The University of Georgia
Cooperative Extension Service
College of Agricultural and Environmental Sciences

Georgia Cotton

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CROP SITUATION. (***Brown***) Producers are required to report planting intentions to the Boll Weevil Eradication Program by May 1. The 2006 "intended" acres total 1,491,018. Historically, actual planted acres are 8 to 10 percent less than the "intended" report, which suggests cotton planted in Georgia in 2006 will be 1.34 to 1.37 million acres. However, it would not be surprising for the tally to reach 1.4 million.

Weather extremes – drought, cold weather, high wind, and high temperatures – in addition to thrips and the fact that the dominant cultivar DP 555 BG/RR has limited seedling vigor, have contributed to a rugged start. Replanting has been more common than any season in recent memory. Warm temperatures over the past 2½ weeks have facilitated recovery, and even though it is very dry in much of the state, the crop is beginning to "look like cotton." Formerly ragged plants have assumed a good color with healthy leaves. There is little to no subsoil moisture so the crop is headed for trouble if drought persists as squaring gives way to flowering. A general rain would make a remarkable difference in crop potential.

ELEVATED TEMPERATURES AFFECT CROP MATURITY AND MANAGEMENT. (***Brown and Harris***) Temperatures significantly influence plant growth rates. High temperatures accelerate development and maturation. The warmer it is, the faster things happen; that is, until temperatures reach the mid-90°s F, at which growth rates level off and begin to decline. Given the high temperatures of late May through June, we should expect plant processes to advance more rapidly than normal. Elevated temperatures typically propel the crop more rapidly towards cutout, towards the point where fruiting sites run out at the top of the plant.

In dryland fields, high temperatures coupled with drought lead to early cut out and low yields. In irrigated culture where yield potential is considerably greater, accelerated plant development should affect irrigation and plant growth regulator use, and to a lesser extent, N application. In a simplified analogy, irrigation and side dress N push the gas pedal while mepiquat taps the brakes. Thus, to minimize the threat of premature cutout in high temperature conditions, irrigation should be more aggressive than normal and mepiquat applications less so. In such environments, stomp the accelerator and be careful with the brakes!

The standard timing for side dress N is from 1st square to 1st bloom. Delaying applications to 1st bloom or later can result in yield losses, especially in non-irrigated fields. In dryland production, it is important to make applications closer to the initiation of squaring to allow more time and opportunity for N movement into the root zone by showers. During rainy seasons or in irrigated culture, soil applications of N can provide a growth boost, but even in the best of environments, they are not recommended past the 3rd week of bloom to minimize the threat of rank growth. Foliar N can help a borderline-deficient crop without contributing to excessive vegetative growth. Peak bloom is the best time to make foliar N applications. Be aware that some research suggests little benefit for such treatments beyond the 4th week of bloom.

PALMER AMARANTH (PIGWEED) GIVING YOU TROUBLE? (***Culpepper and Brown***) Palmer amaranth is a unique weed and an elite adversary to most growers. Palmer will win the "battle" more times than not simply because of its ability to grow inches per day, emerge throughout the season, and produce over 500,000 seed per female plant. With that said, we will discuss several potential reasons why Palmer amaranth is so problematic this season.

1. Too Dry? In many areas of the state it has been exceedingly dry, at least up until the recent tropical storm. At one of our research sites, Palmer amaranth has been wilting by 9 am. Performance of postemergence herbicides, including herbicides such as glyphosate, is reduced severely under conditions of severe drought.

2. Weed Size? Most growers realize they can often kill extremely large Palmer amaranth with glyphosate when conditions are favorable. Not so during periods of severe stress! Delaying applications until Palmer amaranth exceeds just a few inches in height reduces effective spray coverage, increases the degree of plant stress during persisting hot/dry conditions because of increasing plant size, and increases the possibility that the plant is entering seed production, at which stage it may become more difficult to control. All these factors make Palmer amaranth more tolerant to glyphosate. Delayed applications to large, stressed plants promote glyphosate resistance.

3. Rate Applied? Glyphosate is the most important and economically effective herbicide in the world. Use the full rate and make timely applications to small weeds! A marginal rate, especially under periods of stress to large weeds, also promotes more resistance and threatens the technology for all growers.

4. Antagonism? Many herbicides when mixed with one another can actually be antagonistic. For example, glyphosate alone provides excellent control of grasses but the addition of certain

herbicides can reduce grass activity significantly. Check with your local extension agent regarding tank mixtures with glyphosate.

5. Resistance? Unfortunately our research indicates we have at least 46 fields that contain Palmer amaranth that cannot be controlled with glyphosate regardless of rate. These fields have Palmer amaranth that are confirmed to be resistant to glyphosate. Similarly, resistance to ALS-herbicides is even more prevalent; thus, there are many, many fields in which Palmer amaranth cannot be controlled with Staple, Envoke, or similar herbicides.

Formal, scientific determination of resistance is a challenging, lengthy process. More informally, growers should be keenly alert to the possibility of glyphosate resistance in Palmer amaranth on their own farms. Causes for weed control failures can be many. If the following can be answered affirmatively, if other possible answers can be eliminated, it is possible that resistance could be the cause of the loss of control of Palmer amaranth.

A. The herbicide was applied under favorable growing conditions.
B. Labeled rates were applied, including the addition of proper adjuvants.
C. Weeds did not emerge after the herbicide application.
D. Weeds were not damaged by environment or tillage prior to application.
E. Weeds were actively growing at time of application.
F. Rainfall did not wash off the herbicide.
G. Application volume and sprayer speed provided excellent coverage.
H. Applications did not include other herbicides that might cause antagonism (reduced control) with glyphosate.
I. Other weeds that are normally controlled with glyphosate were successfully controlled.
J. Palmer amaranth of the same size is living and dead in the same general area.

SIDEDRESS NITROGEN – RATES AND TIMING (*Harris*) How much nitrogen do I need to make a good crop of cotton ? Good question. The answer depends on a number of factors. Besides soil type, history of growth, and yield goal, one of the most important factors is timing of applications. A research study was done in the early 1980's that showed that the most efficient use of nitrogen -- and therefore the most economical! -- was a "3-way split" between preplant, sidedress and foliar. Back then, the optimum N rate was 60 lb N/A to make roughly "2-bale" cotton.

A very similar study was repeated in 2005 to see if the "3-way split" is still the most economical. The effect of delaying N application until sidedress time was also examined for the 30, 60 and 90 lb N/A rates. In addition, the effect of applying 60 lbs N/A all at planting was included.

The 2005 study was conducted at the RDC Pivot in Tifton, GA on a Tifton loamy sand soil. The site was center-pivot irrigated and the previous crop was corn. DPL 555 was planted in early May and machine harvested in mid-September. No growth regulator (mepiquat chloride) was used. The study was randomized (complete block) and replicated (4 times).

Ammonium nitrate was used as the preplant and sidedress N source. Feed grade urea was used as the foliar N source. Treatments were as follows:

Treatment	Preplant (lbs N/a	Sidedress (lbs N/a)	Foliar (lbs N/a)
0	0	0	0
0 + F	0	0	44
30	30	0	0
30 + F	30	0	15
30L	0	30	0
60	30	30	0
60 + F	30	30	5
60 L	0	60	0
60 AP	60	0	0
90	30	60	0
90 + F	30	60	0
90 L	0	90	0

Foliar N on the 0+F treatment was made in 5 different applications starting at first bloom, the 30+F treatment was made in 2 applications during weeks 1 and 3 of bloom, and the 60+F treatment was made in a single application during the 4th week of bloom.

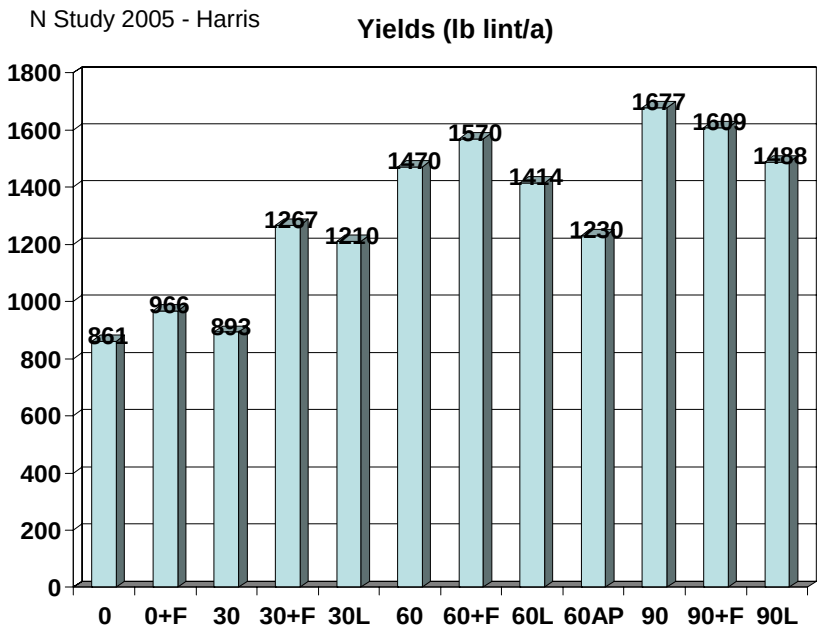
Yield results for the study are shown in the graph below. Compared to the 1980's study the overall response to nitrogen was very similar. However, there were two significant differences. One is that the yield level was much greater with the highest yielding treatment exceeding "3-bale". The other difference is that the 90 lb N/A (with no foliar since it was not called for) out yielded the 60 + F treatment.

So which is the most economical rate and timing combination ? One way to look at it is that the 60+F cost roughly $32.50 (based on 50 cents/lb N and not including application cost of the foliar N) vs. $45 for the 90 lb N/a rate. Using the yield numbers in the graph, the 60+F treatment yielded 48 lbs cotton for every dollar spent on nitrogen fertilizer vs. 37 lbs cotton/$ worth of N for the 90 lb N/A treatment.

Remember this is only one year of data. This study is being repeated this year.

Some other interesting results from this 2005 study include:

1) The "no N" treatment yielded over 800 lb lint/A
2) Cotton yield increased with increasing N rates
3) Foliar N had the greatest effect at the 30 and 60 lb N/A rates
4) 30 lb N/A all at sidedress out-yielded 30 lb N/A all at planting
5) Delaying the first N application until sidedress decreased cotton yield for the 60 and 90 lb N/A rates, but not the 30 lb N/A rate as stated in 4)
6) 60 lbs N/A all at sidedress significantly out-yielded 60 lb N/a all at planting



SIDEDRESS NITROGEN – SOURCES, UREA, VOLATILIZATION AND AGROTAIN (***Harris***) The goal of sidedressing cotton is to provide readily available nitrogen to the plant when demand rapidly increases, i.e. between first square and first bloom. Ammonium nitrate (solid) and "liquid N" or "N solutions such as 19 %, 32 % and the popular 28-0-0-5(S) are commonly used. Organic N sources such as poultry litter and biosolids are not the best choice for sidedressing cotton. This is because a good portion of the N in these organic sources is "slow-release", again during a time when the cotton plant needs significant amounts of N ready to be absorbed. Other slow release N fertilizers such as sulfur-coated urea or urea-formaldahyde are also not recommended as sidedress N sources on cotton for this reason.

Due to the rising cost of ammonium nitrate and safety issues related to its handling, storage and use, there is currently a lot of interest in using granular (46 % N) urea. The cost of urea has actually gone down recently making it even more attractive as an alternative to ammonium nitrate. Fertilizer dealers across Georgia are taking a hard look at switching from ammonium nitrate to urea as a granular N source. Some have already made the switch. Why not handle both? There is an issue with storing both ammonium nitrate and urea at the same location. It can be done under certain conditions, but usually the ammonium nitrate "grabs" moisture from the urea and basically gets too messy and wet to handle.

Will urea work as good as ammonium nitrate? Another good question. Urea is made by adding carbon dioxide to ammonia under high temperature and pressure. When applied to soil, urea is converted to ammonia where it grabs a hydrogen ion from water and is converted to ammonium. At this point urea acts as any other ammoniacal (ammonium containing) N source including the ammonium portion of ammonium nitrate.

Urea is unique and different from ammonium nitrate however in the fact that it can undergo a volatilization reaction whereby ammonia is lost as a gas back up into the atmosphere. This

reaction requires an enzyme called urease that is naturally present in soil and on crop residues. It also requires that the urea undergo hydrolysis (reaction with water). Under certain condition, volatilization losses of N from urea have been reported at 25 to 35 %. I believe losses of this magnitude are "worst case scenario" however. What is the worst-case scenario? Surface applied granular urea applied where there is residue, not incorporated and where there is enough soil moisture for hydrolysis but you go on a hot and dry spell for at least two weeks. Sounds like cotton sidedressing time in South Georgia, doesn't it?

Well, the good news is that there are some management factors that can help reduce loss of urea to volatilization and make it a viable alternative to ammonium nitrate. One is that on irrigated land, ¼ to ½ inch of irrigation water should incorporate the urea far enough into the soil where volatilization is greatly reduced. Obviously on dryland, rainfall of this amount will do the same thing. Another tool available to reduce N volatilization from urea is the use of urease inhibitors. These products block the urease enzyme but are safe to other microbes and organisms in soil. (Don't get these confused with nitrification inhibitors which block the reaction of ammonium to nitrate). Currently there is a product available in Georgia called Agrotain which is a urease inhibitor. This product has been tested extensively across the country and claims to reduce N volatilization from urea for up to 2 weeks after application. More limited data is available on cotton in the southeast but it is definitely is encouraging. And in fact, some fertilizer dealers are already offering to treat urea with this product. The other good news is that it is not terribly expensive either. In fact, you only have to save approximately 4 lbs N/A to cover the cost of this additive.

Don't forget that any "UAN" solution, i.e. Urea Ammonium Nitrate such as 32% and 28-0-0-5 contain half of their N as urea. Volatilization of N from these materials is less of a concern since only half of the N is urea and they are usually applied as a concentrated band which reduces volatilization. However, you can still lose N from these products and may still get a benefit from adding a urease inhibitor such as Agrotain.

Look for this trend away from ammonium nitrate and toward urea to continue. Also look for more research on urease inhibitors and other methods to minimize volatilization losses. Predicting exactly how much N will be lost from urea is difficult. The magnitude of loss depends on both soil properties such as pH and environmental factors such as moisture and temperatures. Most of the loss if it does occur is going to happen soon after application. The final good news is that most of the high volatilization losses have been measured under laboratory conditions, and in the words of a UGA soil scientist back in 1989 (back when we had a lot more soil scientists at UGA) "in a dynamic field environment, the conditions necessary for high rates of NH3 loss seldom exist for sustained periods of time" (W.L. Hargrove. 1989. Soil, Environmental and management Factors Influencing Ammonia Volatilization Under Field Conditions. In B.R. Brock and D.E. Kissel (ed.) Ammonia volatilization from urea fertilizers. Bull. Y-206. National Fertilizer Development Center, Tennessee Valley Authority, Muscle Shoals, Alabama.

STANCE PLANT GROWTH REGULATOR. (***Jost***) The new plant growth regulator "Stance" has garnered much attention and many questions from growers and agents. Our typical growth

regulators which contain mepiquat chloride (Pix and generics), mepiquat chloride plus kinetin (Mepex Ginout), or mepiquat pentaborate (Pentia) must all be used at rates varying from 4 to 16 oz/A depending on plant growth stage and rate, weather conditions, and variety. Stance contains mepiquat chloride plus cyclanilide, the added ingredient in the defoliant Finish which distinguishes it from Prep. In addition, Stance is more concentrated than other mepiquat formulations. It contains two times the amount of mepiquat per gallon as these other products and its use rate is significantly less than other growth regulators.

What is the use rate of Stance?
The recommended use rate of Stance is generally 3 oz/A. This rate may need to be reduced to 2 to 2.5 oz/A in some situations.

Can such a low use rate be as effective as 8 to 16 oz/A of other growth regulators?
A 3 oz application of Stance supplies the same amount of mepiquat chloride as a 6 oz/A rate of the other growth regulators. However, there is the added effect of the cyclanilide. Research in Georgia last year indicated that a growth regulator program consisting of multiple applications of 3 oz/A provided identical height control and yield as standard programs of other growth regulators.

Should I use this 3 oz rate even under these current hot a dry conditions?
This year is much drier and hotter than last year during which the previously discussed data were generated. In these situations cotton can potentially be stunted by aggressive growth regulator management, regardless of product. Under these current conditions DPL 555 BGRR and other potentially aggressively growing varieties such as ST 6565 B2RF, ST 6611 B2RF, and FM 991 BR, should still be treated with 3 oz/A, the rate should probably be lowered on less aggressive varieties. Until we learn more about Stance under these conditions growers should limit the number of acres treated with product, especially those not irrigated.

How much of my acreage should be treated with Stance?
While growers are encouraged to try Stance, as with any new product or variety, caution is advised. Treat no more than 20 to 30% of total acreage.

NEMATODE CONTROL OPTIONS (***Kemerait***) The most effective management of parasitic nematodes for Georgia's cotton growers includes good crop rotation and use of effective nematicides prior to or at planting. In fields with high populations of nematodes and where damage to the cotton has been severe in the past, growers may wish to supplement their earlier control tactics with a side-dress application of Temik 15G or perhaps a foliar application Vydate C-LV.

Side-dressing cotton with 5 lbs/A of Temik 15G after earlier applications of Telone II or Temik 15G can be an effective means to reduce damage to the cotton from nematodes and also increase yield. We do not have any data yet on side-dressing cotton after using the seed treatment AVICTA Complete Pak; however these studies are being conducted in Georgia this season. To maximize the effectiveness of the Temik side-dress option, growers should consider the following:

1. Growers who intend to side-dress their cotton with Temik 15G should reserve use of a side-dress applicator through Bayer CropScience or their local dealer. As timing of the application is important and there are not that many application rigs, growers should plan ahead.
2. The goal of the side-dress application is to extend the window of nematode protection provided by an earlier treatment. If a grower waits too long to side-dress, the cotton may suffer additional damage from the pests. Also, delaying the application too long increases the likelihood that roots will be pruned by the applicator and the cotton plants damaged.
3. The Temik side-dress option should be timed roughly 40 days after planting and concluded by the time the cotton crop in the field reaches pin-head square.
4. To minimize the risk of root pruning as the Temik is knifed into the soil, it is important that the tractor drive insure that the coulters remain at least 6 inches on either side of the cotton stalks.
5. The activation of Temik requires either rainfall or irrigation.

Supplementing an earlier nematicide treatment with a foliar application of Vydate C-LV is a popular treatment across much of the cotton belt. However in Georgia, our results have been mixed on the yield benefits from use of Vydate to reduce damage from nematodes.

Growers who wish to apply Vydate C-LV to their cotton crop to manage nematodes should consider the following.

1. A foliar application of Vydate C-LV should only be used to supplement an earlier application of Telone II or Temik 15G. We are conducting trials in 2006 to determine benefits when following AVICTA Complete Pak.
2. A foliar application of Vydate C-LV should be made at the 4^{th}-5^{th} true leaf stage at a rate of 17 fl oz/A. For reniform nematodes, some may consider an application of 8.5 fl oz/A at the 4^{th}-5^{th} true leaf stage, followed by a second application at 8.5 fl oz/A 14 days later.
3. Growers should recognize that Vydate is extremely water soluble. Excessive irrigation or rainfall soon after application, especially in sand soils, may lead to rapid leaching of the product from the target zone.

2005 COTTON RESEARCH AND EXTENSION REPORT (***Jost and Roberts***) The 2005 edition of the UGA Cotton Research and Extension Report is now available on-line on the UGA Cotton Web Page at www.ugacotton.com.

MIDVILLE FIELD DAY (***Jost***) The what is becoming "annual" field day at the Southeast Research and Education Center in Midville will be held on Thursday, August 24, 2006, from 9:00 am to 12:00 pm, a sponsored lunch will be provided. Details on topics of discussion will be forthcoming.

Your local County Extension Agent is a source of more information on these subjects.
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