



Articles in this month's issue include:

1. Finalizing Cotton Irrigation and Cotton Irrigation Termination Decisions (*David Hall and Wes Porter*)
2. Late-Season Disease and Nematode Management Considerations for Cotton Growers (*Bob Kemerait*)
3. Weather and Climate Outlook for September 2021 (*Pam Knox*)
4. Defoliation Considerations for 2021: On-Target Applications are Critical!!! (*Camp Hand and Stanley Culpepper*)
5. Terminating Insecticide Applications (*Phillip Roberts*)

Finalizing Cotton Irrigation and Cotton Irrigation Termination Decisions (*David Hall and Wes Porter*): It's safe to say that the 2021 growing season has received its fair share of rainfall. From May 1st to August 24th Midville has received 16.23 inches, Tifton 21.95 inches, Attapulgus 19.84 inches and Jeffersonville located in the middle of the state has received 22.5 inches of rain. Weather patterns can turn around in a blink of an eye as we focus on the tropics closely this time of year. As I finalize this report, Hurricane Ida is sitting in the middle of Mississippi, something we do not need our way this time of year. As we enter into September, cooler, drier and less humid days will be graciously received. The 2021 cotton planting window proved to be a very wide window due to both wet and hot dry weather. Therefore, knowing the stage of your crop will prove vital in irrigation scheduling, if irrigation is needed. In this month's article we will discuss determining irrigation termination as we get near the finish line of the crop's growing season.

As we approach the end of the growing season we are around 12 to 16 weeks after planting at the beginning of September based on a May 1 to June 1 planting. On average, we will be around 14 to 18 weeks after planting throughout the month of September. This will put our water usage just past peak and beginning to decline. UGA Extension cotton irrigation scheduling guidelines, like all other guides, must be used in conjunction with field and atmospheric conditions. That means boots on the ground or moisture sensors to assist you in determining available moisture in the soil. September is historically dry with low humidity leading to soils drying out faster. Although cotton plant moisture uptake is small, there still is a need for some moisture in the soil to add in finishing out those last harvestable bolls.

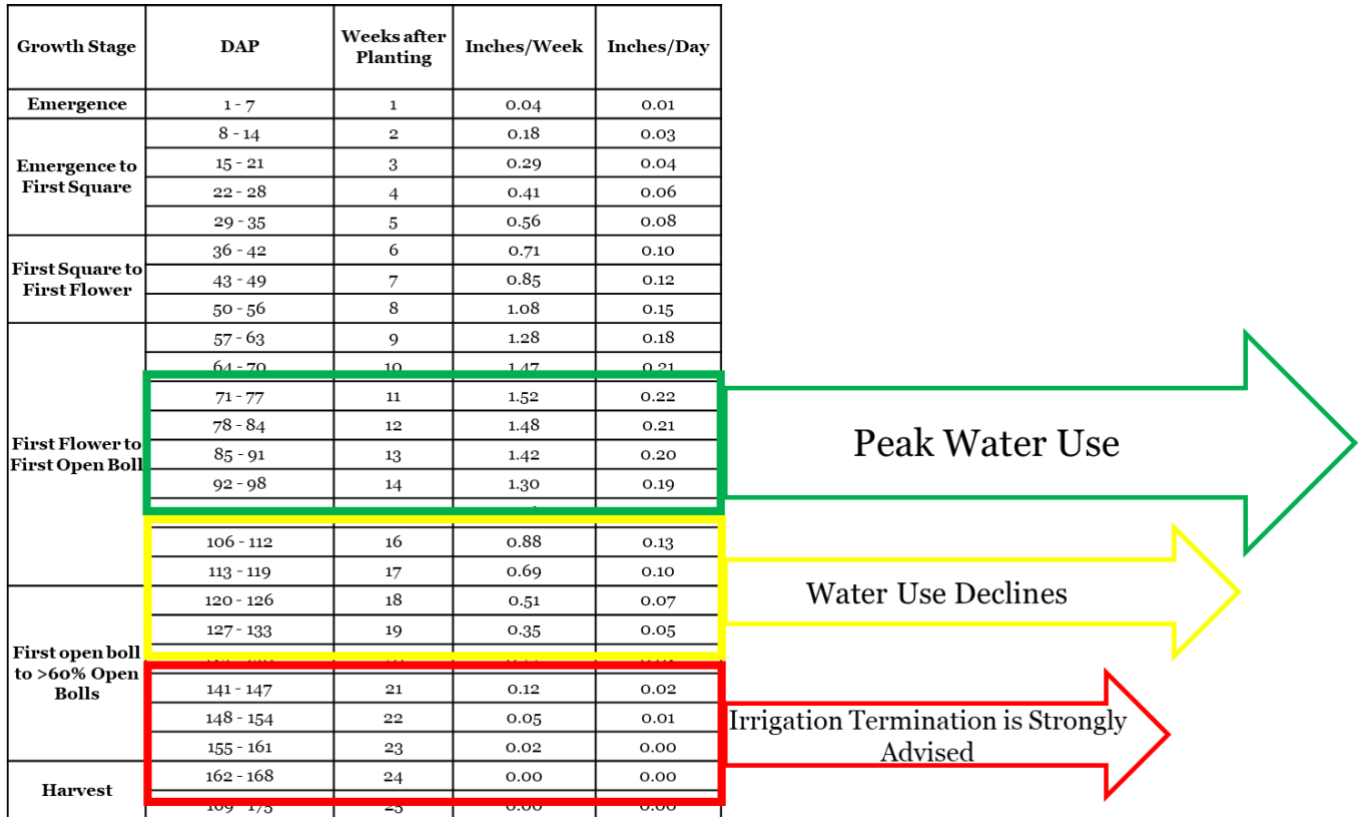


Figure 1. Seasonal cotton water usage with peak, decline and irrigation termination highlighted.

As water use declines, it is necessary to closely monitor your fields for cotton bolls that are beginning to open. UGA’s official irrigation termination recommendation for cotton is at an average of 10% open boll across a field. 10 percent open is not a high number of bolls that are open to start considering irrigation termination. A plant with 12 harvestable bolls means you need to be looking at the available soil moisture if 1.2 bolls are open. September 2019 was abnormally hot and dry. Bolls were beginning to open but our available water “banked” in the soil was depleted. Due to dry soils, hot temps and long-term dry weather forecasts, one last irrigation event(s) was(were) needed to help finish the crop. The low humidity and sunny conditions helped to prevent open bolls from being damaged. We are hoping 2021 will not bring on the level of boll rot we witnessed during 2020 but the heavy dews, high humidity and plentiful rainfall are excellent conditions for it. Do not self-inflict or worsen boll rot issues if sufficient soil moisture is present. In times when an application of irrigation is needed, soak the soil sufficiently so that you can limit your irrigation events to as few as possible. Frequent small irrigation events will only exacerbate or flare boll rot. Paying attention to the long term and short-term forecast is critical in your irrigation scheduling decisions as always. The tropics have a way of surprising us with pop up storms or even hurricanes this time of year.



Figure 2. Boll rot picture courtesy of Dr. Bob Kemerait

Mother Nature cannot be controlled but your irrigation applications can be. Two weeks from now we could be very dry, which would be very good for reducing new boll rot instances. The main point for irrigation termination on cotton is upon reaching that 10% open boll stage, do not over irrigate and exacerbate more boll rot, observe the current and long-term weather forecast, know your soil moisture content and use good judgement on terminating irrigation. Good moisture in the soil and 10% open bolls means the end of another irrigation cotton season!

An updated boll positioning value has been produced by Jared Whitaker showing the importance of those lower and first position bolls.

Fruiting Location	Value
1 st Positions	72%
2 nd Positions	18%
3 rd Positions	5%
Vegetative	5%
Nodes ≤10	60%
Nodes 11-15	31%
Nodes ≥ 16	9%

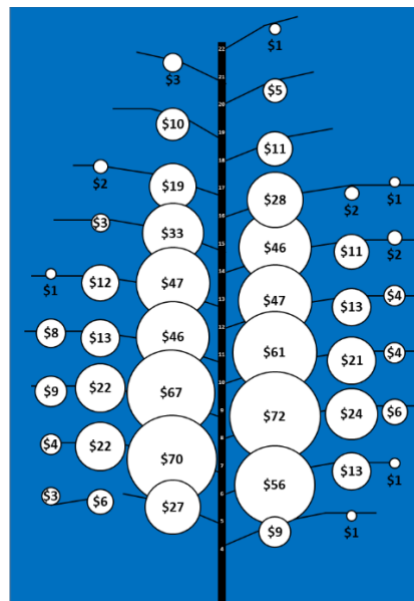


Figure 3. Boll position and value of boll position along the cotton plant, courtesy of Jared Whitaker.

This new value tree really emphasizes the importance of first setting those high dollar bolls early in the season with proper management. Nearing the end of the growing season, overwatering and irrigating your crop with a higher than 10% open boll in an effort to make young upper position low value bolls open in the top will lead to losing or damaging your most valuable bolls and reducing yield and profitability. Not to mention, those young bolls probably will not mature enough to be harvested. If you have questions about terminating irrigation make sure you reach out to your local UGA County Extension Agent.

Late-Season Disease and Nematode Management Considerations for Cotton Growers (*Bob*

Kemerait): With the arrival of September, cotton growers in Georgia have long anticipated the start of harvest and preparation for the final days of the season. Understandably, much of the focus now is on defoliation and in getting the cotton out of the field and to the gin. If the crop is within four weeks of defoliation, there is little need to further protect against foliar diseases; if a crop is more than a month off from defoliation, then some attention should be given to areolate mildew which may (or may not) be present.

While it will be quickly too late to further protect the 2021 crop from diseases and nematodes, there are important steps that should be taken now in preparation for the 2022 crop. Later in the season, especially while leaves are still on the cotton plants, is a good time to identify problems that have led to “weak” spots in the field, premature leaf drop, and even boll rot. While there is very little that can be done to protect a cotton crop against fungal boll rots, it is still helpful to identify the important pathogens that were responsible for the damage to the bolls and to differentiate the rots they cause from bacterial boll rot. Below are signs and symptoms to look for now in a cotton field and recommendations for next season.

1. “Weak spots” in a field, often characterized by stunted and even dead plants, are frequently associated with **plant-parasitic nematodes** (southern root-knot, reniform, Columbia lance and sting). Submitting soil samples collected directly from the root zone now, or shortly after harvest, and submitting them to a nematode diagnostic lab allows the grower to A) determine if indeed nematodes are the culprit and B) what type of nematodes are present. Such information is critical for 2022 in that it helps to determine best crop rotation, best variety choices (e.g., root-knot and/or reniform resistance) and need for nematicides. **Fusarium wilt** is also of increasing importance in Georgia and can be best assessed by collecting a soil sample for nematode analysis AND by examining the interior of the lower stem of the affected plants for characteristic “vascular” discoloration. Fusarium wilt can best be managed through crop rotation and use of an effective nematicide. Lastly, dead and dying plants occurring in spots in a field may also be caused by a disease known as “charcoal rot” caused by the fungus *Macrophomina phaseolina*. **Charcoal rot** can easily be confirmed in a disease diagnostic clinic. While there is not much that can be done to manage this disease during times of crop stress, identifying the problem can help growers avoid other treatments, such as use of nematicides, that will not help.

2. Premature defoliation has been caused by several important diseases in 2021. These include target spot, areolate mildew, Stemphylium leaf spot, Cercospora leaf spot and, to a small degree, bacterial blight. Premature defoliation does not always cause a loss of yield, but these diseases can, when they occur early enough and are severe enough, can increase losses at harvest. Stemphylium and Cercospora leaf spot diseases are a direct result of insufficient nutrients IN the plants, especially potassium. They typically occur in the same spots in a field year after year. Efforts to better manage soil fertility and irrigation in those areas can reduce the risk to both diseases. Target spot and areolate mildew can both be managed with timely and judicious use of fungicides. When they occur late in the season no treatment may be needed as the defoliation is too late to affect yield and may also improve air circulation and reduce bolls rots. Growers are encouraged to identify the cause of foliar diseases in the field so that a) they can scout for them early in the 2022 season and B) so they can deploy effective and appropriate management strategies. For bacterial blight, this would be selection of resistant varieties. For fungal diseases it would be whether use of appropriate fungicides or greater attention to soil fertility issues is the key management strategy.
3. **Boll rots** are a challenging problem, especially when rainfall has been abundant later in the season. Boll rots are especially frustrating to farmers because there is very little that can be done to protect against them. A first step in management for 2022 is to identify the causes of boll rot in a field. If the boll rot is primarily caused by bacterial blight (*Xanthomonas citri* pv. *malvacearum*) then it is important to consider planting a resistant variety next season. Impact of all boll rots, whether caused by bacteria or fungal pathogens, can be reduced by managing the cotton crop to increase air flow and reduce humidity within the canopy and to manage insects, such as stinkbugs, that can damage the boll and allow introduction of pathogens and organisms that further rot the bolls.

Attention now to troubled spots and problems in the field may not make more cotton in 2021, but such efforts could significantly increase yields in subsequent seasons.

Weather and Climate Outlook for September 2021 (Pam Knox): The start of September brings us into the heart of the Atlantic hurricane season. It's been a busy year already, with Ida the latest to bring rain to parts of Georgia while missing others. Fortunately, the early monthly outlook does not have any storms on the immediate horizon. There is an area off the east coast of Mexico that has a 30 percent chance of developing by the end of the first week of September, but the likely path of that storm, if it does develop, is west over Mexico, so that should not be a threat to us. Tropical Storm Larry is in the eastern Atlantic now and is expected to become a major hurricane, but is predicted to swing north well before it gets close to the US and should not be a factor either. But since the peak of the season is September 10, and that only brings us halfway through the season, I expect to see more storms develop later in September or

October, although there is no way to know where they will go or if they will affect us. Best thing to do is keep watching in case you have to move quickly to protect your crops and equipment.

The NOAA Climate Prediction Center's latest forecast for September and beyond indicates that September could see more rain, especially in a band that stretches from the Texas Coast up to New Jersey. In large part this is being driven by the remains of Hurricane Ida, which merged with a front there and is dropping eye-opening amounts of rain in that area. Cool and dry air will move into the Southeast for the first week of September but temperature will gradually warm up over the rest of the month, although the initial forecasts keep most of the Southeast except Florida relatively dry. Of course, this depends on the tropics, but there is no way to predict specific storms that far out.

Going into winter, La Nina is expected to return by late fall and last through winter. That means statistically that we are likely to see warmer and drier conditions than usual over the winter. A recent study that I saw indicated that in the second year of a double-dip La Nina, nine out of 15 winters were warmer than average and 12 out of 15 were drier than average over most of the region.

Defoliation Considerations for 2021: On-Target Applications are Critical!!! (*Camp Hand and Stanley Culpepper*): It is that time of the season where people are beginning to think about defoliation. Traveling across the state recently, I observed bolls opening in some of our earlier planted crop. It has been a tough year for many, but we are beginning to see the light at the end of the tunnel.

It is definitely time to think about defoliation, and one topic that should be front and center for everyone is making on-target defoliation applications. Georgia farmers and their applicators have reduced pesticide drift complaints to the Cooperative Extension Service over 78% since 2014; this is simply remarkable and an achievement that should make us all proud. However, cotton defoliation drift remains a significant concern and one that we must collectively address if our hope is to maintain the practical use of these important products.

There are multiple factors that influence the movement of pesticides out of the treated area; several of those factors are discussed below.

1. What is around my field?

As defoliation approaches, it is important to know what is around your fields. Pay attention to surrounding crops (i.e. late planted cotton, fall vegetables) and neighboring areas (i.e. homeowners). Knowing this information can assist in multiple defoliation decisions such as when to defoliate (a day with low drift potential) and application method.

2. Wind speed and direction

Wind speed and direction are the two most important weather factors influencing spray drift. High wind speeds will move spray droplets off-target in the direction that the wind is blowing. Optimum wind

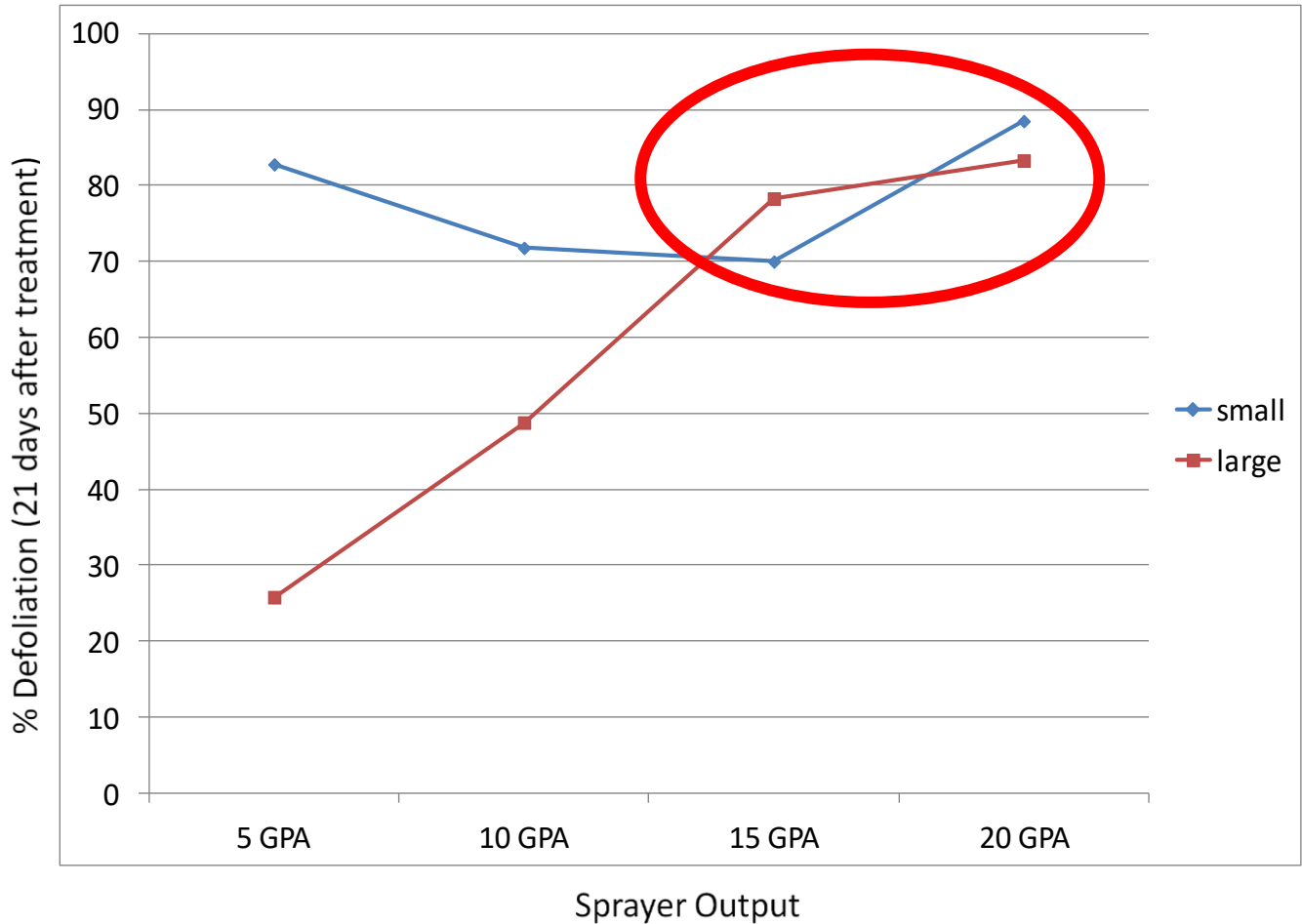
speeds for any pesticide application will be between 3 to 10 miles per hour, with the optimum direction being away from a sensitive area. Examples of sensitive areas where wind speed and direction should be influential in applications are listed above.

3. Boom Height

Boom height is one of the most important components to reducing spray drift thereby improving on-target applications. As boom height increases, potential particle drift increases. The ideal boom height for ground applications is 24 inches above the target (cotton plant). Of course, make sure your nozzle spacing provides proper spray pattern overlap!

4. Nozzle Type / Droplet Size

Nozzle type influences droplet size, which in turn can affect the likelihood of those spray droplets to drift. If you will remember from your UPW training, smaller droplets remain in the air for a longer period of time making them more vulnerable to move off-target. Although larger droplets are less likely to drift, many growers have questioned the efficacy of these larger droplets as it pertains to defoliation (along with other applications). A study conducted across the cotton belt demonstrated that sprayer output was far more important than nozzle type, meaning that regardless of nozzle type higher sprayer output resulted in greater defoliation. Dr. Guy Collins at North Carolina State University shared the data in the graph below, which shows defoliation three weeks after treatment as impacted by droplet size (small vs. large) and sprayer output. In this situation, Prep, Folex, and Dropp were the defoliant applied. A nozzle that produces small droplets would be a hollow cone nozzle, with larger droplets being produced from an air induction nozzle (i.e. auxin nozzles).



Thus, effective defoliation can occur with larger droplets, but sprayer output must be in the 15 to 20 GPA range! Although applying more water per acre may take a little more time, if it helps us make on-target defoliant applications, particularly in sensitive areas, then it will be worth it in regards to long-term farm sustainability.

Since the auxin technologies were commercialized in cotton and soybean, Georgia growers have consistently proven to be some of the best in the country at making on-target herbicide applications. Let's take the lessons we have learned over the past few years, use them when applying defoliants, and reduce the number of drift complaints related to cotton defoliation. As always, if anyone has any questions related to this or anything else, please contact your local UGA Extension agent. They, along with myself and the other specialists, are here to help.

Terminating Insecticide Applications (*Phillip Roberts*): The decision to terminate insect controls can be challenging in some fields but a few basic considerations will assist in that decision. When evaluating a

field a grower must first identify the last boll population which will significantly contribute to yield (bolls which you plan to harvest). In some situations the last population of bolls which you will harvest is easy to see (i.e. cotton which is loaded and cutout). In others, such as late planted cotton, the last population of bolls you will harvest will be determined by weather factors (the last bloom you expect to open and harvest based on heat unit accumulation). Once the last boll population is determined the boll development or approximate boll age should be estimated. Depending on the insect pest, bolls are relatively safe from attack at varying stages of boll development.

The table below list approximate boll age in days which bolls should be protected for selected insect pests. Cooler temperatures will slow plant development and subsequent boll age values may increase in such environments. It is assumed that the field is relatively insect pest free when the decision to terminate insecticide applications for a pest is made.

Insect Pest(s)	Approx. Boll Age (days)
Corn Earworm Tobacco Budworm	18-20 bolls fully sized
Stink Bugs	25
Fall Armyworm	bolls near maturity
Sucking Insects whiteflies aphids	harvest (honeydew accumulation on lint)

Important Dates:

Northeast Georgia Cotton Field Day (Athens, GA) – September 28