



# WEEKLY CROP UPDATE

UNIVERSITY OF DELAWARE COOPERATIVE EXTENSION

Volume 27, Issue 13

June 21, 2019

## Vegetable Crops

**Vegetable Crop Insect Scouting** - David Owens, Extension Entomologist;  
[owensd@udel.edu](mailto:owensd@udel.edu)

### Watermelon

Spider mite populations continue to build up near the edges of fields. In general, very few are in the main crop, but there are some exceptions. Last year and this year, pokeweed along wooded edges has been the first plant to become heavily infested (see picture below, note the yellow and reddening leaves caused by heavy mite loads).



Complicating the picture a little bit is the arrival of worms in several fields. We observed 2<sup>nd</sup> instar caterpillars of various species in melons this week. To my knowledge, beet armyworm has not yet been observed in pigweed or main crops. Most other worms should be fairly easy to control with most products. Radiant, a good worm product, does have some effect on spider mites though not as good as a miticide. Some premix products are available, including Minecto Pro (Abamectin + cyantraniliprole) and Gladiator (avermectin B1 + zeta-cypermethrin). Be sure to follow label directives regarding pollinator protection and use of adjuvants if using either product. The cyantraniliprole is a systemic material with long residual control of Lepidoptera.

### Sweet Corn

Sweet corn pheromone and blacklight traps are checked twice weekly on Mondays and Thursdays. By Tuesday and Friday morning, data is uploaded to our website: <https://agdev.anr.udel.edu/trap/trap.php>. For reference, action thresholds based off of blacklight and pheromone trap can be found here: <http://extension.udel.edu/ag/insect-management/insect-trapping-program/action-thresholds-for-silk-stage-sweet-corn/>. Moth counts continue to decrease. We have caught very few moths in our pheromone traps at the REC, and moths are no longer looking 'fresh'. We have been evaluating moth susceptibility to pyrethroids using vial testing (vials prepared by Dr. Sally Taylor's lab, Virginia Tech Tidewater AREC). So far, we have run 69 treated moths and have not observed elevated levels of resistance.

I suspect this will change later in the season when southern migrants reach our area. Last year when we started, about 20% of moths survived the treatment in late June to early July, but by the end of August, around 40% survived. Thursday's trap capture is as follows:

| Trap Location | BLT - CEW            | Pheromone<br>CEW |
|---------------|----------------------|------------------|
|               | 3 nights total catch |                  |
| Dover         | 0                    | 2                |
| Harrington    | 1                    | 16               |
| Milford       | 0                    | 6                |
| Rising Sun    | 0                    | 1                |
| Wyoming       | 0                    | 3                |
| Bridgeville   | 0                    | 4                |
| Concord       | 1                    | 4                |
| Georgetown    | 0                    | 6                |
| Greenwood     | 0                    |                  |
| Laurel        | 1                    | 2                |
| Seaford       | 0                    | 4                |
| Harbeson      |                      | 1                |
| Trap Pond     | 1                    | 5                |
| Lewes         | 0                    | 6                |

**Leaf Aging in Cucurbits** - Gordon Johnson, Extension Vegetable & Fruit Specialist; [gcjohn@udel.edu](mailto:gcjohn@udel.edu)

We are starting to see the oldest leaves (crown leaves) in watermelons, cantaloupes, squash, cucumbers, and pumpkins with large areas that are discolored (white, tan, or bronze). These leaves will be brittle to the touch and may start to tear or shred with high winds and storms. This condition is common in cucurbit crops and can be due to a number of leaf aging factors including mineral nutrient scavenging (export of mobile nutrients from oldest leaves to newer leaves), ozone air pollution damage, chemical phytotoxicity, repeated stress cycles, and wind injury. Leaf cells that die will leak their contents, releasing enzymes and oxidizing chemicals affecting nearby cells thus accelerating the "aging" process. This results in large patches of dead leaf cells that then dry, making the leaf feel brittle. If leaf veins are damaged, water and food transport will be compromised, accelerating leaf decline. This

leaf aging is not to be confused with damage from mite feeding which is also concentrated on oldest leaves or any of a number of foliar diseases caused by plant pathogens.



Cucumber crown leaf showing leaf aging likely initiated by wind damage.

**Air Pollution Damage from Ozone in Vegetables Revisited** - Gordon Johnson, Extension Vegetable & Fruit Specialist; [gcjohn@udel.edu](mailto:gcjohn@udel.edu)

We are starting to see evidence of air pollution damage from ozone in sensitive vegetable plants. Those vegetables most susceptible include potatoes, watermelons, cantaloupes, snap beans, pumpkins, and squash.

Damage is most common during hot, humid, hazy weather with little wind. Air inversions, when warm air at the surface is trapped by even hotter air in the atmosphere above, lead to build up of air pollutants that cannot disperse and, consequently, plant injury. The most common form of air pollution injury to plants is ozone damage. Ozone is a strong oxidant and is formed by the action of sunlight on products of fuel combustion. It is moved from areas of high concentration (cities, heavy traffic areas) to nearby fields.

Ozone injury in susceptible vegetable varieties develops when ozone levels are over 80 ppb for



four or five consecutive hours, or 70 ppb for a day or two when vegetable foliage at a susceptible stage of growth. Because it occurs in areas with high levels of automobile exhausts, crop injury is often visible on fields near roads, especially with heavy summer weekend traffic. High pollution indexes in Baltimore and Washington are also a good indication that ozone damage may occur.

In potatoes, symptoms of ozone damage occur on the most recently emerged leaves and can be seen as a black flecking. Early red varieties are most susceptible.

Injury on watermelon leaves consists of premature chlorosis (yellowing) on older leaves. Leaves subsequently develop brown or black spots with white patches. Watermelons are generally more susceptible than other cucurbits to ozone damage. Damage is more prevalent when fruits are maturing or when plants are under stress. Injury is seen on crown leaves first and then progresses outward. Seedless watermelon varieties tend to be more resistant to air pollution injury than seeded varieties, so injury often shows up on the pollenizer plants first. "Ice box" types are the most susceptible.



Ozone injury on watermelon

In muskmelons and other melons, the upper surface of leaves goes directly from yellow to a bleached white appearance.

Ozone injury on squash and pumpkins is intermediate between watermelon and cantaloupe starting with yellowing of older interior or crown leaves. These leaves

subsequently turn a bleached white color with veins often remaining green.



Ozone injury on squash. Note leaf yellowing

In snap and lima beans, ozone causes small bleached spots giving a bronze appearance on upper leaf surfaces and pods. Leaves may ultimately turn chlorotic and senesce (drop).

Ozone injury can be easily misdiagnosed as mite injury, pesticide phytotoxicity, or deficiencies.

The key to avoiding air pollution injury is to plant varieties that are of low susceptibility and to limit plant stresses. Certain fungicides such as thiophanate methyl (Topsin and others) offer some protection against ozone damage.

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**Angular Leaf Spot on Cucurbits** - *Kate Everts, Vegetable Pathologist, University of Maryland; [keverts@umd.edu](mailto:keverts@umd.edu)*

A common bacterial disease of cucurbits is angular leaf spot, caused by *Pseudomonas syringae* pv. *lachrymans*. Angular leaf spot can be seed borne and its hosts include cucumber, zucchini, yellow squash, pumpkin and winter squash. Foliar lesions are initially small, water

soaked, and green, but become tan with dark brown margins. Holes or tears often form in the tan lesions, and yellow haloes occur around the lesion. Fruit also develop lesions, which are small and have tan centers. Because the disease is seed borne the symptoms occur on young leaves and the disease is spread by splashing rain, workers hands and other contact when the leaves are wet. Within a field, the first flush of leaves may be heavily infested, but if conditions don't favor spread and the plant has indeterminate vines, the plant may "outgrow" the symptoms and produce normal fruit. However, fruit can also develop lesions that compromise their marketability. Fruit lesions are small (up to 1/8 inch diameter) tan lesions, which can penetrate the fruit and may predispose fruit to secondary rot.



**K Everts, University of Maryland**  
Winter squash leaves infected with angular leaf spot. Lesions have tan centers, dark edges, ragged appearance and yellow halos.

Control measures begin with purchasing disease free seed and planting into land that has not had a cucurbit crop in two or more years. Seed treatments are available that can reduce the likelihood of bringing in the angular leaf spot on seed. Avoid overhead irrigation to reduce disease spread. In season, apply fixed copper on a 7 to 10-day schedule to reduce disease spread

and protect fruit from lesion development. Some copper formulations are available for organic producers. Conventional growers should apply fixed copper plus mancozeb.

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### Two Spotted Spider Mites on High Tunnel Vegetables - Jerry Brust, IPM Vegetable Specialist, University of Maryland; [jbrust@umd.edu](mailto:jbrust@umd.edu)

This week I saw several high tunnel tomatoes and cucumbers with moderate to severe two spotted spider mite (TSSM) *Tetranychus urticae* infestations (Fig. 1). These pests vary in color from white to yellow to red. Mites feed by sucking chlorophyll from the plant, which at first appears as small white or yellow marks on the top surface of the leaf (Fig. 2). This damage may look like other problems early on and because the mites are difficult to see on the underside of the leaf at this stage of damage their build-up can go unnoticed. The feeding damage then progresses to loss of chlorophyll, yellowing, browning (Fig. 3) and eventual death of the leaves or whole plant. They occur in the highest numbers on the undersides of leaves, but when their populations get very high they can move to the top-side of a leaf or onto fruit. Most high tunnel cucumber and tomato cultivars are susceptible to two spotted spider mite damage, however in most of the HTs I was in there were only 4-5 cultivars of cucumber or tomato (out of anywhere from 6-12) that the mites were found on in very high numbers. Growers need to be sure to check all the different varieties of tomatoes and cucumbers they are growing for mite infestations and to specifically check those varieties that are prone to TSSM infestations.

The warm, dry conditions in a high tunnel favor rapid mite development and reproduction, which enables them to complete a generation in as little as 5-7 days which could lead to a 50X increase in the population in just one week. Heavily infested leaves may be covered with very fine, irregular webs in which mites and eggs can be found (Fig. 1). Once the spider mites begin to make these webs they are even more difficult to control. This is because the mites hide under the protective layer of webbing



making it that much more difficult to get spray coverage to the underside of the tomato leaf.

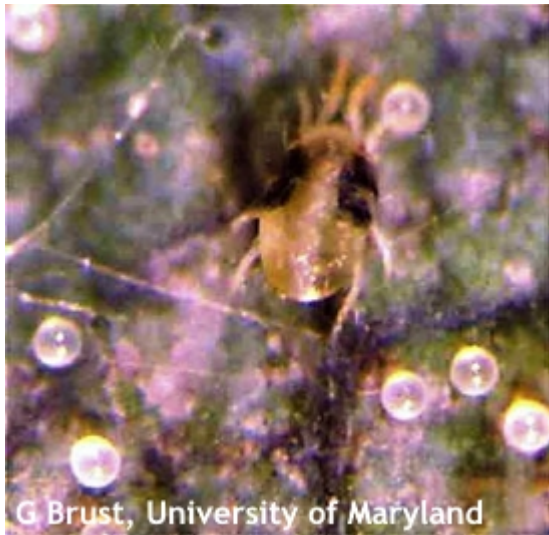


Figure 1. Two spotted spider mite female with eggs and fine webbing

Early detection is the key for controlling two spotted spider mites. As soon as two spotted spider mites are detected, control efforts need to be taken. Infestations are highest on older leaves and at the base of the leaf near the petiole. Using insecticidal soaps or horticultural oils can work very well if mites are caught early before populations build and severe damage occurs. I have had a few growers who were skeptical of the efficacy of the oils to work on TSSM who were quite pleased by the control they got when they tried them. Thorough coverage of the foliage is critical if the oils are to work.

Biological control of TSSMs with predatory mites is used successfully in greenhouse tomato and cucumber production. How well the predatory mites work depends on the initial pest populations, temperature, humidity and cultural practices that are found in the GH. Usually several releases are required for effective control. But we currently do not have a great deal of information about these predatory mites being effective in high tunnel situations. If used these predators are best utilized as are the organic controls—very early on in a mite infestation.



Figure. 2. The beginning of TSSM feeding damage on cucumber and tomato

Because of the frequent harvest intervals for cucumbers and tomatoes the use of some of the synthetic miticides can be limited. Miticides that can be used on high tunnel cucumbers and tomatoes that have a relatively short preharvest interval are Kanemite and Portal XLO, each has a 1-day PHI and Acramite which has a 3-day PHI. Other TSSM controls that work well but have a longer PHI can be found in the [2019 Mid-Atlantic](#)

## [Commercial Vegetable Production](#)

[Recommendations](#) guide. Some states consider a high tunnel the equivalent of a greenhouse for pesticide use, be sure you know how your state classifies high tunnels.



Figure 3. Severe TSSW damage to tomato-loss of flowers and chlorophyll

## Agronomic Crops

**[Agronomic Crop Insect Scouting](#)** - David Owens, *Extension Entomologist*; [owensd@udel.edu](mailto:owensd@udel.edu)

### Soybeans

Continue to check fields for defoliation. The defoliator complex is present, generally at populations that do not require treatment. Insects include bean leaf beetle, bean leafroller, green cloverworm, thrips, and Japanese beetle.

### Field Corn

Some of our earliest fields are silking, and Japanese beetle are flying. Generally, Japanese beetles are an 'edge' species, present around field edges and pivot tracks. If you see large numbers, a good rule of thumb is ½ inch of silk or less, less than 50% pollination, and 2 or more Japanese beetles per ear.

There has also been some concern in the area regarding stink bugs. Dominic Reisig at NC State has a very useful fact sheet explaining a dynamic

stink bug threshold for young corn and corn that is beginning to form ears. It can be found here: <https://entomology.ces.ncsu.edu/2018/04/new-stink-bug-thresholds-in-corn/>.

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**[Corn Disease Update](#)** - Alyssa Koehler, *Extension Field Crops Pathologist*; [akoehler@udel.edu](mailto:akoehler@udel.edu)

Corn has been growing well and we are beginning to see some foliar diseases. Residue-borne leaf diseases like Grey Leaf Spot and Northern Corn Leaf Blight are common across our area. It is possible to select hybrids with good/excellent resistance to these diseases, which will reduce the amount of foliar disease observed. Resistant hybrids typically have smaller lesions and reduced spread of spores. Continuous corn, no/minimal till systems, rainy weather (like we have been seeing) or heavy irrigation, and high plant populations can all create environments that favor foliar disease development.

So far we have seen some cases of Grey Leaf Spot (GLS), caused by the fungus *Cercospora zea-maydis*. Under favorable conditions, this disease can significantly reduce yields. GLS usually begins on lower leaves with small, tan, rectangular lesions with a yellow halo. When lesions are young, they can be difficult to distinguish from other common corn foliar diseases. As lesions mature, they become more diagnostic, making it easier to separate from other common foliar diseases. At maturity, lesions are grey to tan in color, with a long rectangular shape; partially resistant hybrids can have more jagged margins than lesions on susceptible cultivars. Lesions can coalesce to form large necrotic areas. Yield reductions are typically observed when lesions are present on the two leaves below the ear leaf or higher. Multiple fungicides are labeled for control of GLS, you can reference the Fungicide Efficacy for Control of Corn Diseases table (<https://crop-protection-network.s3.amazonaws.com/publications/cpn-2011-corn-fungicide-efficacy-for-control-of-corn-diseases.pdf>). If applying a fungicide, application is typically recommended at VT/R1 timing for greatest chance of economic return.



As a general threshold, if 50% of plants have lesions on the third leaf below the ear or higher prior to tasseling, a spray may be considered. Other considerations when making a fungicide application include hybrid susceptibility, environmental conditions, grain prices, and cost of application.

**Growing Degree Days Through June 18 -**  
*Jarrod O. Miller, Extension Agronomist,*  
[jarrod@udel.edu](mailto:jarrod@udel.edu)

Corn planted on April 24<sup>th</sup> in Georgetown has just hit the V12 stage, close to the expected GDD of 870 (Table 1). We have observed a few fields of corn tasseling, which would fit the April 14<sup>th</sup> GDD in Sussex County. Any corn planted in late May has passed V6, and should have been sidedressed, while fields planted in early June are probably close or at V6.

**Table 1:** Accumulated growing degree-days based on planting dates through June 18<sup>th</sup>.

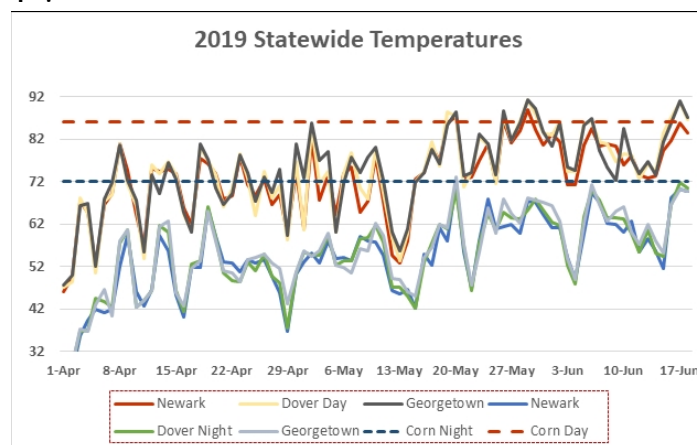
| If you planted ↓ | Sussex | Kent | New Castle |
|------------------|--------|------|------------|
| 14-Apr           | 1128   | 1084 | 1024       |
| 21-Apr           | 1038   | 992  | 938        |
| 28-Apr           | 956    | 917  | 858        |
| 5-May            | 856    | 836  | 786        |
| 12-May           | 755    | 738  | 696        |
| 19-May           | 685    | 673  | 636        |
| 26-May           | 545    | 537  | 502        |

V6 = 475 GDD, V12 = 870 GDD, VT = 1135 GDD, R1 = 1400 GDD

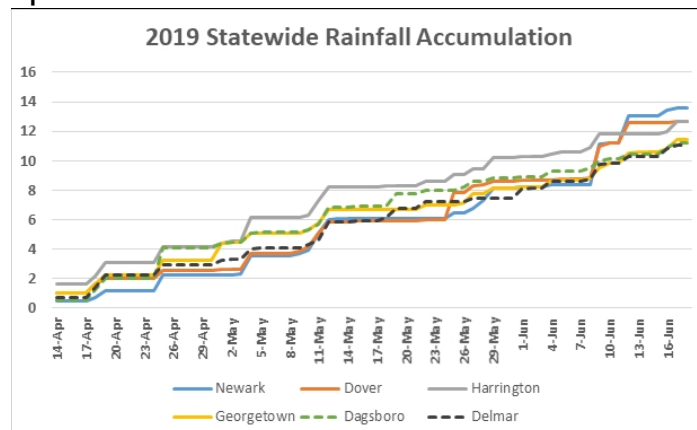
As we approach tasseling and pollination it is a good idea to start watching day and night temperatures (Figure 1). They have exceeded 92°F during the day and 72°F at night in the past few days, which could hamper pollination and set back yield. While you can't change the weather, you can account for the effects when trying to determine if your management or weather were the deciding factor in the final yield.

Rainfall still has a steady, linear increase across the state (Figure 2). How it affects planting and field conditions depends on where you are at. Newark has pulled ahead in total rainfall since April 14<sup>th</sup> with 13.5 inches, while Delmar is the lowest with 11. The larger rainfall events from Harrington north in the last week may be slowing soybean planting on tilled fields.

**Figure 1:** Statewide temperatures since April 1<sup>st</sup>.



**Figure 2:** Statewide rainfall accumulation since April 1<sup>st</sup>.



**Reminder About Herbicide Use with Enlist E3 Soybeans-** *Mark VanGessel, Extension Weed Specialist;* [mjv@udel.edu](mailto:mjv@udel.edu)

There are not a lot of Enlist E3 soybeans in the region, but I have received a few calls about which herbicides can be used. Enlist E3 soybeans are resistant to glyphosate, glufosinate, and 2,4-D choline. Enlist One (2,4-D choline alone) and Enlist Duo (2,4-D choline plus glyphosate) can be

applied to these soybeans. But Enlist soybeans do not carry the brand name of "Roundup Ready" or "Liberty Link". If the glyphosate brand says only use on "Roundup Ready" crops then it cannot be applied to Enlist soybeans. These soybeans can only be treated with glyphosate brands that allow application to "glyphosate-resistant" or "glyphosate-tolerant" crops. Likewise, if the label specifies use on "Liberty-Link" soybeans then it cannot be used. Only glufosinate brands that say they can be applied to "glufosinate-resistant" or "glufosinate-tolerant" crops are allowed.

Many herbicide companies are changing their labels to allow application to these new soybeans, so more brand options should be available next season. So be sure to read the label of the brand you intend to use to be sure it is labeled for use.

If using crops with herbicide-tolerance traits be sure you keep detailed records of which fields are planted with which traits. Likewise, when switching varieties, you may need to clean out your planter to avoid mixing traits.

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### **Postemergence Timing of Residual Soybean Herbicides** - Mark VanGessel, *Extension Weed Specialist*; [mjv@udel.edu](mailto:mjv@udel.edu)

The Group 15 herbicides, Dual, Warrant, Zidua can be applied to emerged soybeans for residual control, but they will not control emerged weeds. They can be applied as a tankmixture with products such as glyphosate, Liberty, Xtendimax or Engenia to provide residual control. Most of these herbicides have a cut-off timing when used after soybeans have emerged:

**Anthem Maxx** through the third trifoliate stage

**Dual Magnum** application timing is not specified on the label; but must be applied 90 days before the crop is harvested

**Outlook** up to the fifth trifoliate

**Warrant** up to the third trifoliate stage

**Zidua** up to the sixth trifoliate stage (recently extended)

Be sure to read the label for application rates when applied to emerged soybeans and total allowed rate for the season.

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### **Considerations for Harvesting Wheat Fields with Italian Ryegrass** - *Claudio Rubione, University of Delaware and Mark VanGessel, Extension Weed Specialist*; [mjv@udel.edu](mailto:mjv@udel.edu)

Most of the winter annuals in winter wheat have produced seeds and have senesced, but Italian ryegrass is one of the few species still present in fields. So it's important to give consideration on how to prevent the spread of Italian ryegrass seeds. It is important to prevent their spread within the field or from field to field. Limiting seed spread in the field requires knowing what portions of the fields are infested. One method is to map the field before harvest. This can be done in advance of harvest, by marking infested areas in the field on a map and then planning a strategy to avoid contamination of the weed-free areas.

Harvest the weed-free portion of the fields first, leaving the weedy portions for last to prevent further spread of weed seeds. After harvesting the infested patches be sure to thoroughly clean the combine to remove as many weed seeds as possible (see video at: <http://integratedweedmanagement.org/index.php/iwm-toolbox/prevention/equipment-maintenance/>)

Summer annual weeds such as lambsquarters and pigweeds, may be present in wheat fields, but most of them have not begun to flower so there are very few viable seeds present.

## General

### **Guess the Pest! Week 11 Answer: Squash Bug Eggs** - *David Owens, Extension Entomologist*, [owensd@udel.edu](mailto:owensd@udel.edu)

Congratulations to Rachel Yocum for correctly answering last week's Guess The Pest challenge. Everyone else who submitted correct answers will be entered in the end of the year raffle.





Squash bugs have been active for a few weeks now and can be irritating insects to deal with in summer and winter squashes. There are a couple of species of squash bug (*Anasa*) that can be found in other cucurbits such as watermelon, but are generally not a significant issue. *Anasa tristis*, however, can cause heavy damage to summer and winter squashes. When they feed, they inject a phytotoxic saliva into the plant, causing a yellowing patch that turns necrotic. Both nymphs and adults stay under leaves, under fruits, and will hide at the base of the plant, leaf litter, or in the planting holes. Treatment is recommended if more than 1 egg mass per plant is present. If treating for squash bug, target nymphs (this may involve either waiting for first eggs to hatch or going out with two sprays). Coverage to the base of plants and underneath of leaves is critical. Pyrethroids, neonics, Sevin, and Sivanto are labeled for squash bug control.



Squash bug nymphs



Squash bug leaf damage.

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**Guess the Pest! Week 12** - David Owens, Extension Entomologist, [owensd@udel.edu](mailto:owensd@udel.edu)

Test your pest management knowledge by clicking on the GUESS THE PEST logo and submitting your best guess. For the 2019 season, we will have an "end of season" raffle for a \$100.00 gift card. Each week, one lucky winner will also be selected for a prize and have their name entered not once but five times into the end of season raffle. A lucky winner will also receive a heavy duty sweep net.

Soybeans are now big enough to sweep! You and your trusty sweep net start encountering these fellas, what are they?



To submit your answer, please go to:  
[https://docs.google.com/forms/d/e/1FAIpQLSfUPYLZnTRsol46hXmqgj8fvt5f8-JI0eEUHb3QJaNDLG\\_4kg/viewform](https://docs.google.com/forms/d/e/1FAIpQLSfUPYLZnTRsol46hXmqgj8fvt5f8-JI0eEUHb3QJaNDLG_4kg/viewform)



## Announcements

### A Day in the Garden Open House

Saturday, July 13, 2019 10:00 a.m. – 2:00 p.m.  
 UD Carvel Research & Education Center  
 16483 County Seat Hwy  
 Georgetown, DE 19947

#### 2019 Highlights

- Plant Sale
- What will the perfect patio be this year?  
 2016 – “Man Cave”  
 2017 – “Think Pink!”  
 2018 – “Backyard Bliss”  
 2019 – ???
- UDairy Creamery Moo Mobile
- Visit Thomas the Tank Engine in the garden

Don't forget your camera

Rain or Shine

Free Admission & Parking

Details at:

<http://extension.udel.edu/lawngarden/mg/sussex-county/a-day-in-the-garden-sussex-county-open-house/>

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### Integrated Pest Management Implementation Workshop

Monday, July 8, 2019

Delaware State University, Smyrna Outreach Research Center

884 Smyrna-Leipsic Road, Smyrna, 19977-3440

#### The workshop will cover:

- Integrated Pest Management Strategies
- Insect and Mites: life cycles, detection methods, monitoring thresholds and control options
- Experience with predatory mites
- Housing pests and control
- Weed management and cover cropping for specialty crop growers

**Pesticide Credits: 6**

#### Speakers:

Dion Lerman Lewis  
 Penn State Center

David Owen  
 University of Delaware

Cerruti Hooks  
 University of Maryland, College Park

Brian Kunkel  
 University of Delaware

Please register by July 3, 2019.

*For more information, to register for this free workshop, or for assistance due to disabilities, contact: Rose Ogutu [rogutu@desu.edu](mailto:rogutu@desu.edu). Phone number 302-857-6397*

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# Weather Summary

Carvel Research and Education Center Georgetown, DE

Week of June 13 to June 19, 2019

Readings Taken from Midnight to Midnight

## Rainfall:

0.10 inch: June 13  
0.13 inch: June 14  
0.74 inch: June 17  
0.28 inch: June 18  
0.28 inch: June 19

## Air Temperature:

Highs ranged from 91°F on June 17 to 74°F on June 14.

Lows ranged from 71°F on June 19 to 55°F on June 15

## Soil Temperature:

75.1°F average

Additional Delaware weather data is available at

<http://www.deos.udel.edu/>

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

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