WEEKLY CROP UPDATE
UNIVERSITY OF DELAWARE COOPERATIVE EXTENSION

Volume 27, Issue 16 **July 12, 2019**

Vegetable Crops

Vegetable Crop Insect Scouting – *David Owens, Extension Entomologist;* owensd@udel.edu

Sweet Corn

Fall armyworm is active in the area. Treatment thresholds are 12-15% infested plants. Corn earworm moth counts are very high for this time of year. Complicating the picture is that there is a wide degree of variation among various states in terms spray schedules based on pheromone trap counts. Our pheromone trap count of 13 or more moths per night triggers a 3-day spray schedule. Some states recommend a 2-day spray schedule when moth counts are at 20 per night and the temperature is above 80 °F. Last year, we compared a pyrethroid sprayed at a 2-day interval with a pyrethroid sprayed at a 3-day interval in August-silking sweet corn. There was an 11 point difference between the two spray intervals in terms of perfectly worm-free ears, however, there was no difference in percentage of clean + tip damage ears. If relying on a straight pyrethroid, tighter spray schedules are advised. Moth susceptibility testing indicates a potential 19% survivorship rate when exposed to pyrethroids in vials. We will be testing moths again in the next several days.

Diamides (Coragen, Harvanta, Besiege) will give excellent earworm control and have translaminar activity. Recently questions have been raised regarding other labeled products for sweet corn because we do not want to rely heavily on just two modes of action. Intrepid (methoxyfenozide) is labeled for sweet corn but it is a growth regulator. It kills larvae slowly during the molting process and it is possible that worms will still infest tips before dying. Obviously, this would not be acceptable for fresh market sweet corn. Avaunt (indoxacarb) is not labeled for silking sweet corn, but is an excellent worm product for pre-silking worm applications. Radiant and Blackhawk (spinosyn class) are good worm products in a rotational scheme. Last year we rotated it with daimide applications, and the last two applications were pyrethroids and it was effective. One to two applications with a diamide should provide excellent control and could allow a spray schedule some flexibility. However, a straight spinosyn application results in poor control. Under heavy moth flights, a more conservative approach would be to include a pyrethroid with a spinosyn. Lannate (methomyl) tank mixed with a pyrethroid is another excellent treatment to include in a rotation. Bottom line: incorporate multiple, effective modes of action (we have 4) to preserve earworm insecticide susceptibility.

A couple of European corn borer have been intercepted this week in black light traps, 1 in Milford and 2 near Trap Pond.

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. Moth counts from Thursday are as follows:

Trap Location	BLT – CEW	Pheromone CEW
	3 nights total catch	
Dover	2	104
Harrington	1	42
Milford	1	27
Rising Sun	1	26
Wyoming	8	171
Bridgeville	1	38
Concord	1	28
Georgetown	2	18
Greenwood	1	
Laurel	6	73
Seaford	1	33
Trap Pond	8	0
Lewes	0	30

Watermelons
Inclement weather earlier this week has prevented us from checking as many melon fields as usual. Several fields have been treated for mites, be sure to check fields and be prepared for a follow up spray. This is especially true of contact miticides. Also make sure that mites are in fact alive and active. Use a hand lens to determine if the mites are still moving and there are new, fresh looking eggs. Some miticides kill mites slowly, and dead mites will stick to the webbing for some time. Reports of worm activity have been increasing in the area. This includes corn earworm. While earworms feed mostly on the blossoms, they should be considered part of the 'rindworm' complex. They are not as aggressive as armyworm or leafrollers but can still scar up fruit.

Fruit and Fruiting Disorders in Summer Squash and Cucumbers Revisited and Pumpkin Fruit Set

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

A number of fruit and fruiting disorders have been observed in summer squash and cucumbers recently including lack of fruit set, bottlenecking, pinched blossom ends, crooks, nubs, hollow centers or cavities, fruit zippering and scarring.

Lack of fruit set can result from a lack of pollination due to reduced bee activity, reduced pollen viability, or reduced pollen germination in high heat. Water stress will compound this problem. When day temperatures are in the 90s and night temperatures are in the high 70s, plants will commonly abort fruits or produce misshapen fruits. To reduce losses due to heat, apply irrigation so that plants are never under water stress.

Growers should note that some squash (mostly zucchini) varieties will still set fruit without pollination. Steve Reiners at Cornell did a trial in 2013 with 21 varieties of summer squash to determine which were capable of setting fruit without pollination. Female flowers were bagged prior to opening to exclude pollinating insects. After 1 week, bags were removed and fruit rated as to whether it was marketable or not. The results can be found at this web site: http://www.hort.cornell.edu/expo/proceedings/2014/Vine%20crops/Seedless%20squash%20Reiners.pdf. For example, 'Golden Glory' and 'Dunja' zucchini both were able to set a high percentage of fruit without pollination. Selecting varieties with this ability can reduce losses due to poor pollination.

Golden Glory Yellow Zucchini can set fruit without pollination.

Parthenocarpic varieties of cucumbers and zucchini that set fruit without pollination are

also available and can be less susceptible to environmental extremes or conditions that limit bee activity in monoecious or gynoecious varieties. We currently are evaluating 16 parthenocarpic pickle varieties for adaptation to our region.

Corinto cucumber, a parthenocarpic slicing type well suited for high tunnel production.

Lack of fruit set can also be due to harvest management. When summer squash or cucumbers are allowed to progress to an overly mature stage, plants will "shut down" and not reflower for a period of time. To manage this problem, frequent picking is necessary. This requires picking every 2 days in the summer.

Misshapen fruits commonly are found in high numbers with high temperatures and water stress in the summer or low night temperatures in the fall. This includes bottle necking, pinched blossom ends, crooked fruits or fruits with "narrow waists". These defects are most commonly due to effects on pollination. Other stresses such as herbicide injury, root pruning in cultivation, or wind damage can increase the number of misshapen and unmarketable fruit. Potassium deficiency can also cause pinching at the stem end.

Hollowness or open cavities in cucumber and summer squash fruit can be caused by inadequate pollination and reduced seed set. Boron deficiency or the combination of boron and calcium deficiency can also result in increased hollowness.

Progression from marketable to unmarketable pickle fruits that are crooked, waist pinched, tip pinched or tip pinched with crook.

Small cavities in cucumber fruit. In a more severe form hollowness and cavities can render the fruits unmarketable or reduce processing (pickling) quality.

Pumpkin Fruit Set

Pumpkins have become an important income source for many Delmarva vegetable growers including u-pick, local sales and regional wholesale.

Each year we see pumpkin fields with poor fruit set or fruit retention. In larger pumpkin sizes, each plant will normally carry 1-2 fruits. The large vining plants also need considerable space – 25 to 50 square feet per plant. While planting jack-o'-lantern types at higher densities might at first seem to be a way to achieve higher yields, interplant competition will increase and you can

decrease fruit retention because of this competition. Matching pumpkin types with space requirements is very important to optimize fruit set.

As with summer squash, a major reason for poor fruit set in pumpkins is high temperatures during flowering in July. Day temperatures in the 90s or night temperatures in the high 70s will cause flower and small fruit abortion. For pumpkin growers that do wholesale and start shipping right after Labor Day, this will limit early pumpkin availability. Varieties vary considerably in their ability to tolerate heat and to set under hot conditions. Inadequate irrigation and excessive water stress can also reduce fruit set, increase abortions, and reduce fruit retention. High temperatures and water stress reduce photosynthesis and the ability of the plant to carry fruits. Drought can also cause a higher than normal male/female flower ratio, thus affecting the amount of fruit per plant.

Another major factor that will reduce fruit set is poor pollination. Misshapen fruit can also result from inadequate pollination. A pumpkin plant has both male and female flowers and the first female flower opens one week after the first male opens. The flowers only last a few hours, blooming at dawn and closing later in the morning but well before noon. Pollinators need to be active during this short period.

Native pollinators can be very effective in pollinating pumpkins and some research has shown that most of the fruit set is occurring because of these native pollinators. Bumblebees and squash bees are native bees active in pumpkins. The squash bee is of particular interest because it has evolved along with pumpkins and squash in the Americas and is dependent on pollen from pumpkin and squash plants.

Other research has shown that honeybees do provide additional pollination benefits above what native pollinators are providing. In research from Illinois, Walters and Taylor found that while pumpkin fruit number was not increased with the addition of honeybees, pumpkin weights and size were increased significantly. Research has shown that 10-15 visits by honeybees transferring 1200 pollen grains will result in full fruit set.

Other reasons for poor fruit retention include foliar diseases and storm damage that reduce effective leaf area and photosynthesis.

Too much available nitrogen can also delay pumpkin fruit set so that many of the pumpkins that are produced do not reach maturity in time. Pumpkins do not normally need more than 80 lbs/acre N to grow a crop. Fertilizing above 100 lbs/acre N may cause the pumpkins to put on excessive vine growth and delay fruiting.

Agronomic Crops

Agronomic Crop Insect Scouting – *David Owens, Extension Entomologist;* owensd@udel.edu

Soybeans

Continue monitoring fields for defoliation. Full season bean fields are in their early reproductive stages when defoliation thresholds decrease to around 15% of defoliation. Begin scouting fields for corn earworm. Corn earworm moths are unusually active right now. Adult moths prefer to oviposit in open canopy fields, and open canopy, drought stressed fields that have had recent insecticide applications are at greater risk. Worms can eat flowers without impacting yields because soybeans can compensate for flower feeding and soybeans produce more flowers than will become pods. However, economically damaging earworm populations may develop in soybean fields flowering at the beginning of a moth flight, because worms will be developing on small pods and pods developing seed. An economic threshold calculator is available to assist with management decisions. https://soybeans.ces.ncsu.edu/wp-content/uploads/2017/08/CEW-calculator-v0.006.html. While scouting for earworm, stink bugs may be observed. Stink bugs in flowering soybean are not injuring plants. Check plants again as pods begin developing to see if stink bugs are still present or if they have dispersed.

Growing Degree Days Through July 10 -

Jarrod O. Miller, Extension Agronomist,
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Corn planted in late May should be in tassel or at least at V15 across Delaware. Most corn planted from mid-April to mid-May is probably on the reproductive stages (Table 1), so be sure to keep the irrigation running to keep plants cooled and less stressed during grain fill.

It has been hard to miss daytime stress on corn, as temperatures have remained high (>87°F) for much of the past month (Fig. 1). Nighttime temperatures have had a little reprieve, but still appear to be on a linear upward trend as we head into mid-July. At this point, the best you can do to keep stress down is making sure that irrigated fields are tended to. Temperatures through next weekend appear to be hot and humid again.

The northern end of Delaware is still getting most of the rainfall, while storms keep skirting just south of the Mason-Dixon line in Delmar (Fig. 2). Over the last month Delmar has received less than an inch of rainfall, while Newark has received three.

Table 1: Accumulated growing degree-days based on planting dates through July 10th

If you planted ↓	Sussex	Kent	New Castle
14-Apr	1733	1685	1614
21-Apr	1642	1593	1527
28-Apr	1561	1518	1447
5-May	1460	1436	1376
12-May	1360	1339	1285
19-May	1290	1274	1225
26-May	1150	1138	1091

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

Figure 1: Statewide temperatures since April 1st.

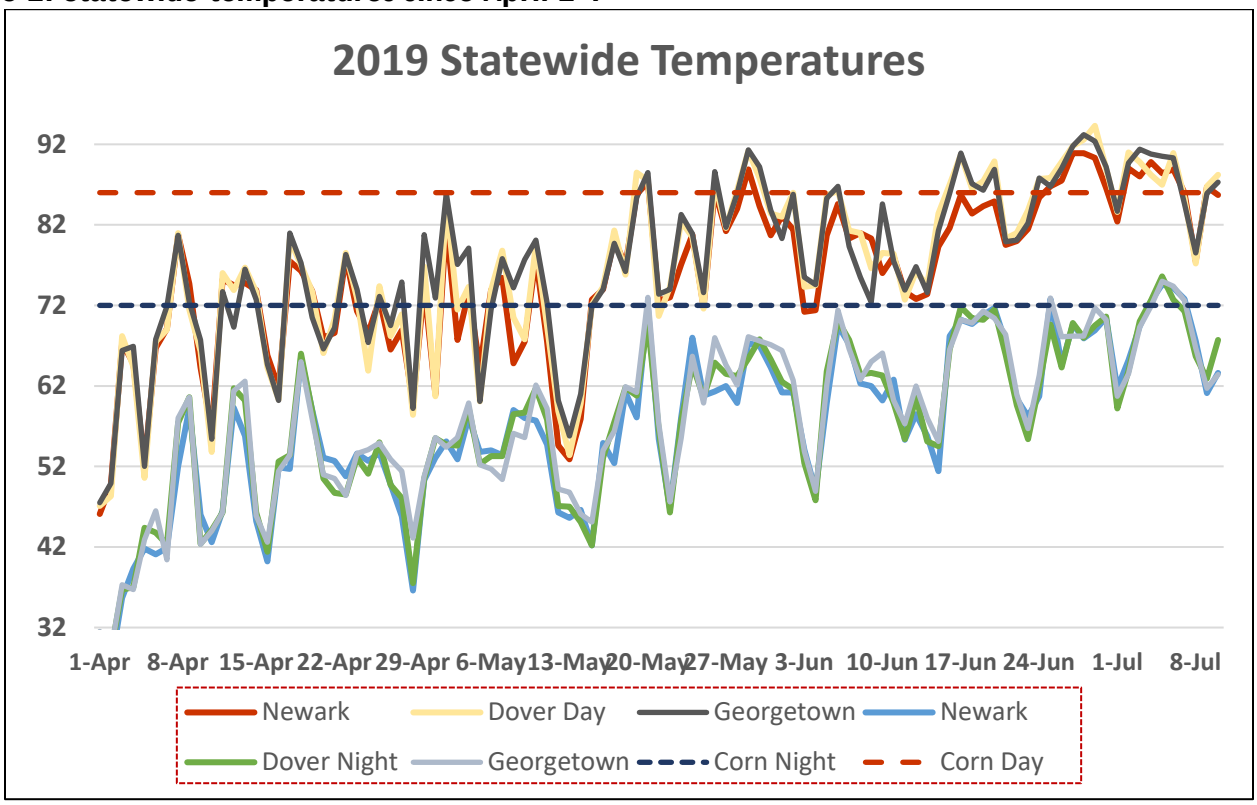
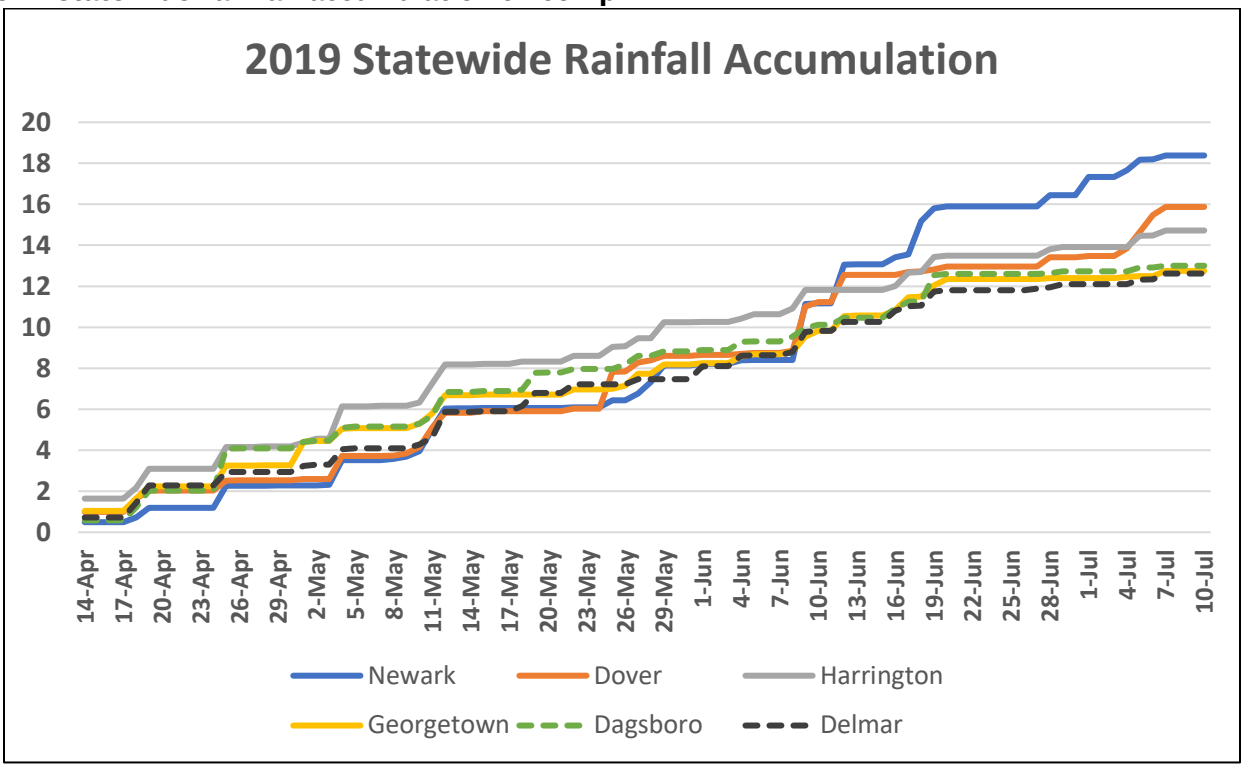


Figure 2: Statewide rainfall accumulation since April 14th.



General

Irrigation Scheduling – When to Resume After Rain- *James Adkins, Agricultural Engineer;* adkins@udel.edu

Continued scattered thunderstorms across the region brought significant relief to a few but most fields received less than 0.2" of rain last week. Both corn and full season soybeans are predicted to use 0.25" per day next week. With sporadic and limited thunderstorms in the forecast, farmers are facing the challenge of when to start back after a rain event.

Coarse loamy sand soils only hold 1.6" in the entire 18" root zone and need to maintain a minimum of 50% of the available water to avoid yield loss. This means a farmer with sandy loam soils needs to initiate irrigation before 0.8" of crop water use. With daily evapotranspiration averaging 0.2"-0.25" per day irrigation should start no more than 3 days after a major (1 inch plus) rain. Sandy loams average 2.34" of holding capacity meaning a 50% managed allowable depletion of 1.17", or a 4-day break after a profile filling rain. High organic matter and clay soils can hold additional 1-2 days of moisture before needing irrigation. Keep in mind that just because a farm received and 1" of rain there is no guarantee that all of it infiltrated and was stored in the soil. Thunderstorms tend to dump water faster than the soil can absorb and thus runoff from the high parts of the field to the low creates soil moisture variability and will require irrigation sooner to prevent yield loss in the high areas.

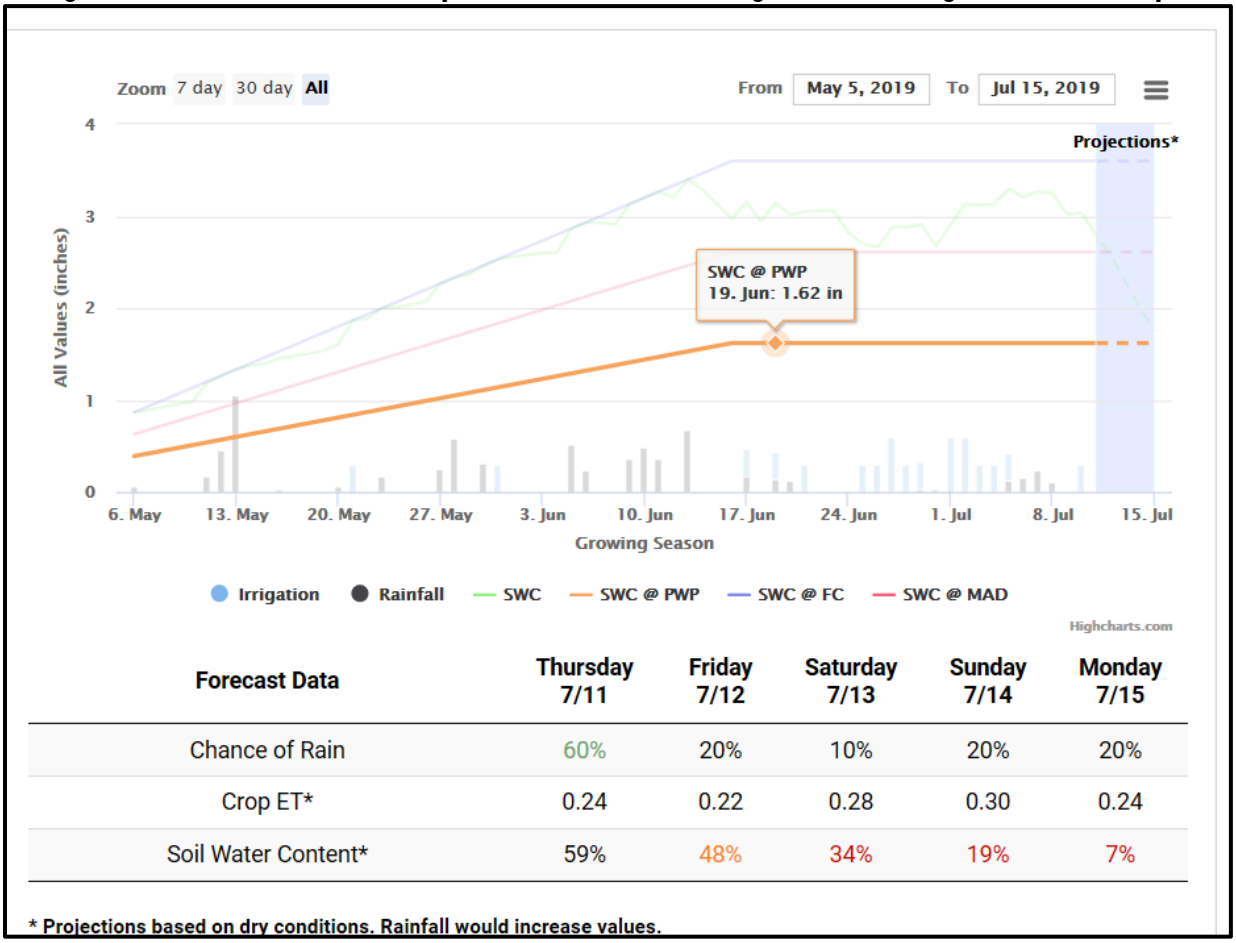
The information presented below is an example of the soil moisture status at University of Delaware's Warrington Irrigation Research Farm. Actual field values will vary greatly depending on crop stage, soil type and local rainfall. There are many tools available that provide field by field values to assist farmers in making irrigation scheduling decisions including paid services through local crop consultants, irrigation equipment manufacturer's, Climate Corp, etc and free tools like KanSched and the Delaware Irrigation Management System (DIMS) http://dims.deos.udel.edu/

Field Corn

Daily corn evapotranspiration (ET) rates for April 25th planted 114 day corn at R1 averaged 0.2"/day for the past week. The cloudy weather on Sunday 7/7 and Monday 7/8 limited transpiration rates to 0.15" bringing the weekly average down from last week. This field received 0.62" of rain in addition to 0.9' of irrigation in 3 events since last Thursday. This same field is predicted to use 0.24", 0.22", 0.28", 0.30", 0.24" for Friday 7-5 - Tuesday 7/9 for an estimated daily usage of ¼" per day for the upcoming week. These are estimated values and are no substitute for daily ET use models and field level soil moisture data.

At this point in the growing season most corn fields are at least into the VT stage; Crop water usage will be nearly the same from V14 until R2/blister stage. Farmers should continue to intensively irrigate through the R2 stage and gradually taper off through R3 until black layer.

Irrigated Corn Soil Moisture Report for the UD Warrington Farm Stage VT – DIMS Report



Forecast Data	Thursday 7/11	Friday 7/12	Saturday 7/13	Sunday 7/14	Monday 7/15
Chance of Rain	60%	20%	10%	20%	20%
Crop ET*	0.24	0.22	0.28	0.30	0.24
Soil Water Content*	59%	48%	34%	19%	7%

*** Projections based on dry conditions. Rainfall would increase values.**

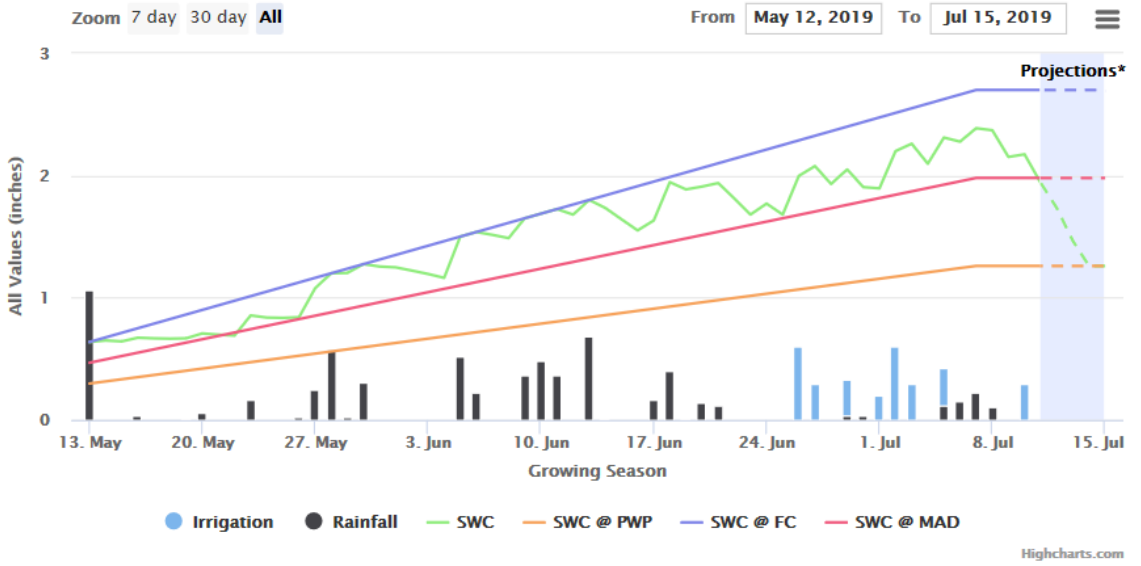
Full Season Soybeans

May 2nd planted soybeans at the UD Warrington Irrigation Research Farm are approaching the R3 stage as of July 11th. We received 0.62" of rain and applied a total of 0.6" in 2 irrigation events last week. The average daily crop water use was 0.19" per day and the predicted daily ET for next week is 0.25" per day (the same amount as corn). Remember to irrigate in small but frequent doses to avoid pushing water beyond the root zone. Multiple years of soil moisture sensor data show soybeans to use water primarily from the shallow (0-8") soil profile.

Double Crop/Late Season Soybeans

Continue to irrigate in small amounts of around 0.2-0.3 inches to maximize canopy development. Keep in mind that irrigation that infiltrates beyond 6" will be of little benefit to the crop. Soybeans that have reached 70+% canopy are using and estimated 0.12" per day.

Irrigated Soybean Soil Moisture Report for the UD Warrington Farm Stage R2 - DIMS Report



Forecast Data	Thursday 7/11	Friday 7/12	Saturday 7/13	Sunday 7/14	Monday 7/15
Chance of Rain	60%	20%	10%	20%	20%
Crop ET*	0.23	0.21	0.27	0.29	0.23
Soil Water Content*	47%	33%	14%	0%	0%

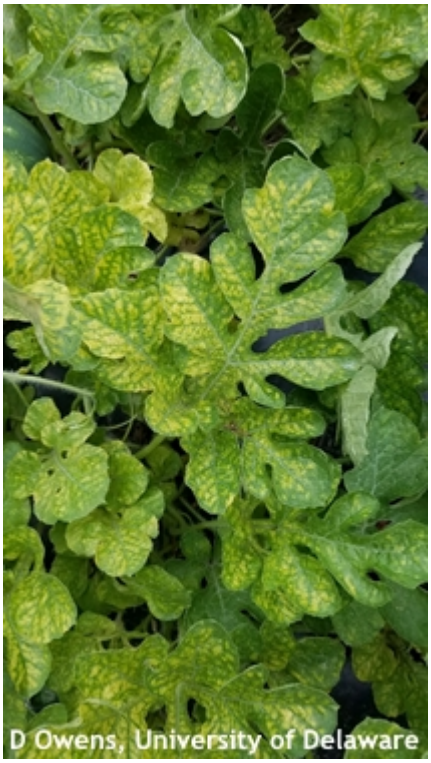
*** Projections based on dry conditions. Rainfall would increase values.**

Guess the Pest! Week 14 & 15 – *David Owens, Extension Entomologist,* 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.

This week, we will add a couple of other watermelon foliar discoloration symptoms. Picture 1 is last week's, of a pretty 'new' leaf. Picture 2 is a much more advanced stage of the causal agent. Picture 3 has 2 separate issues.

Picture 1



Picture 2

Picture 3

To submit your answer, please go to: https://docs.google.com/forms/d/e/1FAIpQLSfUPYLZnTRsol46hXmgqj8fvt5f8-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

Join Delaware Master Gardeners and explore the multitude of benefits a garden can bestow! Exercise with a leisurely stroll. Relax on a bench and observe our many pollinators and birds! Delight in watching children discover a garden toad or spot a fish in the pond. Take deep breaths and soak in the aromas of our fragrant annual and perennial show stoppers! Catch up with a friend under a shade tree! Bring your curiosity along with your camera and capture the astounding flora and fauna that call our garden home. Be dazzled by the new meadows we've established for pollinators!

Come visit our garden for inspiration on how to create your own special outside oasis! We can help you create that happy place! Get ideas for backyard fun and games for the whole family. Be creative and help us create a kindness rock garden. Channel the child inside you and join little ones as they hopscotch through our special children's sensory garden. Shop the plant sale! Attend our free mini-workshops (see below). Enjoy ice cream from the UDairy Creamery's Moo Mobile (free to children under 16 with a coupon from Farmer McGregor). We have plenty of seating and shady spots in the garden to enjoy. We hope to see you there!

Come see TWO model trains in our garden! Thomas the Tank Engine will be one. A special thank you to Delmarva Model Railroad Club.

FIVE Mini-Workshops! They're Free!

10:00 a.m. – Worm Composting with Judy Pfister

10:30 a.m. – Salsa Demonstration with Ana Dittel

11:00 a.m. – New to Delaware with panel:
Bob Williams | Susan Trone | Tracy Mulveny

12:00 Noon – Art in the Garden with Tina & Bunny

1:00 p.m. – Good Bug/Bad Bug Walk with David Owens, UD Entomologist

Events this year include:

● Grow healthy foods in a vegetable garden

● We've created incredible meadows! Small or large, learn how a meadow can enhance your landscape or open space!

● The perfect patio: In 2016 it was a "man cave!" 2017 it was all about "Thinking Pink!" For 2018 it was a restful meditation garden. For 2019…???

● UDairy Creamery Ice Cream available for sale from the MooMobile! (Free to children who attend the Master Gardener puppet show!)

● Ask an Expert – Sick Plant Clinic

● Our popular home-grown plant sale

● Raffle and Door Prizes

Special Children Events

● The international award winning "The Misadventures of Peter Rabbit in Farmer McGregor's Garden" will show at 11:00 a.m. and 12:30 p.m. Kids, ask Farmer McGregor for a coupon for free ice cream!

● Art in the Garden – a hands-on activity!

Come see what we've designed, planted and cultivated. There is a lot new this year! Do you have a plant that's under the weather, or not cooperating with the weather? Bring it to our Sick Plant Clinic. Visit our plant sale and take home a new plant to enjoy in your garden!

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/

Field Tour of Carvel Crops Research

Wednesday, August 14, 2019 3:30-5:30 p.m.
University of Delaware
Carvel Research & Education Center
16483 County Seat Hwy
Georgetown, DE 19947

Please mark your calendars and save the date to join us for the 2019 Crops Research Tour at the University of Delaware Carvel Research and Education Center. This event will include wagon tours of agronomic and vegetable research plots. Dinner will be provided.

Cut Flowers 1: Succession Planting, Harvesting Tips, & Pest Control

Sunday, July 21, 2019 1:00 – 4:00 p.m.
Hattie's Garden
31341 Kendale Rd, Lewes, DE 19958

Local, sustainable flowers are increasingly popular with farmers, at markets, and with florists! Join us at Hattie's Garden to learn the following important cut flower production skills: succession planting, harvesting techniques, and organic pest control. All experience levels are welcome! (Rain Date: July 22nd, same time, same place.)

This workshop will be led by farmer/owner Hattie Allen, who is deeply committed to growing flowers sustainably and organically. Thanks to Hattie and to the organizers of Future Harvest CASA and the University of Delaware.

https://www.eventbrite.com/e/cut-flowers-1-succession-planting-harvesting-tips-pest-control-tickets-63985426132

Cut Flowers 2: Advanced Annuals, Post-Harvest Handling & Season Extension

Saturday, September 28, 2019 1:00–4:00 p.m.
Masterpiece Flower Farm
7945 Old Ocean City Road, Whaleyville, MD 21872

Join us at Masterpiece Flower Farm and learn how to grow advanced annuals such as Dahlias, Ranunculus, and Lisianthus. Special focus will be given to post-harvest handling practices. We will also discuss tips for season extension. All experience levels are welcome. (Rain Date: September 29th, same time, same place.)

This workshop will be led by farmer/owner Crystal Giesey, who is deeply committed to growing flowers sustainably and organically. Thanks to Crystal and to the organizers Future Harvest CASA and the University of Delaware.

https://www.eventbrite.com/e/cut-flowers-2-advanced-annuals-post-harvest-handling-season-extension-tickets-64194508503

Weather Summary

Carvel Research and Education Center Georgetown, DE

Week of July 4 to July 10, 2019

Readings Taken from Midnight to Midnight

Rainfall:

0.06 inch: July 5
0.04 inch: July 6
0.25 inch: July 8

Air Temperature:

Highs ranged from 91°F on July 4 to 79°F on July 8.

Lows ranged from 75°F on July 5 to 62°F on July 9.

Soil Temperature:

80.9°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