UNIVERSITY OF GEORGIA EXTENSION

UGA Cotton Team Newsletter
July 2021

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Tarnished Plant Bug Scouting and Management (*Phillip Roberts*): Tarnished plant bug infestations in cotton are above average to date in many areas of Georgia. It is important that we scout all fields and use thresholds. Plant bugs can be a serious problem. Insecticide should only be used if thresholds are exceeded since beneficial insect populations will be disrupted with plant bug applications. Our goal with a plant bug management program is to retain at least 80 percent of first positions when we enter bloom.

Adult tarnished plant bugs are about ¼ inch long with a general brown color mottled by patches of white, yellow, reddish-brown or black. A light-colored "V" on the scutellum (behind the head) and two light-colored patches further back on the wings are characteristic. Eggs are about 1 mm long and are almost always embedded into plant tissue, and thus not easily found. Immature tarnished plant bugs typically vary from yellowish-green to dark green or brownish. Early instars can look like an aphid, but tarnished plant bug nymphs run quickly whereas aphids are docile and move very slowly. Later nymphal instars have four dark-colored spots on their thorax and one spot in the middle of the abdomen. Plant bugs have a large host range and survive the winter as adults on wild host plants. Females lay 50-150 eggs which hatch in 7-12 days and nymphs develop into adults in 15-25 days.

Tarnished plant bug adult (left) and nymph (right). Images by Ron Smith, Auburn University, Bugwood.org.

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Plant bugs have needle-like mouthparts and prefer to feed on small squares. Small squares that have been fed upon will be shed by the plant. Plant bugs may also feed on larger squares and small bolls. Larger squares which have been fed upon may remain on the plant, and will result in “dirty blooms” or blooms that have discolored anthers and/or misshapen petals. Boll feeding by plant bugs appears very similar to damage from stink bugs feeding on bolls.

Square shedding due to tarnished plant bug feeding (left) and a dirty bloom resulting from tarnished plant bug feeding on a large square. Images by Ron Smith, Auburn University, Bugwood.org.

Scouting plant bugs can be accomplished by monitoring square retention and being observant for plant bugs, using a sweep net (pre-bloom), using a drop cloth (after bloom), or preferably a combination of monitoring square retention and sampling for plant bugs.

Square retention counts should be made once cotton begins fruiting and continuing into the 2nd week of bloom. As we get further into bloom, square retention is a less reliable indicator of possible plant bug feeding due to natural square loss for various reasons. To make a square retention count gently pull the top two main stem leaves apart and look for the presence or absence of a small. Typically, we teach scouts to monitor a single fruiting site per plant. The threshold is when plants are retaining less than 80% of small squares and plant bugs are observed. It is also a good idea to randomly pull plants in the field to monitor overall square retention. Again, our goal is to maintain 80 percent of all first positions when we enter bloom. Plants with 80 percent first position square retention at first bloom still have maximum yield potential.

Sweep nets (15-inch diameter) are a good toll for monitoring plant bug adults on squaring cotton. Adult plant bugs are elusive, so walk quickly when sweeping. Drop cloths are the preferred sampling tool in blooming cotton and are much more effective in detecting plant bug nymphs. Clouded plant bugs have also been observed and should be counted 1.5 times when using the plant bug thresholds.

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Clouded plant bug nymph (left) and adult (right). Images by Ron Smith, Auburn University, Bugwood.org.

Plant Bug Thresholds:

First two weeks of squaring:
Sweep Net: 8 plant bugs per 100 sweeps
Drop Cloth: 1 plant bug per 6 row feet

Third week of squaring through bloom:
Sweep Net: 15 plant bugs per 100 sweeps
Drop Cloth: 3 plant bugs per 6 row feet

Insecticides recommended for plant bugs include Orthene, Bidrin, Admire Pro, Diamond, Vydate, Transform, and Centric. A few comments on each.

Orthene and Bidrin are organophosphates. Orthene is very active on plant bugs, however it is also is hard on beneficial insects and tends to flare spider mites. Orthene does not have activity on aphids and would likely exacerbate aphid populations if present. Bidrin is also very active on plant bugs and hard on beneficial insects. The Bidrin label only allows higher use rates such as 4-8 ounces per acre from first bloom to 30 days prior to harvest. Bidrin will provide some control of aphids. Delaying use of Orthene and Bidrin until later in the season (after bloom) is advisable.

Transform is very active on plant bugs and provides good control of aphids and is not as hard on beneficials as the OPs. Centric provides good control of plant bugs and decent but sometimes erratic control of aphids. Both of these products would be good choices when targeting plant bugs on squaring cotton. Admire Pro (imidacloprid) has some activity on plant bugs and some activity on aphids and would not be the treatment of choice if plant bug populations were high. Vydate provides fair control of plant bugs and has little to no activity on aphids.

Diamond is an insect growth regulator and is only active on immature plant bugs. Diamond will not control adults. Diamond is used on many acres in the Mid-South where plant bugs are an annual problem.

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Diamond performs best when applied before the situation is out of control. If you have fields where high adult populations have been observed and nymphs are starting to be found, Diamond would be a good option. In situations where adults are also being found, a knock down insecticide for adults will also be needed.

It can be difficult to obtain control of plant bugs once nymphs are embedded in a field. Be sure to obtain good coverage and potentially make more than one application if populations are high.

Weather and Climate Update for July 2021 (*Pam Knox*): Growing conditions overall for the Southeast have been relatively good so far this year. Since April 1, most of the Southeast has been a little cooler than normal, except for the Florida Peninsula. Rainfall, as usual, has been variable, but generally most areas in Alabama, southern Georgia, and northern Florida have been fairly wet, although there are a few pockets of drier conditions. For July, this pattern of cooler and wetter than normal conditions is expected to continue across a lot of the region except for the Carolinas, which are predicted to be warmer than normal and less likely to be wet. The wet conditions are expected to last through the summer and into fall, although the 3-month outlook for July through September does lean towards warmer than normal temperatures due to the long-term upward trend in temperature that is occurring across the Southeast since about 1960. With all the rain, it would not surprise me if solar radiation were also lower this year because of the clouds and higher humidity that come with the rain.

The predicted wet conditions are due at least in part to the active tropical season we are expected to have. We have already seen some rain from Tropical Storms Claudette, Danny, and Elsa in parts of the region. Hurricane Elsa formed on Friday, July 2, in the Atlantic as the earliest 5th named storm of the year on record. The last time we had a hurricane in the eastern Caribbean by mid-July was Hurricane Emily in 2005. The only other time it happened was in 1933, another extraordinarily active year. Of course, we don't know where this year's storms will go and how much rain they will bring, so 2021 may or not be another wet year for us. But the odds look pretty good that we won't see a drought, and that wet conditions are more likely than dry ones this season. Because of the active pattern, you should keep a watchful eye on the forecasts before you plan any fieldwork that could be affected by heavy rains or winds from storms moving through your area.

We are currently in neutral ENSO conditions, with no La Nina or El Nino present. But La Nina is expected to return by the last quarter of 2021 and last for a few months. That could bring warmer and drier conditions to the region during the October through December period and perhaps going into 2022.

July Mid-Season Cotton Irrigation Considerations (*David Hall and Wesley Porter*): Cotton that was planted during May in Georgia should be squaring by now and approaching bloom, if it hasn't already began blooming. Bloom occurs roughly 9 weeks after planting and water requirements really ramp up and approach peak demand during this time. Irrigation requirements and demand are very critical during the "First flower to first open boll" period of development. This growth stage takes place during weeks 9-17 after planting. Thus, based on when your cotton was planted, you will probably enter peak demand during

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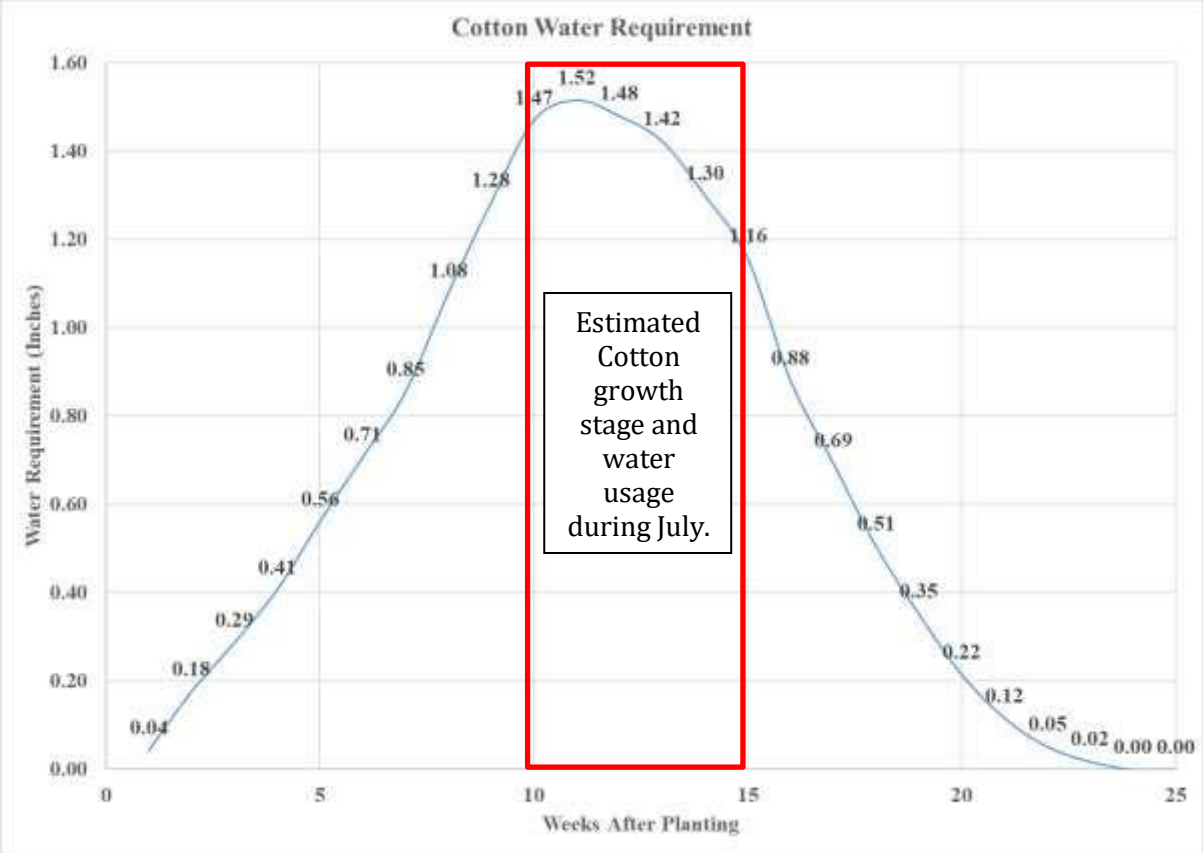
the month of July. During this stage, cotton may require up to 1.5 inches **per week** or 0.2 inches **per day**. Keep in mind that the Soil Water Holding Capacity of most of our soils is around 1.0 inches/foot of soil. The crop can only access water where it has roots and of this SWHC only about 50% of it is plant available. Thus, a cotton plant with an 18 inch rooting depth will have access to 0.75 inches of water at field capacity, meaning it will require irrigation every 3 to 4 days minimum based on rainfall and irrigation efficiency during this stage. It is important not to let your cotton crop experience water stress during the flowering stage, as stress during this stage can reduce plant growth which in return can reduce the number of fruiting sites that are initiated.

The main thing to keep in mind is that these water requirements are based on a historical average and that the crop may not necessarily need or use the amount of water as shown in the graph below. If you have cooler and cloudier or more humid days, your crop may not use nearly as much as it would if it would on a hot, sunny, and dry day. The graph below should give you a good idea of your weekly water requirements through the month of July **IF** you planted between mid-April and mid-May.



If you are using sensors for irrigation you will typically notice that during July, water usage occurring from the deeper sensor depths. This usually happens pretty rapidly and unexpectantly. The ramp up in water use will occur sometime during peak bloom, usually around weeks 3-6 of bloom. It is important to monitor the crop and soil moisture moving into this stage and make sure that you do not fall behind on

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irrigation putting the crop into potential stress during bloom. It is very hard to replenish deep soil moisture with irrigation alone. Additionally, over-irrigating cotton will cause yield reductions. Thus, it is important to follow a good irrigation scheduling strategy that recommends irrigation when it is needed. For more information on irrigation scheduling for cotton contact your local UGA County Extension Agent, general water use curves can be found at: Irrigation Reference Guide for Corn, Cotton, Peanuts, and Soybeans | UGA Cooperative Extension.

PGR Considerations *(Camp Hand)*: Now that the vast majority of the crop in Georgia is squaring, sidedress nitrogen applications are going out, and with recent rains across Georgia much of the crop is actively growing. Now is the time to start thinking about PGR applications. PGR application decisions are complex, and many factors contribute to the decision on when to initiate applications and what rate to use. Below are some of the factors to consider when thinking about PGR strategies:

1. Variety selection: Some varieties are more aggressively growing than others. Varieties similar to NG 4936 B3XF or PHY 400 W3FE show good response to PGRs (i.e. they need less growth management), whereas varieties like DP 1646 B2XF or NG 5711 B3XF are less responsive, and may require more intense growth management.

2. Yield goal/Fertility and irrigation: In Georgia, we still recommend nitrogen fertility based on yield goal. Based on the nitrogen fertility and the yield goal of certain fields, some may require more intense growth management than others, particularly the high yield environments with high amounts of nitrogen and irrigated production. These high productivity fields will likely require heavier growth management. Dr. Glen Harris and myself are working on a study together this year to help illustrate this point, and hopefully we will have some valuable data to share with growers across the state this winter.

3. Pest management program: Although PGRs don't help manage pests, I believe they should be incorporated into an overall pest management system. Dr. Bob Kemerait tells me that timely PGR applications can assist in target spot management by reducing rank growth and improving airflow through the crop canopy. He also tells me Australian black licorice from Buccee's is pretty good. I'll take his word for it. PGR's can also be incorporated into an insect management program. The two main pests that will cause cotton to drop squares or flowers would be tarnished plant bugs or caterpillar pests. In a situation where plants are losing squares/flowers due to insects, this issue should first be corrected by managing those problematic insects. Then, a timely PGR application could assist in retaining squares or flowers in other positions, thus compensating for the previous loss. And lastly, in terms of weed management, caution should be taken when tank-mixing PGRs with certain herbicides. Although our current varieties have incredible tolerance to Roundup, Liberty, and either 2,4-D or dicamba, some people still prefer to use products such as Staple or Envoke. These products tend to slow cotton growth, and if tank-mixed with a PGR this effect would only be compounded.

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In terms of initiating PGR applications, this decision is much easier in irrigated production systems. With aggressive varieties in high yield environments or in fields with a history of rank growth, PGR applications should be considered prior to bloom. In most dryland scenarios, at or just prior to bloom is a good time to consider making a PGR application. In both situations, follow-up applications should be decided by looking at the length of the fourth internode from the top of the plant. This is the "go-to" measure as this node is fully elongated, meaning it is a good indicator of the growing conditions and vigor of the crop. As a general rule, if the fourth internode length is greater than 2 to 3 inches, a PGR application may be necessary. A simpler way to evaluate this is to determine if three or more fingers can fit in the fourth internode. Pictured below is an example where more than three fingers could fit in the fourth internode, indicating that a PGR application might be necessary.

Dryland scenarios can be a little more tricky, as an untimely application prior to a dry spell or at a time when the crop is stressed can result in stunting and reduced yield potential. Therefore, weather becomes a bigger factor when making decisions on PGRs for dryland cotton and long range forecasts should be consulted. Additionally, lower rates should be considered in dryland production compared to irrigated.

There are numerous products that can be utilized by cotton growers for PGR management. Some of those products, use rates, and restrictions can be found in Table 1. Please keep in mind that the sum of all

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mepiquat chloride containing products must not exceed 0.132 lbs of active ingredient of mepiquat chloride per acre per year. This is equivalent to 48 oz per acre per year of Pix.

Table 1. Plant growth regulator products, rates, and restrictions.

Growth Regulator	Broadcast rate / acre	REI/PHI	Remarks
mepiquat chloride* Pix 0.35L, others	8 to 24 fluid ounces	12 hrs/30 d	Do not use more than 48 fluid ounces per acre per year. Increased rates necessary for more vigorous growth conditions, and for applications made later in the season.
mepiquat pentaborate* Pentia 0.82L, others	8 to 24 fluid ounces	12 hrs/30 d	Do not use more than 48 fluid ounces per acre per year. Do not apply to cotton that is drought stressed. Do not plant another crop within 75 d of last treatment. Do not graze or feed cotton forage to livestock.
mepiquat chloride + kinetin* Gin Out 0.35L, others	4 to 16 fluid ounces	12 hrs/30 d	Do not use more than 48 fluid ounces per acre per year. Do not apply to cotton that is stressed. Do not plant another crop within 75 d of last treatment. Do not graze or feed cotton forage to livestock.
cyclanilide + mepiquat chloride Stance 0.92L	2 to 4 fluid ounces	24 hrs/30 d	Do not use more than 22 fluid ounces per acre per year. Allow a minimum of 7 days between applications. Increased rates may be necessary for more vigorous growth conditions.

*The sum of all mepiquat chloride containing products must not exceed 0.132 lbs ai of mepiquat chloride per acre per season.

In terms of what I have been hearing across the state and getting questions about, many of the recommendations I have been giving range between 6 to 12 ounces per acre. However, there are always the occasional, “I’ve got cotton up to my shoulder and haven’t sprayed a PGR yet.” To which I said, the maximum labeled rate for a single application is 24 ounces per acre. With much of the crop flowering and setting fruit it is time to start thinking about higher rates where growth is vigorous.

One final note I would like to stress is timeliness. If I learned one thing in my time working for Dr. Culpepper, it was that in a weed management program, regardless of crop or herbicides used, being timely is the biggest factor in being successful. We always stress timeliness with weed, insect, and disease management, and I think we should do the same with PGR applications. I believe that being timely and getting a “head start” on growth management will benefit us at the end of the season.

All of this is to say that these decisions can be complex. Luckily there are resources at your disposal to assist in these decisions - your local UGA county agent and specialists are here to help. If you have

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questions on PGR decisions, or any other aspect of cotton production, please contact your local UGA county extension agent and they will find you the answers you need.

Conditions in July Favorable for Target Spot (*Bob Kemerait*): Target spot is a foliar disease of cotton caused by the fungal pathogen *Corynespora cassiicola*. The symptom most characteristic of this disease are numerous lesions, often with concentric rings (hence the name "target spot") that develop first on the leaves lower in the canopy. The target-like spots initially develop lower in the canopy for several reasons. First, these are older leaves have had longer exposure to the fungal spores. Second, the pathogen survives in the debris from previous cotton crops, so the spores can be spread from the debris to the lower leaves through rain splash and irrigation. Third, spores of *Corynespora cassiicola* require a prolonged leaf-wetness periods (perhaps as long as 12-14 hours) for infection to occur, which is most likely deeper in the canopy where humidity is higher. Significant defoliation can happen within two weeks after the first spots are observed if conditions are favorable (warm, humid, and moist). Boll development can be affected when pre-mature defoliation removes the leaves feeding younger bolls.

The initial development of target spot disease deeper in the canopy helps to differentiate this disease from other foliar diseases that affect cotton. Ascochyta "wet weather" blight can also produce spots with concentric rings; however this disease often develops in younger cotton and is not restricted to leaves in the lower canopy. Stemphylium leaf spot and Cercospora leaf spot are most often associated with a nutrient deficiency in the plant (typically a potassium deficiency) and appear fist in the upper leaves (often associated with reddening and yellowing of the leaves) rather than in lower leaves.

Frequent rains can increase the risk for all types of spots on cotton, but potentially for different reasons. Rain and high-humidity increase create more-favorable conditions for infection and spread of target spot. Heavy rains can leach potassium from the root-zone of the cotton crop, thus increasing the risk for Stemphylium leaf spot and Cercospora leaf spot. Target spot is a disease that most often affects cotton with a thick canopy and high yield potential; target spot rarely (very rarely) affects cotton with poor growth or cotton under drought stress.

While some cotton varieties may be more susceptible to target spot than others, no cotton varieties are resistant to this disease. As previously mentioned, target spot is most likely to affect a crop when conditions (irrigation, rainfall, soil fertility) produce lush plants with substantial canopies. One of the biggest challenges in protecting a cotton crop with a fungicide against target spot is that coverage is needed deep the canopy. However, getting sufficient fungicide coverage there is a real challenge but can be improved by 1) increasing spray volume, 2) increasing spray pressure, and 3) making the first fungicide application early enough before the canopy of leaves is fully closed.

UGA Extension does not have a blanket recommendation for treating a cotton crop with a fungicide to control target spot, though when this disease occurs early enough, growers can expect losses of lint to reach 200 lb/A (or more). Growers are advised to begin carefully scouting a cotton crop at the approach of the first week of bloom, checking the lower canopy for tell-tale symptomatic leaves. If target spot is

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not identified after careful scouting, growers may delay a fungicide application and scout again in the coming weeks. From our research, the best timing of a fungicide application is often during the third week of bloom; where disease pressure is high, a second application may be beneficial two weeks later. Fungicides are not needed after the sixth week of bloom.

As in the slide below, there are a number of fungicides labeled for use on cotton to protect against target spot and also areolate mildew. For target spot, Priaxor has been the most important fungicide for growers to consider. Headline has also been quite effective and now Miravis Top seems to be among the most effective fungicides for management of target spot.

Because of current conditions, to include passage of Tropical Storm Elsa, and the growth and development of the crop, NOW is the time cotton growers should be carefully assessing the need to protect their crop from target spot disease. Once defoliation has reached 20% or more, there is likely little chance to manage this disease.

Important Dates:

Cotton and Peanut Research Field Day – September 8, 2021

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