

## **COTTON GROWTH AND DEVELOPMENT MONITORING DURING 2005**

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### **Introduction**

The preliminary results presented in this report are part of our crop monitoring research in southwest Georgia that started during the 2003 cropping season. The main objective of this project was to obtain on-farm management practices and crop growth, development and yield data to be used for evaluating the performance of the crop simulation models that are part of the Decision Support System for Agrotechnology Transfer (DSSAT), which includes the new CSM-CROPGRO-Cotton model (Hoogenboom et al., 2004).

During the 2005 crop season we monitored one cotton field in Mitchell County and two cotton fields in Baker County. Local weather conditions, the farmers' management practices, including irrigation amounts, crop growth and development, including dry matter of plant components as well as leaf area index (LAI) and canopy height were collected every two weeks. The monitoring started during mid-April and ended during mid-October. A total of 11 field visits covered the complete growing season for the three cotton fields. The observed irrigation amounts were obtained from the database of the Agricultural Water Pumping (AWP; [www.AgWaterPumping.net](http://www.AgWaterPumping.net)) program of which the main objective was to determine agricultural water use in Georgia (Hook et al., 2004).

### **Weather Conditions**

The cotton field in Mitchell was planted earlier (April 18) than the two cotton fields in Baker (May 23 for Baker 1 and May 18 for Baker 2). The weather conditions were characterized by cool temperatures from April through May and above normal rainfall during the growing season. The late planting for the Baker fields partially avoided the cool temperatures that remained through the end of May. During the six-month growing season, the highest total rainfall was recorded in July. However, most of the rainfall occurred during the first ten days of July, followed by at least two weeks of dry conditions. Dry conditions also prevailed during the third week of June, third week of August, and throughout September (Figure 1).

### **Irrigation**

A total of 1.89 inches of irrigation was applied during the June-September period in the Baker 1 field. Despite the high total rainfall for July, the total amount of irrigation for this month (1.07 inches) was more than three times the amount applied during the other months. Irrigation was applied during the third week of July when rainfall was low and evapotranspiration was high. The amounts of irrigation for June, August, and

September were similar (Figure 2). No irrigation data were available for the Mitchell and Baker 2 fields.

### **Comparison between the Different Fields**

The Mitchell field was sown with ST 5242BR, an early maturing variety, using a conventional tillage system. The two fields in Baker were sown with DP 555 BG/RR, a later maturing cotton variety, using a reduced tillage system. The DP 555 BG/RR was the most popular variety planted in Georgia for the 2005 season, accounting for almost 73 percent of the total cotton acreage (<http://risk.cotton.org/varseast.htm>). The field in Mitchell County was sown during the third week of April while the two fields in Baker County were sown during the third week of May. All fields had the same row spacing but the Mitchell field had the highest plant population (Table 1).

The yield for the early maturing cotton variety ST 5242BR for the Mitchell field was at least 30% lower when compared with the later maturing cotton variety DP 555 BG/RR for the Baker fields. The Baker 2 field had a higher seed cotton yield than the Baker 1 field but the lint yields were similar (Table 2). The difference in yield between Baker 1 and Baker 2 fields could be attributed to the higher number of bolls per plant for the Baker 2 field that resulted in a higher rate of increase in boll weight (Figure 3). The harvest index was lower for the fields in Baker County than for the field in Mitchell County, which was due to the higher aboveground biomass for the Baker fields (Table 2).

In spite of some environmental constraints, 2005 represented a very good growing season for cotton. The average lint yield for the three fields was 1,692 lb/A, which was higher than the average lint yield for two fields in 2003 (1,541 lb/A) and for three fields in 2004 (1,508 lb/A). The lint yield for the Baker 1 field in 2005 (1,818 lb/A) was higher than the yield in 2003 (1,479 lb/A). For the Baker 2 field, the lint yield in 2005 (1,973 lb/A) was higher than the yield in 2004 (1,461 lb/A).

Table 1. Cropping system comparison.

CHARACTERISTIC	FIELD		
	Mitchell	Baker 1	Baker 2
Variety	ST 5242BR	DP 555 BG/RR	DP 555 BG/RR
Sowing date	04/18/05	05/23/05	05/18/05
Harvest date <sup>[a]</sup>	09/01/05	10/18/05	10/18/05
Tillage	Conventional	Reduced Tillage	Reduced Tillage
Area (acres)	62	190	100
Row spacing (inches)	36	36	36
Plant Population (plants/acre)	40,486	33,943	34,988
Days to harvest	136	148	153
Rainy days <sup>[b]</sup>	61	58	61
Total Rainfall (inches) <sup>[b]</sup>	25.9	25.1	26.0
Total PET (inches) <sup>[b]</sup>	25.2	21.9	22.6
Total Irrigation (inches)	nd <sup>[c]</sup>	1.89	nd <sup>[c]</sup>

<sup>[a]</sup> At maturity; the farmer harvested at least 2 weeks later, <sup>[b]</sup> From sowing to harvest, <sup>[c]</sup> No data

Table 2. Comparison of biomass, yield and yield components.

VARIABLE	FIELD		
	Mitchell	Baker 1	Baker 2
Seed Cotton Yield (dry matter, lb/A)	2923	3891	4612
Lint Yield (dry matter, lb/A)	1285	1818	1973
Lint (%)	44	47	43
Boll Unit Weight (dry matter, oz/boll)	0.28	0.22	0.24
Total aboveground Biomass (dry matter, lb/A)	5106	9220	9906
Lint Harvest Index	0.25	0.20	0.20
Seed Cotton Harvest Index	0.57	0.43	0.46

## References

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### **Acknowledgements**

The authors gratefully acknowledge the cooperation of Mr. Bryant Campbell and Mr. Kenneth Deese for on-farm data collection during our 2005 crop monitoring study in southwest Georgia.

This work was supported in part by the United States Department of Agriculture through the Risk Management Agency (USDA/RMA) and the Office of Global Programs of the National Oceanic and Atmospheric Administration through the Regional Integrated Sciences and Assessments project (NOAA/OGP/RISA). This research was conducted under the auspices of the Southeast Climate Consortium (<http://secc.coaps.fsu.edu/>).

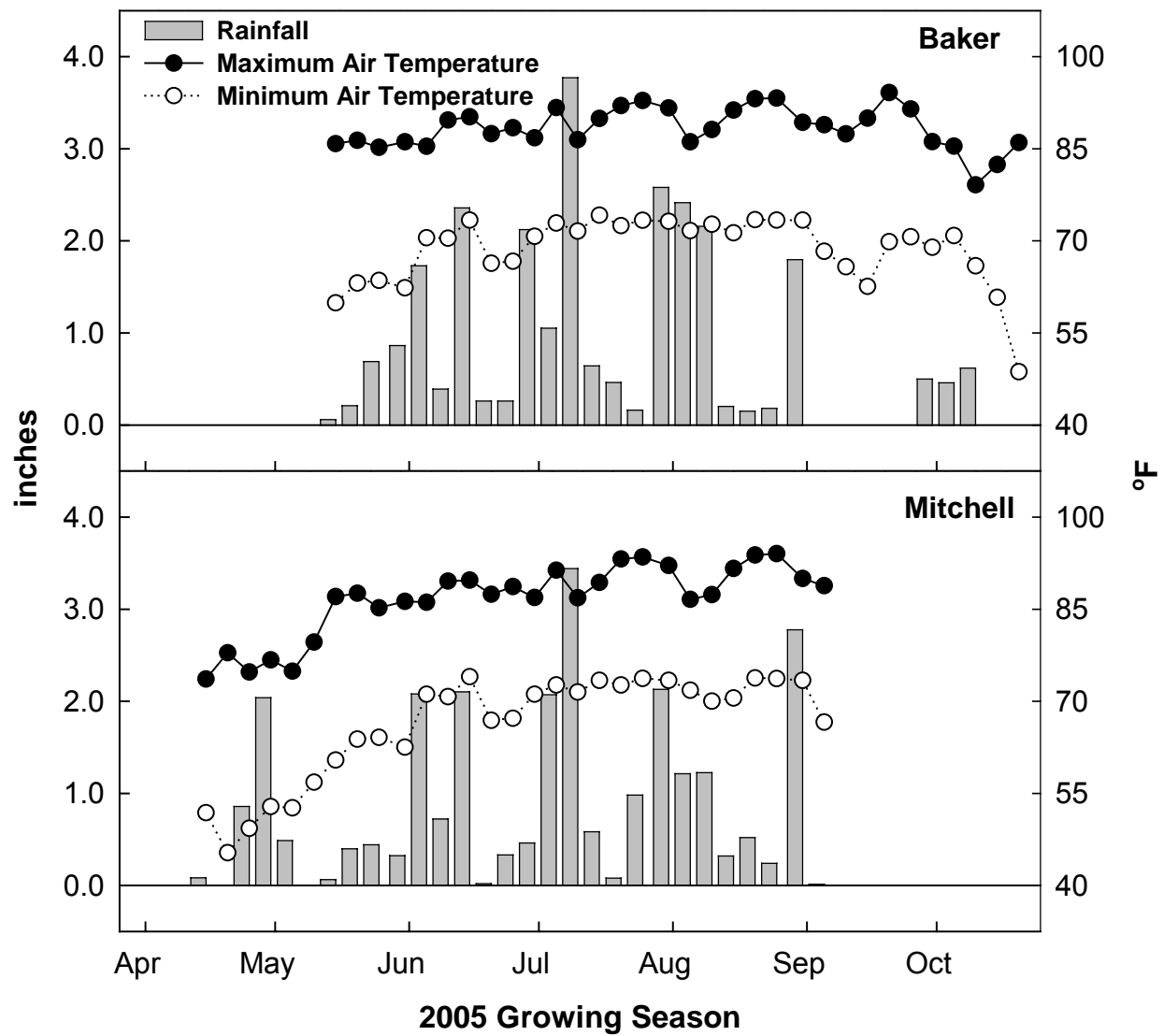


Figure 1. Five-day average minimum and maximum air temperature and five-day total rainfall during the growing season.

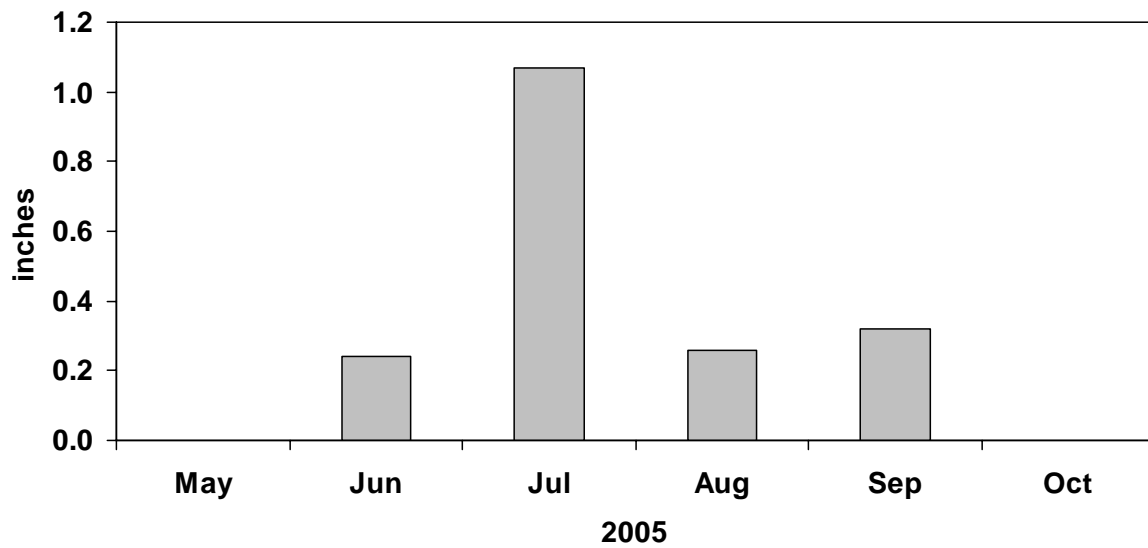


Figure 2. Total monthly irrigation amounts observed for the Baker 1 field.

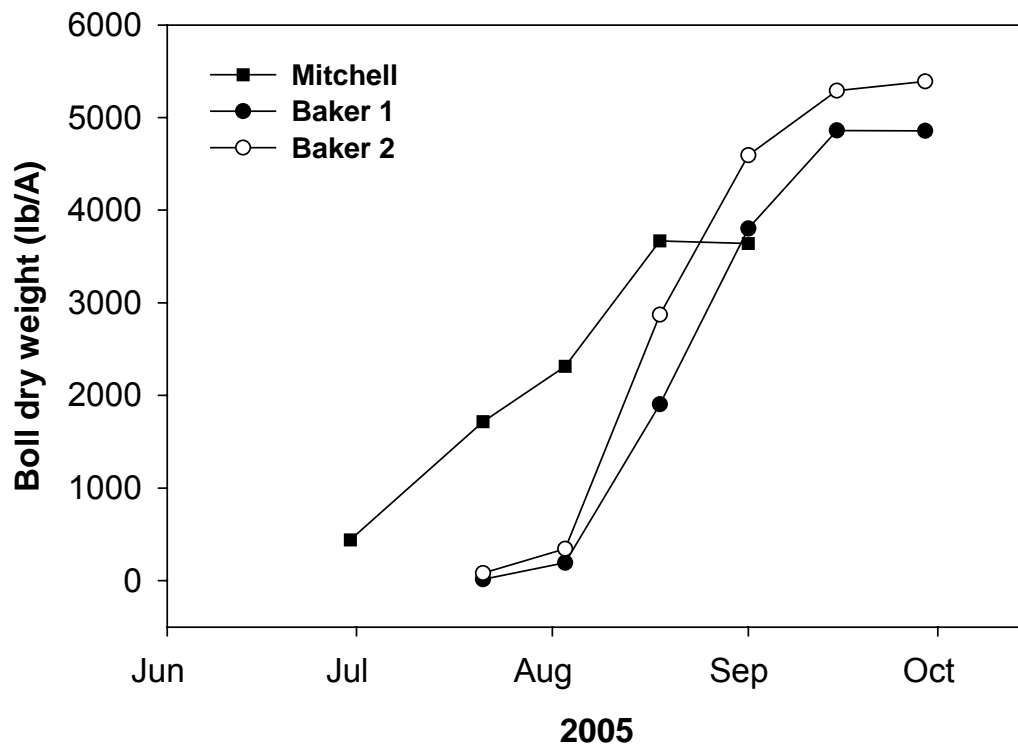


Figure 3. Boll development during the growing season.