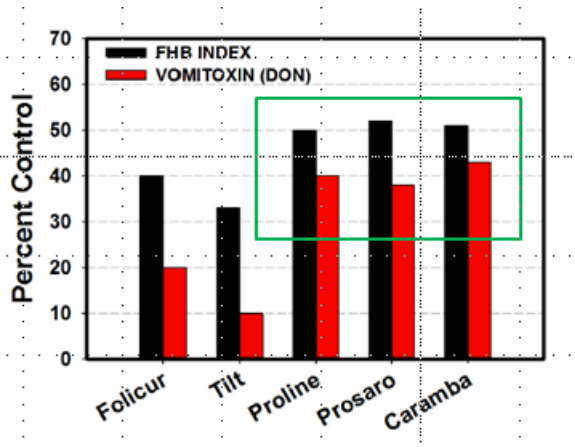


Figure 1. Average percent control of head bleaching (Index) and DON contamination (Vomitoxin) from 309 trials conducted over 19 years. Percent control is used to standardize the data because different years, cultivars, or locations may result in different total amounts of FHB or DON. Note that if you want to plant vegetables, Proline can be used due to its 30 day replant label.

A moderately resistant variety reduces DON compared to a susceptible check (e.g. Shirley) by roughly 45%. Some varieties I see planted this year were sold as moderately resistant based on visual ratings, but not DON. When looking at the DON, I would categorize some of these as moderately susceptible — better than a susceptible variety but not as good as moderately resistant variety. Remember, visual symptoms only predict DON about 60-70% of the time and FHB can elevate DON in healthy looking kernels. Always start your variety selection by assessing DON levels compared to a susceptible check, then rank by visual symptoms, or index.

More recent data indicate that applications 5-6 days after flowering can be just as efficacious as those at flowering. Some growers plan on applying a fungicide for FHB and are concerned about uneven emergence in the field. I suggest estimating when the earliest tillers will flower, and considering an application later in the 5-day window. This may allow the fungicide to be applied to both early and late flowering heads in the field within the 5-day window.

The scab prediction center predicts elevated levels of FHB risk **FOR SUCEPTIBLE VARIETIES** flowering through the end of the week. Figure 2 shows the difference in risk between a susceptible (e.g Shirley) and a moderately resistant (e.g. Jamestown) variety that was flowering on 5/4/16. Red indicates severe, yellow moderate, and green low levels of risk. Click on the Agnet box to see the data for the DEOS station nearest to your fields.

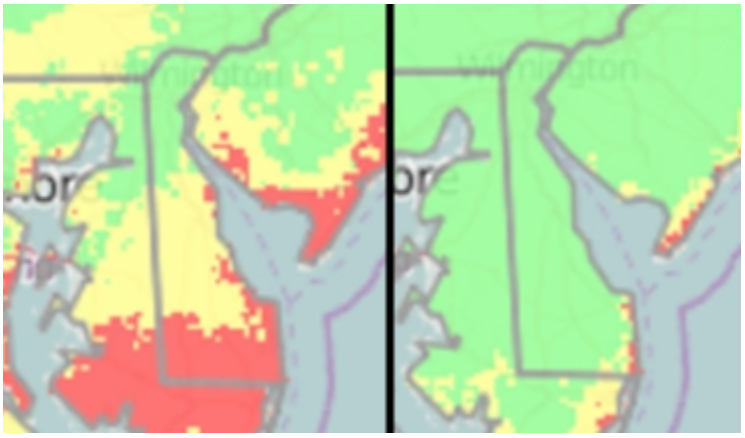


Figure 2. Difference in FHB risk between a susceptible wheat variety flowering around 5/4/16 (left) and a moderately resistant variety flowering around 5/4/16. From http://www.wheatscab.psu.edu/.

DO NOT apply QOI containing products, including premixes, to heads. Replicated university trials conducted across multiple states indicate that these products can elevate DON if FHB occurs. Note that most of these products do not even list FHB suppression on the label. They are not recommended for FHB management. See the NCERA-184 fungicide list, which I provided in last week's WCU, for more information.

The forecast is calling for an increase in temperatures next week. Stripe rust shuts down when temperatures exceed 69°F. Powdery mildew slows as temperatures increase. Increases in temperature and low levels of relative humidity in the upper canopy can limit development of powdery mildew to lower portions of the plant, which contribute little to yield after stem elongation. Relative humidity, not water or leaf wetness, determines the level of infection by the powdery mildew pathogen in susceptible varieties. Recent cool temperatures have limited the development of our most common foliar diseases, the leaf blotch complexes. These may increase with warming temperatures provided we receive adequate amounts of rain.

In **barley** we are well past the point for managing diseases. However, the lesson this year, particularly for those of you contracting malting barley, is when to apply fungicides for suppressing DON. Barley begins to flower while in the boot, and continues to flower as the head emerges. It also is a closed flowering plant, unlike wheat. For these reasons we do not see significant FHB-derived yield losses in barley as the fertile anthers are not exposed to the environment to a significant degree. However, infection of the glumes by the FHB pathogen can result in elevated DON that can be a major issue for malt and overall grain quality. Consequently, fungicide applications for malting barley and barley in general need to occur when heads have just fully emerged (Figure 3). This ensures the glumes are protected by the product once the head emerges from the boot. If you see white spent anthers from the head you have missed your application window and could run into PHI issues. Remember that malting barley needs to be harvested at a higher moisture content than grain barley- be prepared.

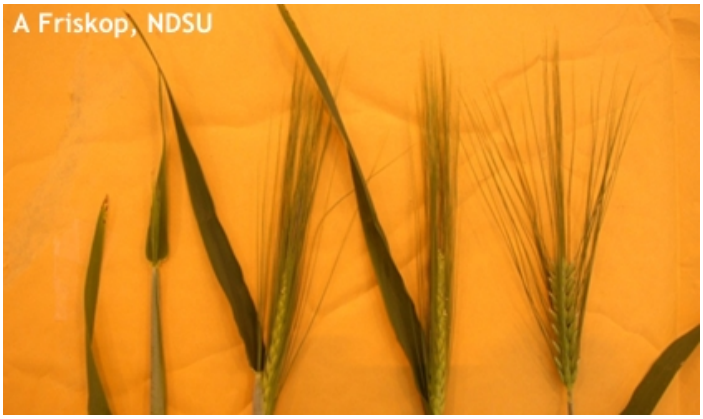


Figure 3. When to apply fungicides to malting barley to suppress DON. Left most tiller - too early. Rightmost tiller - too late. Middle two tillers - optimal stage

Sulfur Deficiency on Field Corn

- *Richard Taylor, Extension Agronomy Specialist;* rtaylor@udel.edu and *Amy Shober, Extension Nutrient Management and Environmental Quality Specialist;* ashober@udel.edu

Wet, cool weather has delayed corn planting, or emergence for those growers who were able to begin planting corn. In the past few years, more growers have chosen to include ammonium sulfate in their starter program to help get corn off to a quick and effective start because the incidence of sulfur (S) deficiency has been on the increase.

There are obvious reasons for the increase in early season S deficiency. Sulfur issues were quite rare on corn in the last few decades because crop need was met, or even exceeded, by deposition of S from the atmosphere. Efforts to improve air quality in the U.S. by reducing S emissions from coal powered plants, switching to ultra-low S diesel fuel, improving fuel economy on trucks and cars that use diesel, and many other small steps have resulted in a great reduction in the amount of S deposition from the atmosphere. Sulfur deposition in 1985 was over 25 lbs/acre for much of the upper Midwest and Mid-Atlantic region; but by 2010 (the last available data), the deposition rate had dropped to 5 lbs/acre or less for Delaware and much of the region.

Sulfur in soil exists primarily as the anion sulfate (SO_4^{2-}), which is subject to leaching similar to nitrate because Delaware soils have very little anion exchange holding capacity and are often quite sandy. Many years ago, Dr. Tom Sims found that, even on the loamy sand soils in southern Delaware, a large amount of S was held in the clay lenses found deep in the soil. Although this S supply can be tapped by the corn plant, it usually doesn't occur until after sidedress time when the rapid growth phase of corn development begins and the corn roots reach deep enough into the soil profile to take up the stored sulfate. In some cases, early season S deficiency does not impact stand or yield. A number of years ago, a grower reported severe S deficiency on corn grown in a field west of Laurel, Delaware. Dr. Taylor and the county agricultural Extension agent established a sulfur rate study at the site with rates of 0, 20, 40, 60, and 80 pounds of S per acre. Corn responded very quickly to the application of gypsum (calcium sulfate), which did not affect the soil pH. By the time corn in the plots that had received the highest rates of S was chest high, the corn in the control plot (0 lbs S/acre) was still showing severe leaf deficiency symptoms and was barely a foot tall. However, there was no yield difference among the treatments at harvest even though the average yield was well over 200 bushels per acre (irrigated). Corn in the control plots finally grew deep enough roots to access the S stored in the deep soil clay layers and was able to catch up with the fertilized corn. Other studies, however, have shown an occasional response to S fertilizer especially when the slow growth induced by S deficiency results in stand loss.

Sulfur is not mobile in the corn plant so classically S deficiency occurs first on the youngest leaves; it is often described as general yellowing of the leaves (see photos below in the left hand column). In recent years, we've noticed that S deficiency shows as interveinal chlorosis of the recently mature (collar visible) leaves (see photos below in the right hand column). A major challenge of dealing with S deficiency involves the ability to correctly determine if the deficiency symptoms will eventually disappear and not affect corn yield potential. As irrigated corn growers push yields higher and higher, or in very favorable growing years when dryland corn yields are exceptional, the risk of S deficiency limiting yield potential is increased. More and more growers are opting to include ammonium sulfate or other S-providing fertilizers in their starter fertilizer package or applying it in combination with an early sidedress application. In general, an application of 30 to 40 lbs S/acre is enough to supply the majority of the crop S need. However, excessive application of ammonium sulfate (or a reduced form of S) can have negative impact on soil pH and require more frequent application of limestone to neutralize the increase in soil acidity.

Air quality improvements of the past 30 years mean that Delaware growers (especially those farming light, sandy soils) will need to spend more dollars on fertilizer to provide S to the corn crop. As a result, growers will probably also need to increase the frequency of lime application. For those growers that have the option of fertilizing with poultry litter/manure, there is some organic S in the litter. However, the organic S is in a reduced form (often in proteins as one of the S-containing amino acids) and must be mineralized in a similar manner as the organic nitrogen (N) in poultry litter. This means that like N, sulfur will become available over an extended period during the growing season since the organic material must be mineralized by the soil microorganisms and won't be immediately available during the early season growth of corn. Supplemental inorganic S fertilizer will still be needed at planting to avoid the early season impact of S deficiency.

S Deficiency of Corn Showing General Chlorosis or Yellowing

S Deficiency of Corn Showing Interveinal Chlorosis on Leaves

Nitrogen Applications on Wheat After Heading

- *Richard Taylor, Extension Agronomy Specialist;* rtaylor@udel.edu and *Amy Shober, Extension Nutrient Management and Environmental Quality Specialist;* ashober@udel.edu

The recent cold, cloudy, wet weather has impacted many wheat fields turning them off-color and creating some confusion as to whether the crop needs an additional nitrogen (N) application. Let's review the uptake and impact of N on wheat after head emergence is complete (Zadoks' growth stage (GS) 58 or Feekes' GS 10.5.

Virginia Polytechnic Institute and State University conducted a lot of research on intensively managed wheat and related N applications to the physiological development of the wheat plant. Around Zadoks' GS 30 or Feekes' GS 5, wheat begins stem elongation and enters the most rapid growth phase of the crop. Two crucial factors are involved in establishing yield at this time since tillering by the crop is essentially complete. The first factor is the establishment of the potential number of kernels per head as embryonic head formation occurs. The second factor is the very rapid uptake of N. Inadequate N availability at this stage will cause an increase in tiller abortion, resulting in a reduction in the number of heads per acre and a smaller overall head size. This phase of rapid growth and N uptake is a critical stage when N applications should be considered.

From Zadoks' GS 30 through GS 58 (initiation of flowering), N plays an important role in the development of adequate leaf area and ovules (unfertilized kernels), which are important for achieving maximum yields. Application of N fertilizer at this stage provides the N that is critically needed during this period of plant production. In addition, leaching loss of N from the soil is less of a concern during this phase since wheat has an extensive root system, relatively high rates of evapotranspiration, and a huge demand for N allowing rapid uptake at the beginning of this period. Therefore, there is little chance that applied N moves through the soil and below the root zone.

At Zadoks' GS 58 or Feekes' GS 10.5, stem elongation is complete, the flag leaf has fully emerged, and there is no chance of increasing the leaf area of the plant needed for photosynthesis (Ps). Our goal at this point is to conserve as much of the leaf area as possible from insect feeding and destruction from diseases. Nitrogen uptake from the completion of head emergence through maturity is very low compared with the amount taken up by the crop during stem elongation. Virginia Tech researchers evaluated the impact of small N applications at head emergence and later but found that even a foliar application of 10 to 20 lb N/acre at this growth stage did not increase yield; however, N application did increase the grain protein content in some cases. A real concern with foliar application at this stage is foliar burn, which can occur if dilution of the N fertilizer is not adequate. Foliar burn can lower yield potential.

In summary, N applications to wheat after head emergence is not recommended because there will be essentially no impact on yield potential from additional applied N. While small foliar N application at this stage could raise wheat grain protein levels, the risk of foliar burn and lower yield outweighs the benefits.

Comments on Burn-Downs for No-Till Soybeans

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

There are a lot of different issues going on in soybean fields. These are some thoughts based on recent phone calls and observations in the field.

If you have already burned down your soybean fields, be sure to look at them before planting and decide if you are going to need another application of a burndown herbicide (glyphosate or paraquat) due to newly emerged weeds. Even if you included a residual herbicide with your burndown, you may not have gotten the rain to activate those herbicides.

For those fields that have not been burned down, you have a few things to consider. If you have marestail/horseweed you have two options, 2,4-D or Sharpen to tankmix with glyphosate.

2,4-D at a pint has a restriction of 15 days preplant, but the 1 pt rate is not going to be very effective on taller horseweed plants. Sharpen use on coarse-textured soils with less than 2% organic matter needs to be applied 30 days before soybean planting due to potential crop injury. Medium to fine textured soils treated with 1 oz of Sharpen has no waiting period, while there is a 15-day interval with the 1.5 oz rate. Horseweed plants beginning to bolt will need at least the 1.5 oz rate for effective control.

Be aware that if you use Sharpen, the label does not allow another group 14 herbicide (Valor, Authority product, or Reflex) within 30 days on coarse-textured soils with low organic matter or 14-days for all other soil types.

A lot of the soybean fields may have had a rye cover crop in them. While the rye will help with weed control by suppressing the growth of weeds or preventing weed emerging, it requires very thick mulch of a cover crop to be highly effective. So scout your cover crop fields to determine the best approaches for weed management.

Finally, I have been asked why the burndowns may not have worked in some of the fields. First, and foremost consider how effective the burndown is on the plants/cover crop present. Paraquat is generally not very effective on grass species or on some of the broadleaf weeds once they are more than a few inches tall. Glyphosate is not very effective on legumes, mustards, henbit, or annual ryegrass. So maybe the herbicide used was not the right choice.

There can be issues with tankmixing. While a triazine herbicide such as atrazine, simazine or metribuzin can increase the control of paraquat, these herbicides can reduce the effectiveness of glyphosate under some circumstances. So be careful about tankmixing.

Was there adequate coverage? While glyphosate can perform well at volumes well under 15 gal/A, that may not be adequate coverage for heavy weed pressure or trying to control smaller weeds under the cover crop. And paraquat should be applied in higher spray volumes. Was the burndown sprayed with large droplet sizes? While increasing droplet sizes can reduce drift, it can also reduce coverage. So things like air-induction nozzles or drift control agents can reduce spray coverage, which in turn reduce performance. Finally, all these herbicides seem to work better when the sun is shining and that has not happened much in our area over the past month.

Many things can work against you when trying to control weeds. Planning ahead, scouting, and allow time to retreat under these challenging conditions will improve success.

General

Black Light and Pheromone Trapping Program – *Joanne Whalen, Extension IPM Specialist*; jwhalen@udel.edu

Our black light and CEW pheromone traps are now up and running for the season. The traps are generally checked on Monday and Thursday and counts are posted on our webpage by early Tuesday and Friday morning. This season we will again be trapping for corn earworm, European corn borer and 3 stink bug species. Please use the following link to access all trap information (http://extension.udel.edu/ag/insect-management/insect-trapping-program/). I will also begin the Crop Pest Hotline starting on May 11 (instate – 800-345-7544; out of state- 302-831-8851).

Palmer Amaranth: Don't Skimp on the Soil-Applied Herbicides – *Mark VanGessel, Extension Weed Specialist*; mjv@udel.edu

If Palmer amaranth is a weed in your fields or in close proximity, you need to plan on using a soil-applied herbicide. But that alone is not enough. You also need to:

• Apply those products close to planting time. Applying soil applied herbicides 10 days before planting soybeans often leads to significantly less Palmer amaranth control when evaluated at harvest than if the herbicide was applied right after planting the soybeans.

• Use the full labeled rate. Reduced rates result in a shorter period of control and often lead to less weed control at harvest.

Assume you will need a postemergence herbicide application. Since most of the Palmer amaranth is resistant to glyphosate and group 2 herbicides, options for control are very limited. Products containing fomesafen have been the most consistent for postemergence control since it provides both contact activity as well as residual control. However, the rate of fomesafen needs to be at least 0.3 lbs active ingredient or the equivalent of 1.25 pts of Reflex.

Announcements

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

5/11: Creating a Farm Marketing Kit - A marketing kit is an essential for tool for any business. Learn how to develop a compelling package to attract your target market and leverage your worth. This webinar will cover the elements of a successful marketing kit and includes examples to help you develop an effective brand and complementary materials that reflect your unique voice and style.

5/25: Why Value-Added Products Fail - Value-Added products can increase your enterprise profit picture, but only if it's a marketable product that fits your resources and farm mission. This presentation explores what works and what doesn't when developing and marketing value-added farm products. And, helps you answer the question, 'Just because I can produce a value-added product; should I?

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.

New Castle Co. Beginning Farmer Series
Fruit Production Workshop
Monday, May 16, 2016 6:00-8:00 p.m.
Milburn Orchards
1495 Appleton Road
Elkton, MD 21921

Participants who attend this workshop/tour will have an opportunity to visit Milburn Orchards with UD Fruit/Vegetable Specialist Dr. Gordon Johnson and New Castle County Extension Agents to learn more about tree and small fruit production opportunities. Learn about producing different fruits, fruit establishment, fruit management, and marketing opportunities.

Meet at the entrance to Milburn Orchards.

To register contact Carrie Murphy at 302-831-2506 or cjmurphy@udel.edu

It is the policy of the Delaware Cooperative Extension System that no person shall be subjected to discrimination on the grounds of race, color, sex, disability, age or national origin.

Sussex Co. Beginning Farmer Series
Fruit Production Workshop
Monday, May 23, 2016 6:00-8:00 p.m.
Ernest Fruit Farm
15092 S. Union Church Road
Ellendale, DE 19941

This workshop will hosted at the Ernest Fruit Farm by Jeremy and Emmalea Ernest. UD Fruit/Vegetable Specialist Dr. Gordon Johnson and Sussex County Agent Tracy Wootten will be on hand to lead the workshop. Learn about tree fruits and small fruits (berries, grapes) and how they grow. Other topics covered will include opportunities for producing fruits on small farms, fruit establishment, fruit management, fruit pests (diseases, insects), fruit harvesting and handling, and local marketing of fruits.

To register contact Tracy Wootten at 302-856-7303 or wootten@udel.edu

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on the grounds of race, color, sex, disability, age or national origin.

IPM Webinar Series

The Northeastern IPM Center has organized an IPM Toolbox Webinar Spring Series. Information on this series and links to join the webinars can be found at the following link: http://neipmc.org/go/ipmtoolbox

Topics and speakers included in the first series are:

Biocontrols
Tuesday, May 10 at 10:30 a.m.
Carol Glenister of IPM Laboratories, Inc

IPM Weather Apps
Wednesday, May 18 at 10:30 a.m.
Juliet Carroll from the NYS IPM Program

Season Extension Workshop and Field Day

Friday May, 20, 2016 10:00 a.m. - 3:30 p.m.
Delaware State University
Smyrna Outreach & Research Center (SORC)
884 Smyrna-Leipsic Road, Smyrna, DE

Presented by DSU Cooperative Extension, Small Farms Program.

The focus of the workshop is spring, fall and overwintered vegetables, fruits and herbs; the EQIP Program and high tunnels; and farmers' perspective on high tunnel production.

SPEAKERS
Growing the Best Tomatoes, Peppers and Cucumbers Ever
Steve Bogash, Penn State Extension

Increasing the Availability of Delaware's Specialty Crops through High Tunnels
Gordon Johnson, University of Delaware

The State of High Tunnel Production in Delaware
Rose Ogutu, Delaware State University

RSVP by May, 16, 2016. To register for the free workshop or for more information, call Rose Ogutu at (302) 587-6397 or email rogutu@desu.edu

UD Small Grains Field Day

Thursday, May 26, 2016 3:00 - 5:00 p.m.
University of Delaware
Warrington Irrigation Research Farm
Harbeson, DE

Join University of Delaware Cooperative Extension Specialists and Agents at the Warrington Irrigation Research Farm for a Small Grains Field Day.

Tour plots that include: Various wheat irrigation strategies, foliar fungicide programs in wheat, irrigated and non-irrigated high input wheat that includes multiple fungicide application timings and Palisade® plant growth regulator, and wheat planted in 7.5 in. and 15 in. rows.

Other topics covered include: Extension IPM Project Update: Fall aphid management in small grains related to barley yellow dwarf management, resistant weeds and some herbicide options, and integrated management of Fusarium head blight; spring insect management update in small grains (aphids, cereal leaf beetle, grass sawflies and armyworms), small grain weed control, fall soil nitrate testing, and update on variety trial disease ratings.

Directions: Harbeson Rd (Rt. 5) 4 miles south of Rt. 9 in Harbeson, DE at the intersection of Hurdle Ditch Rd and Payline Dr. Signs will be posted.

Credits: (1) DE Nutrient Management, (1) DE Pesticide, CCA offered

Maryland Grape Growers Association and University of Maryland Summer Field Day

Saturday, July 16, 2016 8:30 a.m. - 5:00 p.m.
The Vineyards at Dodon
391 Dodon Road
Davidsonville, MD 21035

AGENDA

8:30 - 9:00: **Registration**
Coffee, juice, and doughnuts provided.

9:00 - 9:30: **Welcome and Introductions**
Announcements from MGGA and Overview of The Vineyards at Dodon
Tom Croghan

9:30 – 11:00 **Grape IV**
Integrated vineyard management includes assessing the

vineyard for current conditions, including canopy management, nutrition, crop level, diseases, and other pests. This session will be in the vineyard, so please bring your hat, sunscreen and sunglasses.
Dr. Joe Fiola, UME and Dr. Cassandra Swett, UMD

11:00 – 11:15 **Break**

11:15 – 12:00 **Ground Cover Management for Sustainable Grape Production**
Dr. Michela Centinari, Assistant Professor of Viticulture, Penn State University*

12:00 - 1:00: **LUNCH**
Bring your own lunch, favorite beverage, and your own lawn chair for seating.

1:00 – 1:45: **Frost and Frost Control in the Vineyard**
Dr. Centinari, PSU*

1:45 – 2:45 **Tasting of Regional R&D Wines**
Dr. Joe Fiola, UME

2:45 – 3:00: **Break**

3:00 – 4:00: **Sustainable Viticulture Workbook**
Dr. Joe Fiola, UME

4:00 – 5:00 **Winery Tour**

*Dr. Michela Centinari, is an Assistant Professor of Viticulture for Penn State University. Dr. Centinari's research and extension program integrates both basic and applied aspects of grapevine physiology to improve production and quality. She specializes in vineyard floor management and understanding and managing winter and frost/freeze damage.

Private & Commercial Pesticide Applicator Recertification Credits for this event are pending

Register online at: www.marylandgrapes.org. Discounted registration until May 30.

Weather Summary

Carvel Research and Education Center Georgetown, DE

Week of April 28 to May 4, 2016

Readings Taken from Midnight to Midnight

Rainfall:

0.48 inch: April 29
0.04 inch: April 29
0.49 inch: May 1
0.43 inch: May 2
0.30 inch: May 3
1.10 inch: May 4

Air Temperature:

Highs ranged from 78°F on May 2 to 53°F on April 28 and April 29.

Lows ranged from 51°F on May 2 to 47°F on April 28.

Soil Temperature:

60.0°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