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

Georgia Cotton

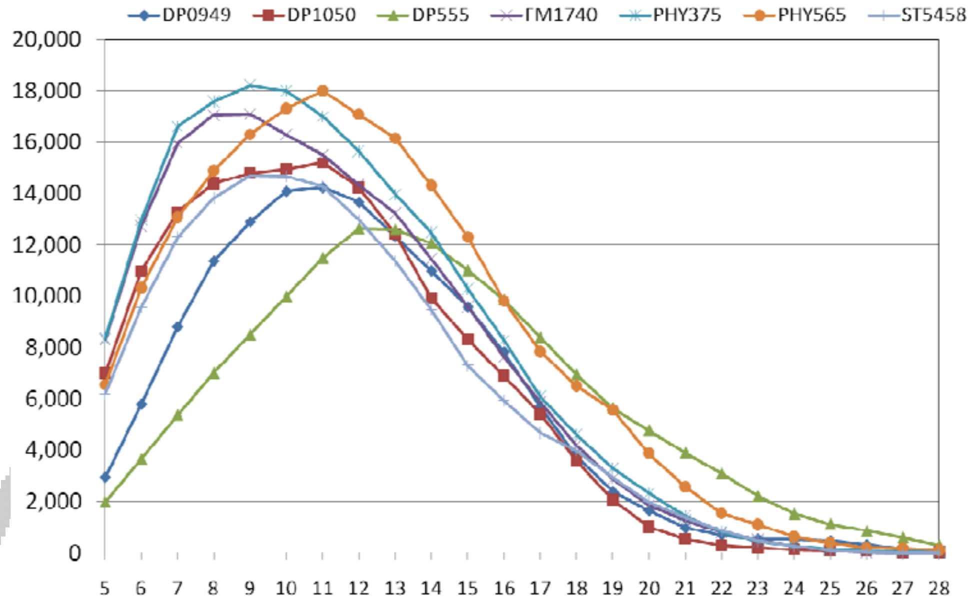
September 1, 2011 www.ugacotton.com

End-Season Management Considerations (*Collins and Whitaker*)

Cotton planted during late April through early May is rapidly progressing towards harvest. The following are considerations for managing the 2011 crop at this point in time.

When Should I Terminate Irrigation **–** Irrigation should generally be terminated when lower earlier-set bolls begin to open (generally when 10-15 percent of bolls are open, if soil moisture is sufficient at the time), especially now that most of our newer cotton varieties generally have a greater number bolls distributed towards the bottom of the plant, compared to that of DP 555 BR (Figure 1). Irrigating once bolls begin to open increases the risk of boll rot, hard-lock, yield loss, and/or quality degradation. However, this recommendation could be adjusted depending on the situation. If the boll population developed relatively normally, i.e. there was a normal progression of boll development beginning at the bottom of the plant and progressed upward and outward, then this rule of thumb should hold true (Figure 2). In these situations, growers should examine the uppermost bolls that they intend to harvest to determine if additional irrigations may be necessary. If upper bolls are firm to the touch, and seed inside these bolls appear to be relatively mature (1. distinguishable brownish seed coat is evident, 2. evidence of developed cotyledons inside the seed, 3. little or no "jelly" substance inside seed, and 4. fibers contain little moisture and "string out" when pulled), then additional irrigation is most likely not necessary.

Figure 1: First position bolls/A per mainstem node for modern varieties.



However, if a large proportion of bolls do not appear to be mature (easily dented when mashed between fingers, high moisture content in fiber, and little evidence of seed maturity), then additional irrigations may be required for these bolls to fully develop and mature, especially if the growers decides that the upper bolls may contribute more to final yield than the few lower bolls that have already opened. This may be common when the fruiting period is extended over several nodes and over a longer period of time than normal. A common situation in 2010 is also illustrated in Figure 2 where some fields reached a premature drought-induced cutout. In these situations, yield potential of the earlier set crop was relatively inferior. In general, the crop temporarily ceased its upward progression of boll development, and waited for rain. The August 2010 weather brought about more rains which revived terminal growth and upper boll development prior to our general last-effective bloom date. This resulted in a distinct fruiting gap and a vast difference in age and maturity between the earlier set lower bolls and the later set upper bolls. In several situations, the grower decided that the upper boll population would contribute more towards final yield and therefore waited on these bolls to develop. Additional irrigations were also implemented to develop the upper boll population in some cases. In many cases, this decision was rewarding in 2010 due to the good fall weather experienced in 2010. However, when deciding that upper bolls (that bloomed prior to the last effective bloom date) may contribute more to final yield than lower opening bolls, when deciding to wait on upper bolls to mature, and/or when deciding that additional irrigations are required for developing upper bolls, the grower must be willing to sacrifice or forego the lower bolls (due to the potential for weathering losses) that are currently opening. This may or may not occur, however in situations where there is a distinct difference in maturity between upper and lower boll populations, a grower cannot expect to always harvest both, and must therefore decide which if the “two” crops they would like to harvest most. This decision is often more difficult when the lower and upper bolls may contribute equally to yield. Lastly, cool and wet fall conditions (similar to the fall of 2009) may not be favorable for waiting on upper bolls, which must also be taken into consideration.

Figure 2. Comparison of plants exhibiting a normal progression of boll development beginning at the bottom of the plant and progressing upward and outward in a normal fashion (left) versus a crop exhibiting a fruiting gap between the lower and upper boll population likely due to a drought-induced cutout, followed by revived upward boll development once rains returned prior to the last effective bloom date (right) resulting in vast differences in age and maturity between the upper and lower boll populations.

***Defoliation Considerations* –** The majority of the early planted crop is rapidly approaching maturity and bottom bolls are beginning to open. Defoliation of early planted cotton is just around the corner (and underway in some places), and temperatures are likely to remain relatively high for the foreseeable future. Deciding on the best harvest aid program to use is often difficult to make, as even experienced agronomists do not always get it right. Considerations must be given to the goals of the defoliation program, whether it be mature leaf removal, juvenile growth removal, regrowth prevention, boll opening, or some combination thereof. Considerations should also be given to prices of harvest aids, yield potential of the crop, crop condition, weather at the time of application, and weather forecast for 10 to 14 days following application. Product selection for optimal harvest aid tank-mixes varies from situation to situation, and effectiveness of any program is strongly dependent on the prevailing environment and crop condition. Results of any program may be unpredictable and may vary as effectiveness is not always "as expected".

The UGA Cotton Defoliant Evaluation Program was launched in 2010 (http://commodities.caes.uga.edu/fieldcrops/cotton/DefoliationTrials.htm), utilizing several different harvest aid products. These reports illustrate harvest aid effectiveness in both warm/hot and cooler environments (see crop condition and weather data in each report). This information is intended to illustrate effectiveness of various programs which were evaluated in these experiments, therefore it is important to remember that these data resulted from specific trials with specific crop conditions and weather patterns. Additionally, these results are not to be considered as easily repeatable, as weather and crop conditions vary widely from field to field and environment to environment. A very general guide to cotton defoliation can be found in the Defoliation section of the 2011 Georgia Cotton Production Guide (http://commodities.caes.uga.edu/fieldcrops/cotton/2011cottonguide/2011CottonProductionGuide.pdf)

Some very general considerations for defoliation decisions are as follows:

1. Hormonal defoliants (thidiazuron, ethephon) perform better when used in tank-mixes during warmer weather than in cooler weather.
2. The risk of leaf-sticking or desiccation increases when some herbicidal defoliants are used when weather remains warm or hot, especially when high rates are used or when some adjuvants not specified by the defoliant label are added to the tank mixture. However, when cooler temperatures prevail, efficacy of hormonal defoliants is diminished and herbicidal defoliants often perform more effectively with less risk of desiccation.
3. To realize the full potential of a defoliant application, carrier volume should be NO LESS than 15 GPA. Complaints of ineffective defoliation during 2010 often resulted from application volumes of 8 to 10 GPA, regardless of the products used.
4. Utilizing a stand-alone harvest aid product is rarely recommended, as most situations have multiple goals to accomplish.

***What is to be expected from fields planted beyond the recommended planting window* –** This is very difficult to predict, and since most of the cotton that emerged beyond our recommended planting window (which ends on June 15th) are dryland acres, predictions are even more difficult to make, as irrigation often helps retain earlier-set bolls. Planting beyond our recommended planting window requires more things going right than wrong, and generally has erratic, inconsistent, and unpredictable results, thus being very risky and not recommended. Yield potential will likely be reduced to some degree depending on how late particular fields were actually planted, although the degree of reduced yield is likely going to be strongly correlated to the amount of rainfall that occurs which may enhance earliness in these fields. Management practices that improve early boll retention and development (water, proper insect management, and the use of PGRs if necessary) may improve the yield potential of cotton planted much later than recommended.

The best way to determine yield potential of cotton planted beyond the recommended planting window is to wait until our last effective bloom date (September 5th through the 15th, depending on fall weather and the date of first frost), and count harvestable bolls at that time. The general rule of thumb for determining yield potential is 10 to 12 normal-size bolls per foot of row (on 36-

inch rows) equals a bale per acre. There is variability to this rule, due to differences in seed and boll size and gin turnout of the particular variety, the retention of these bolls (which will depend heavily on rainfall), and the rate of development and size of these bolls. Hopefully, we will experience fall conditions similar to that of 2010, when warm weather persisted without an early frost.

Leaf Symptoms Provide Necessary Clues to Management of Diseases and Nematodes Affecting Cotton (*Kemerait, Harris, Sanders, Brock, and Walls*)

Leaf symptoms have become a major interest to growers, consultants, and county agents in recent months, primarily because of the potential for losses from Corynespora leaf spot. There are three significant leaf diseases that affect cotton in Georgia; Cercospora leaf spot, Stemphylium leaf spot, and Corynespora leaf spot. The first two of these diseases result from nutrient deficiencies affecting the cotton crop; use of fungicides has not lead to consistent, effective management. Based upon limited data with Headline fungicide, Corynespora leaf spot can be managed with a fungicide and in Thomas County in 2010, R. J. Byrne determined that yields were increased by an average of 63 lb lint/A when treated with Headline. Preliminary results in 2011 further document that fungicides like Headline and Twinline can reduce disease severity and premature defoliation; yield data will be available at the end of the season as well as results for other fungicides such as Quadris. Foliar symptoms may also indicate that nematodes and perhaps Fusarium wilt are a problem in a field. Below are photographs and descriptions of the diseases and symptoms mentioned above.

Interveinal chlorosis associated with damage from root-knot nematodes.

The interveinal chlorosis pictured above is often the result of damage from root-knot, sting, or perhaps reniform nematodes. In the case of root-knot nematodes, this can be confirmed by carefully examining the roots for galls associated with the damage from the nematodes. Plants with such foliar symptoms tend to be clustered in certain, often sandy, areas of a field. In some cases, the damage from nematodes is worsened by further infection by a fungus producing Fusarium wilt. Foliar symptoms like that above coupled with stunted plants are a sure-sign that the grower has a problem that likely requires treatment with a nematicide or resistant variety in the field.

Symptoms associated with nutritional/potassium deficiencies in southern Georgia.

Pictured above is a field of cotton planted in southern Georgia where a nutrient deficiency, likely potassium, developed in specific areas of the field. Leaf spots found in this area were Stemphylium leaf spot, the spores of which are pictured below. Because Stemphylium leaf spot and Cercospora leaf spot diseases develop as a result of a nutritional issue in the cotton crop, use of fungicides has not been an effective strategy for management.

Stemphylium and Cercospora leaf spot diseases are almost always associated with plants and with leaves that also show symptoms of nutritional deficiencies. It is our experience that these diseases are not often found on nutritionally healthy leaves. Cercospora leaf spot may produce a larger spot with concentric rings (similar to the Corynespora leaf spot below) while Stemphylium leaf spot is most typically described as small-to-medium sized spots with a dark purple border and an ashy, gray center. In many cases, the center of the older lesions may fall out leaving the leaf with a “shot-hole” appearance.

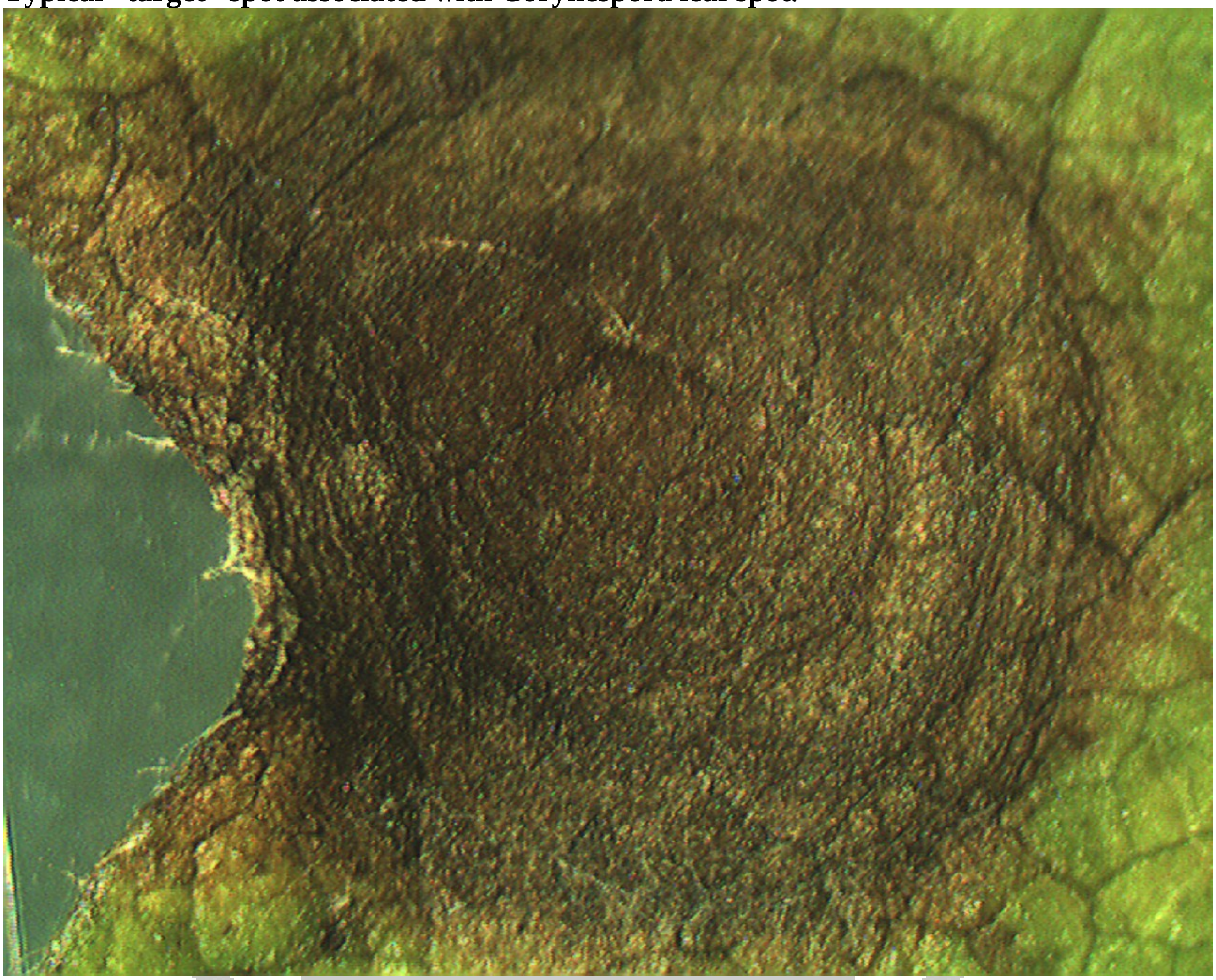
Pictured below are spores of Stemphylium (pineapple-like) and Alternaria (with longer necks). The Stemphylium pathogen is largely responsible for much of the defoliation that occurs in fields affected by nutrient deficiencies.

Pictured below is premature defoliation resulting from Corynespora leaf spot.

Corynespora leaf spot is a recently recognized disease in Georgia, Florida, and Alabama. This disease does not appear to be linked to a nutrient deficiency and is most often severe in fields with exceptional growth and dense canopies. The disease tends to first appear in the lower part of the canopy and spread upwards; typically producing "target" spots like that pictured below. As the disease progresses, significant defoliation can occur in the bottom 2/3 of the canopy. The fungal pathogen has also been found associated with spots on the bracts and bolls of the cotton plants in Georgia.

In attempting to diagnose Corynespora leaf spot in the field, one should first determine if symptoms of nutrient deficiencies or nematodes are also present. If these symptoms are present, it is more likely that one is viewing Cercospora and/or Stemphylium leaf spot. Assuming that the crop does not show symptoms of nutrient needs and that the disease appears to be most significant lower in the canopy, especially where growth is rank, it is probable that Corynespora leaf spot is the cause of the problem.

Typical "target" spot associated with Corynespora leaf spot.



The decision to use fungicides or not first requires one to diagnose the type of foliar disease in the field, then to determine how advanced the disease is at the time of anticipated application, and then to determine if the yield potential in the field merits the expense of a fungicide. For example, at this point it appears that only Corynespora leaf spot has a reasonable chance of responding to an application of a fungicide like Headline, Twinline, and possibly Quadris. Once the disease is positively identified as being Corynespora, the grower must determine if there is a reasonable chance for successful management using a fungicide. If the disease has already spread throughout the canopy resulting in defoliation, it is unlikely that a fungicide will slow the disease enough to justify the cost of application. Finally, if the yield potential in the field is already compromised significantly by drought or other factors, use of a fungicide may not be justified.

Where use of fungicides appears most justified (based upon limited data) appears to be where Corynespora leaf spot is in the early stages of development in fields with good-to-excellent growth. In such cases, a fungicide application, likely early in the bloom stages, may provide significant yield increases over untreated plots. Because the spores of the Corynespora pathogen can overwinter in crop residue, the disease will likely be more severe in fields where cotton follows cotton in a field.

Spores from the spots produced by the Corynespora fungal pathogen.

“ Is It Too Late to Foliar Feed ?” and Other Related Questions (***Harris***)

1) **Q: Why is my cotton is running out of fertilizer so early?**

A: There could be a number of reasons. One is that it just seems early because we have accumulated so many additional heat units compared to “normal”. If you planted around May 15th, your crop should have been blooming for at least 7 weeks by now anyway and should be exhibiting the normal “fall colors” of senescence. Hopefully you have a decent boll load and the plant has drained the nutrients from the leaves into the developing bolls. This is a lot different situation compared to where you may have under-fertilized and are truly coming up short on major nutrients, namely nitrogen or potassium. The peak demand for nutrients occurs around the 4th week of bloom. If your cotton ran out of nutrients soon after this time you may not have put enough out. There is also the possibility that you applied the recommended amount of N and K but it has simply been too hot and dry for the plant to take the nutrients up from the soil. This is obviously more likely to occur in dryland fields or where irrigation water supply is limited.

2) **Q: Are some varieties running out of fertilizer more than others?**

A: Within the same maturity group, or probably more accurately, varieties that have similar fruiting patterns, there should not be a difference. “Short season” varieties should run out sooner than “full season” varieties. There apparently is some concern that one particular variety has run out sooner or worse than others. However, in my research trials I have not observed this, again, as long as you compare within maturity groups.

3) **Q: How late is it too late to foliar feed?**

A: After the 7th or 8th week of bloom. Game over. Grease up the picker.

4) **Q: How do I know if I should foliar feed?**

A: The best way to make this decision is to petiole test. Once cotton starts blooming, petiole testing is more sensitive or accurate than tissue testing. Also, the focus should be on N and K. Other nutrient problems need to be taken care of before first bloom or they are going to be hard or impossible to fix by foliar feeding. If you notice yellowing or bronzing of top leaves and leafspots on the top leaves you likely have a potassium problem. If you notice yellowing of the lower leaves, you likely have a nitrogen problem. If you catch these problems early enough, like 4th, 5th or 6th week of bloom, it may still be early enough to correct the problem with foliar feeding.

5) **Q: What should I use ? And how much ?**

A: The easy answer is 10 lb/a feed grade urea for nitrogen or 10 lb/a potassium nitrate for potassium, in at least 10 gal of water. However, there are numerous other products available.

And although most of these alternatives can be more expensive and have more burn potential, they are also considered easier or more convenient to use. The key with these products is to get enough N and K, economically and without causing burn.

Effect of Cotton Cultivar on Fiber and Yarn Quality (***Li, Knowlton, Thibodeaux, Foulk***)

In 2010, DP 555 BR, the long dominant cotton cultivar in Georgia, was no longer available for cotton growers in Georgia. Therefore, it is important for cotton growers to understand how other alternative cotton cultivars perform compared to DP 555 BR. This study evaluates the cotton varietal effect on fiber and yarn quality by benchmarking DP 555 BR against two other Georgia cotton cultivars. All cotton samples were harvested using a spindle cotton harvester in a commercial farm in Colquitt County during October and November 2009. Three cotton cultivars (Deltapine 555 BG/RR (DP 555), FiberMax 1740 B2F (FM 1740), and PhytoGen 370 WR (PHY 370)) were grown in one irrigated field with similar growing conditions. A total of 54 cotton samples were used (18 samples for each cultivar). Cotton samples were stored in trailers and ginned at the University of Georgia microgin facility. After ginning, cotton bales were sent to USDA Cotton Fiber Quality Research Station of the USDA ARS in Clemson for spinning tests and yarn quality measurement.

HVI fiber quality

For both trash count and leaf grade, there were no significant differences in the three cultivars (Table 1). This might suggest that the three cultivars were grown and harvested under similar conditions because cotton trash content is usually determined by growing environment and harvesting methods. For lint length measurements, all three cultivars were significantly different in upper half mean (UHM) with FM 1740 B2F the longest, and PHY 370 WR the shortest. The cotton cultivar DP 555 BR had significantly lower uniformity than the other two cultivars. Results suggest that DP 555 BR does not have any advantage over FM 1740 B2F in either fiber length or length uniformity and is less desirable than PHY 370 WR in length uniformity. Our statistical analysis also showed that that cotton trash levels were largely determined by cleaning treatments instead of cotton cultivar, while cotton length was more heavily influenced by cotton cultivar than by cleaning treatments.

Table 1: Statistical test of HVI™ cotton fiber quality in trash level and fiber length in comparison of three cotton cultivars.

Cotton cultivar	Trash count (au)	Leaf grade (au)	UHM (in.)	UNIF (%)
DL555	41.00[1]	3.39	1.12 B[2]	82.21 B
FM 1740	43.28	3.39	1.15 A	83.13 A
PHY 370	41.72	3.00	1.10 C	83.31 A
LSD	4.96	0.47	0.0069	0.31

1. No letters indicate no significant difference across treatments or varieties.
2. Same upper case letters indicate no significant difference between cotton varieties.

Yarn quality

Other than ends-down, all other yarn properties showed significant differences among the three cultivars (Table 2). PHY 370 WR had the best elongation property among the three cultivars, while DP 555 BR showed the lowest elongation. As for strength, PHY 370 WR and DP 555 BR showed significantly higher strength values than FM 1740 B2F. Overall, PHY 370 WR seemed to be the cultivar with the best performance in yarn tensile properties. As for hairiness and irregular CV, DP 555 BR and FM 1740 B2F showed higher values than PHY 370 WR. If we consider hairiness an unfavorable yarn property, the data suggest that PHY 370 WR is the best cultivar among the three in hairiness measurement. In all three defect measurements, PHY 370 WR consistently had significantly less defects than the other two cultivars. DP 555 BR and FM 1740 B2F were similar in thicks and thins measurement, but FM 1740 B2F showed higher neps than DP 555 BR. In waste, a consistent pattern was observed that PHY 370 WR showed the lowest waste values than the other two cultivars. In general, the data suggest that PHY 370 WR seems to be the best cultivar among the three in most yarn quality properties.

DP 555 BR was once the dominant cotton cultivar in Georgia in the past decade due to its high yield potential. However, this study demonstrates that DP 555 BR has less desirable quality properties compared to the other two cotton cultivars. Therefore, replacing DP 555 BR with other cotton cultivars would lead to beneficial effect in yarn quality.

Table 2. Statistical test of ring yarn quality in comparison of three cotton cultivars.

Cotton cultivar	Ends-down	Elongation	Strengths	Hairiness	Irregular CV	Neps	Thicks	Thins	Waste
DL555	4.89[1]	4.89 C[2]	14.62 A	5.72 A	16.82 A	172.52 B	419.48 A	19.78 A	2.84 A
FM 1740	5.83	5.36 B	13.71 B	5.60 B	16.85 A	195.81 A	432.69 A	19.53 A	2.78 AB
PHY 370	3.61	5.83 A	14.64 A	5.31 C	15.98 B	117.06 C	280.60 B	13.03 B	2.67 B
LSD	4.88	0.16	0.43	0.10	0.13	12.67	22	2.23	0.11

1. No letters indicate no significant difference across treatments or varieties.
2. Same upper case letters indicate no significant difference between cotton varieties.

The three cotton cultivars exhibited significant differences in cotton length properties via HVI™ measurement. DP 555 BR appeared to have the highest short fiber content and lowest length uniformity among the three cultivars. Cotton cultivar PHY 370 WR seemed to be the best among the three cultivars in most yarn quality properties. As far as the fiber quality and yarn quality are concerned, therefore, replacing DP 555 BR with other promising alternatives should be beneficial to textile mills and consumers.

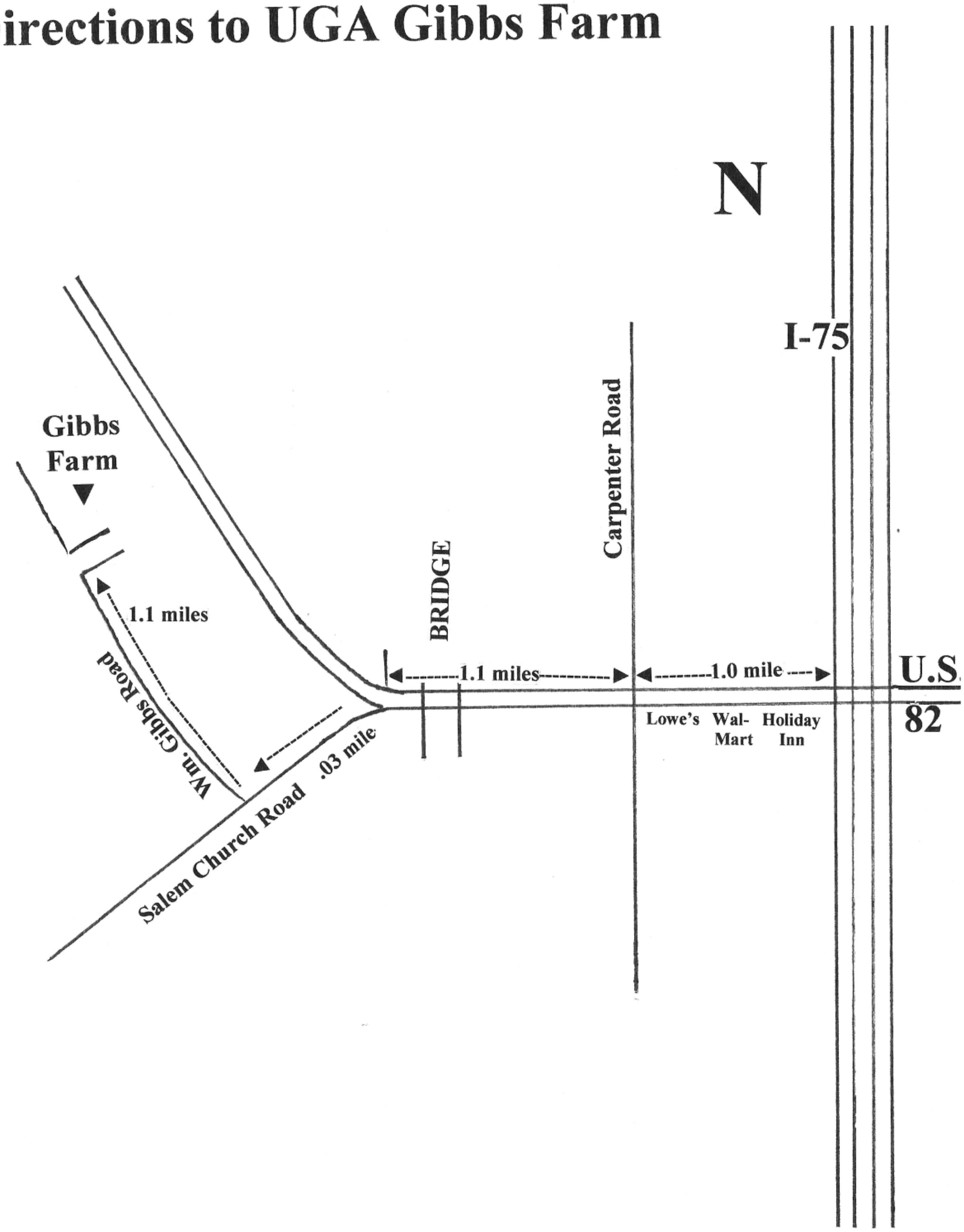
Cotton & Peanut Research Field Day, September 7, 2011 Tifton: Mark your calendars for the 4th Annual UGA Cotton and Peanut Research Field Day scheduled for September 7, 2011. Attendees should arrive to the UGA Gibbs Farm (directions below) between 8:30 and 9:00 a.m., and the tour will begin at 9:00a.m. concluding with lunch. The field day is graciously sponsored by the Georgia Cotton Commission and the Georgia Peanut Commission. **Please RSVP to Mrs. Sara Cates at 229-386-3006 or sbcates@uga.edu by Friday September 2, 2011 if you wish to attend, so that we can have an accurate head count for the meal.**

2011 UGA Cotton & Peanut Research Field Day
September 7, 2011

8:30-9:00am	**Arrival at Gibbs Farm**	
9:00 am	Welcome	Dr. Joe West
9:05 am	Discussion of Logistics / Load Trams	Dr. Guy Collins Dr. John Beasley
9:20 am	UGA & USDA Peanut Breeding Programs, Peanut Economics	Dr. Bill Branch Dr. Corley Holbrook Dr. Nathan Smith
9:50 am	Cotton & Peanut Pathology, Peanut Agronomics, Peanut Weed Control	Dr. Bob Kemerait Dr. John Beasley Dr. Eric Prostko Dr. Tim Grey
10:20 am	UGA Cotton Breeding & OVT Program Cotton Agronomics Research	Dr. Peng Chee Mr. Don Day Dr. Guy Collins Dr. Jared Whitaker
10:50 am	**Leave for the Lang / Rigdon Farm**	
11:10 am	Load Trams at the Lang / Rigdon Farm	
11:15 am	Cotton & Peanut Soil Fertility Cotton & Peanut Cropping Systems Cotton & Peanut Economics	Dr. Glen Harris Dr. Scott Tubbs Mrs. Amanda Smith
11:40 am	Cotton Entomology & Engineering	Dr. Mike Toews Dr. Phillip Roberts Dr. John Ruberson Dr. Charlie Li
12:10 pm	Peanut Disease Research & Entomology	Dr. Tim Brenneman Dr. Albert Culbreath Dr. David Adams
12:30 pm	Lunch at the Blackshank Pavillion	

Please RSVP to Mrs. Sara Cates at 229-386-3006 or sbcates@uga.edu by Friday September 2, 2011 if you wish to attend, so that we can have an accurate head count for the meal.

Directions to UGA Gibbs Farm



Contributions by:

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Changying "Charlie" Li, Biological and Agricultural Engineer
Andy Knowlton, Microgin Operator and Manager
Devron Thibodeaux, USDA Clemson Spinning Lab Textile Technologist
Jonn Foulk, USDA Clemson Spinning Lab Engineer

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

Edited by: Guy Collins, Extension Cotton Agronomist