**Figure 1.** Cotton Furrow diking plots near Elizabeth, MIsissippi, Note water ponding behind dikes

running alongside row crops, is a management practice with potential to save irrigation water and reduce irrigation costs. This management practice, however, has received little research attention in the Mid South. Cotton furrow diking experiments were initiated by USDA-ARS and Mississippi State University researchers near Elizabeth, MS to determine if this practice could potentially reduce irrigation levels by the targeted value, 25%, while maintaining and/or improving yields when compared to a conventional tillage system. Physiological data were collected at early bloom, cut-out and harvest for both irrigated and non-irrigated studies. Twenty-six percent less irrigation water was applied to furrow dike systems when compared to the conventional tillage system. At early bloom, no difference between plant heights, number of main stem nodes, leaf area index, stem weight and total plant weight were noted between tillage systems. Similarly, at cut-out, no difference in aforementioned physiological measurements was observed, nor did we detect differences in boll or square weights between tillage systems. At harvest, box mapping indicated no difference in plant height, node number, number of occupied positions or seed lint weight within position. Consequently, cotton lint yields between tillage systems were not different, averaging 989 lbs/acre. Similar results were noted for our non-irrigated cotton furrow diking experiments. Our preliminary data indicate the potential for furrow diking to reduce irrigation levels by 25% while maintaining yields equivalent to that of conventional tillage/irrigation systems.

**Program 18C-1**

# Weed Control Systems For Controlling Glyphosate Resistant Palmer Pigweed In Cotton And Soybeans

**Presented by Dr. Anthony Mills**
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Glyphosate resistant palmer pigweed is an extremely prolific weed. Seed production can exceed three hundred thousand seeds per plant and germination occurs over several months. Under optimum conditions palmer pigweed can grow more than 2 inches in a single day. This makes glyphosate resistant pigweed the most difficult weed to manage in cotton and soybean production systems today. Weed control systems that utilize multiple residual herbicides with different modes-of-action are most effective. Post-emergence herbicides can also be effective with appropriate application timing.

Farmers rapidly adopted Roundup Ready Technology in cotton and soybeans because it made weed control easy, effective and economical. Many farmers today do not have experience with weed control systems that are not based entirely on glyphosate. While glyphosate is still effective on many weeds today, it is imperative that other chemistries are used; especially in areas where palmer pigweed is prevalent.

A cotton palmer pigweed control system proven to be effective in the Mid-south is as follows:

| Herbicide Practice | Herbicide Recommendation |
|---|---|
| | |
| Burndown February | Roundup PowerMAX® Herbicide (22-32 oz) + dicamba (8 oz) |
| Early PRE 2 weeks before planting | Reflex® (1 pt) **DO NOT DISTURB BEDS AFTER APPLICATION** |
| | |
| PRE | Cotoran® (2 pt) + Gramoxone® (1.5-2 pt) + 0.5% Surf<br>APPLICATION PRIOR TO PLANTING WILL PROVIDE BETTER CONTROL OF EMERGED PALMER AMARANTH |
| | |
| POST 1 leaf cotton | Roundup PowerMAX® Herbicide (22-32 oz) + Warrant™ Herbicide (3 pt) |
| POST - HOODED SPRAYER *(option 1)* (emerged palmer) 6-8 leaf cotton | Cotton-Pro® (1.5 pt) + MSMA®(2 pt) + Warrant™ Herbicide (3 pt) + 0.5% Surfactant |
| POST *(option 2)* 6-8 leaf cotton (No emerged palmer) | Roundup PowerMAX® (22-32 oz) + Warrant™ Herbicide (3 pt) |
| LAY-BY HOODED SPRAYER | Direx (1.5 pt) or Valor SX (2 oz) + Roundup PowerMAX® Herbicide (22-32 oz) or MSMA (2 pt) + 0.5% Surf |
| | |
| *HOODED SPRAYER* (Under Hood Only) | Gramoxone® (2 pt) + Direx (1-1.5 pt) + 0.5% Surf |

This weed control system requires good management and timely applications to ensure that residual herbicide activity is overlapped for season long control. The use of hooded sprayers in this system is highly recommended for controlling escaped weeds.

A soybean palmer pigweed control system proven to be effective in the Mid-south is as follows:

| Herbicide Practice | Herbicide Recommendation |
|---|---|
| | [illegible] |
| Burndown February | Roundup PowerMAX® Herbicide (24-32 oz) + dicamba (8 oz) |
| | Planting |
| PRE | Valor® SX (2 oz) + Gramoxone® (1.5-2 pt) + 0.5% Surf |
| | [illegible] |
| POST 1 (Palmer is emerged and less than 3 inches in size) | Roundup PowerMAX® Herbicide (24-32 oz) + Flexstar® (1.25 pt) + Warrant™ Herbicide (3 pt) |
| POST 2 (14 days after POST 1) | Roundup PowerMAX® Herbicide (24-32 oz) + Warrant™ Herbicide (3 pt) |

Similar to the cotton system, the soybean palmer pigweed control system requires good management and timely applications. The POST1 application must be applied prior to any pigweeds exceeding 3 inches in size.

These weed control systems allow farmers to choose their cotton and soybean varieties based on yield and overall net return.

**Program 8C-2**

# ▸ Irrigation And Nitrogen Fertility Effects On Cotton YieldAnd Fiber Quality

**Presented by Dr. William T. Pettigrew**

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Although the price for cotton has appreciated to historically high levels in recent years, the cost for productions inputs has also steadily increased over the past few years. Rising costs have been particularly problematic with petroleum based inputs, such as nitrogen fertilizers and diesel fuel needed to run irrigation pumps. Because of these increasing input costs, it is important for producers to understand how to make the most efficient use of any input they incorporate into their production strategies. This research investigated the effectiveness of three rates of nitrogen fertilization under both irrigated and dryland conditions for 4 different cotton varieties.

Cotton was grown at Stoneville, MS in the years 2009-2011. The four varieties grown were 'DPL 0935B2RF', 'FM 840B2RF', 'PHY 485WRF', and 'STV 4554B2RF'. These varieties represented a range of maturities and breeding programs. Half the plots were furrow-irrigated and half the plots were grown under non-irrigated dryland conditions. All plots received one of three nitrogen fertility treatments (0 kg N ha-1, 56 kg N ha-1, or 112 kg N ha-1). Plots consisted of 4 rows spaced 1-m apart. The plots were 18.3 m long in 2009 – 2010 and 15.2 m long in 2011. The experimental design was a randomized complete block design with a modified split plot treatment arrangement and 6 replicates. The irrigation regimes were the main plots and the split plots were the variety by nitrogen treatments arranged factorially. Dry matter partitioning, canopy light interception, lint yield, yield components, and fiber quality data were collected.

The 2009 growing season was characterized by rains occurring on a regular basis such that the few irrigation events were needed, and those irrigations provided no beneficial effects on yield. Therefore, the 2009 data will not be presented. 2010 and 2011 were both dry years where a strong positive effect from the irrigation was observed. All the varieties responded similarly to both the nitrogen fertilization and irrigation. Although nitrogen fertilization produced a yield increase each year, the extent of that yield response was dependent upon whether the plots were irrigated or not. In 2010, the yield response to the highest nitrogen treatment under irrigated conditions was over twice as much as that observed under dryland conditions (270 kg ha-1 vs. 649 kg ha-1). The yield response to the highest nitrogen level in 2011 was only 208 kg ha-1, but under dryland conditions no significant response to nitrogen fertilization was detected.

Both irrigation and nitrogen fertilization impacted the quality of the fiber produced in 2010. Irrigation increased fiber length and micromaire by 3% and 8%, respectively. In contrast, irrigation caused a 1% decrease in fiber strength. Nitrogen fertilization increased fiber length by 1% and increased fiber strength by 3%. However, the fiber micronaire was 5% lower when the highest level of nitrogen fertilization was applied. Although these fiber quality differences caused by irrigation and nitrogen fertilization are statistically significant, most of those differences were relatively small and would generally not trigger a premium or discount on the price received for the fiber produced.

As the costs and availability of inputs becomes more challenging for cotton producers going into the future, producers will have to make difficult decisions as how to best allocate their input dollars. This research indicates that when water is limited during the growing season (through the lack of precipitation, insufficient irrigation capabilities, or restrictions on the