

2004 RESEARCH SUMMARY
ARKANSAS CORN AND GRAIN SORGHUM BOARD

TITLE: Weed Control Programs in Arkansas Corn

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CROP: Field Corn

STATUS: Funded in 2002 for 3 years.

OBJECTIVES AND ACCOMPLISHMENTS:

The funding allowed Chad Brewer, a half-time Graduate Assistant, and the Weed Science crews to conduct 8 excellent field trials in 2004 (six at the Northeast Research and Extension Center, Keiser, and two at Southeast Branch Experiment Station, Rohwer). Specific objectives to be answered in the field trials were:

- 1) **To develop late-season morningglory control programs that allow maximum crop rotations (Oliver and Smith).** Morningglories and pigweeds germinating after the last herbicide application may not offer enough competition to reduce yields, but can cause problems at harvest and add to the weed seedbank in the soil. When atrazine was tankmixed with the last application of glyphosate, late-season morningglory control was greatly improved in the Roundup Ready system. Liberty herbicide is slightly better than glyphosate on morningglory and slightly weaker on pigweed. Over the past three years the more consistent morningglory control has been maintained with conventional herbicide programs. Effective control (>90%) of pitted and entireleaf morningglory was maintained throughout the season by Facet (quinclorac) preemergence (PRE), Bicep II Manum (metolachlor/atrazine) PRE followed by (fb) Callisto (mesotrione) (POST) postemergence, Callisto PRE, Callisto + Aatrex (atrazine) PRE, Callisto PRE fb POST applications of Accent (nicosulfuron), Callisto, and Roundup Ultra Max (glyphosate), Callisto EPOST fb Callisto LPOST, Callisto POST alone or tank-mixed with Aatrex or Accent. There was no significant injury from any of the treatments tested. All treatment yields were similar except Facet PRE, which failed to provide mid- to late-season Palmer amaranth control.
- 2) **To determine efficacy of Roundup UltraMax, Liberty, and Lightning applied alone and with residual herbicides in transgenic cultivars for season-long weed control with and without Aatrex (Oliver and Smith).** In a study to compare conventional and new herbicide programs to Roundup Ready programs, neither conventional nor Roundup Ready corn cultivars were injured by any treatment. In 2003, the conventional cultivar (Pioneer 31B13BT) out-yielded the Roundup Ready (DKC 4610) by 28 bu/A; however, in 2004, cultivars were different and both cultivars yielded approximately the same (210 bu/A). The yield

lag must be declining for Arkansas-adapted cultivars. Weed control was equivalent with conventional and glyphosate programs, except for Steadfast at 2- to 4-inch weed without a previous PRE application. The reduced control with Steadfast was noted for velvetleaf, prickly sida and Palmer amaranth. Regardless of the herbicide program used in corn, two application timings were required: an initial early-season PRE followed by an application at 2- to 4-inch weeds or an application at 4-inch corn plus an additional POST application 2 to 4 weeks later.

- 3) **To determine costs of transgenic weed control systems and compare with cost of standard herbicide programs (Oliver and Smith).** A cost analysis will be conducted at the conclusion of the three-year studies.
- 4) **To evaluate new herbicides and the best herbicide programs for newly emerging weed problems (Oliver and Smith).** Last year a corn field with an uncommon weed species was not located, but the potential for herbicide resistance and other emerging weed problems such as honeyvine milkweed (*Ampelamus albidus*), horsenettle (*Solanum carolinense*), bigroot morningglory (*Ipomea pandurata*), mexicanweed (*Caperonia castaniifolia*), and of course, late-season morningglory still exists. Of the new products tested, Callisto appears to be the closest to an atrazine replacement. It is similar to atrazine in grass activity but is slightly less effective on morningglory. It is very versatile in that it can be applied PRE or POST up to 30-inch-tall corn. Callisto is an excellent tank-mix herbicide to use in a weed control program. Steadfast is a new product containing rimsulfuron and nicosulfuron and is similar to Basis Gold, except for the additional atrazine in Basis Gold. However, there is more nicosulfuron (the strong grass component) in Steadfast than in Basis Gold. Weed control has been slightly inconsistent but is still very good. Steadfast does offer an alternative to atrazine for control of triazine-resistant pigweeds.

Option (formasulfuron) and Equip Corn Herbicide (mesosulfuron + iodosulfuron) are effective broadleaf herbicides but are weak on grasses such as broadleaf signalgrass. In a Roundup Ready system the addition of atrazine at 1.5 lb ai/A to the initial glyphosate application at 6-inch corn did not improve weed control during the growing season. Lexar or Lumax (metolachlor + mesotrione + atrazine) applied PRE improved residual weed control over that of Bicept II Magnum.

- 5) **To develop weed control programs in early short-season corn so that multiple crops (soybean followed by wheat) can be planted in the same year (Oliver).** The triple-crop production system avoids mid-season water deficit stress, which coincides with the fragile reproductive development of full-season crop plants, by timing crop maturity so that the most sensitive stages occur before the onset of drought or after it. The system comprises the monocrop cultures of corn (Pioneer 39M27BT), soybean (Asgrow 2201 RR), and winter wheat (Pioneer 2684) compressed into a 14-month period. Few herbicides can be used in this

system because of the short rotation interval between crops. Of the 15 herbicide programs evaluated, current herbicide technology was sufficient to control the weed species present in a triple-crop system. The most cost efficient treatments that are labeled for use in this triple-crop rotation are Dual II (metolachlor) PRE fb Basagran (bentazon) + Sencor/Lexone (metribuzin) POST, metolachlor + Python (flumetsulam) PRE fb 2,4-D POST, and Axiom (flufenacet + metribuzin) PRE fb 2,4-D POST. Even though Aatrex is not labeled for a follow crop of soybean for 10 months, there was no detrimental effect to subsequent crops in the rotations from the atrazine applied as a split application of 0.75 lb ai/A PRE and POST on a Taloka silt loam soil (pH 5.8 and organic matter < 1%). Wheat yield was influenced by the corn herbicides that had too short a residual activity, which allowed weed interference in the wheat. The soybean planting date is critical and should be by the first of August for high yield potential. The triple-crop system will reduce irrigation cost, spread out cash flow, and potentially increase gross returns. In our study, the triple-crop system more than doubled gross margin returns over herbicide cost as compared to a conventional full-season corn or double-crop wheat followed by a soybean production system. net returns were - 20, 60, and 160 \$/A for corn, double-crop wheat, and the triple-crop system, respectively. At present, the greatest limitation to the triple-crop system is the lack of well-adapted short-season corn hybrids and soybean cultivars.

PUBLICATIONS:

Brewer, C.E. and L.R. Oliver. 2003. Weed control strategies for triple-crop production system. Proc. South. Weed Sci. Soc. 57:46.

Stephenson, IV, D.O., J.A. Bond, E.R. Walker, M.T. Bararpour, and L.R. Oliver. 2004. Evaluation of mesotrione in Mississippi Delta corn production. Weed Technol. (accepted).

Brewer, C.E. 2004. Weed control strategies for a triple-crop production system and late-season glyphosate applications to reduce weed seed rain. Master of Science Thesis. Univ. of Arkansas. 74 pgs.