

**2003 RESEARCH SUMMARY
ARKANSAS CORN AND GRAIN SORGHUM BOARD**

TITLE: Weed Control Programs in Arkansas Corn

INVESTIGATOR: Lawrence R. Oliver, Department of Crop, Soil, and Environmental Sciences; 479-575-3976; oliver@uark.edu and Kenneth L. Smith, Southeast Research and Extension Center, Monticello; 870-460-1091; smithken@uamont.edu

CROP: Field Corn

STATUS: Funded for 2002 for 3 years.

OBJECTIVES AND ACCOMPLISHMENTS:

The funding allowed Jason Bond, a half-time Graduate Assistant, and the Weed Science crews to conduct 19 excellent field trials in 2003 (six at the Northeast Research and Extension Center, Keiser, two Pine Tree Branch Experiment Station, Colt, and 11 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 two 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) premergence (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.

- 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 (Pioneer 31B13BT) or Roundup Ready (DKC64-10) corn cultivars were injured by any treatment. Leadoff (dimethenamid/atrazine) PRE and Dual II magnum + Aatrex controlled pitted and entireleaf morningglory, velvetleaf, prickly sida, Palmer amaranth, and broadleaf signalgrass controlled

80% or more four weeks after treatment. Conventional POST treatments controlled pitted morningglory 88% or more in September, except Steadfast (nicosulfuron/rimsulfuron) provided 80% control. Roundup Ready corn treatments provided 84 to 96% pitted and entireleaf morningglory control with no difference between treatment or timings. All POST treatments controlled velvetleaf 100% and broadleaf signalgrass 90% in July through September and Palmer amaranth 90% or more in September except Steadfast which provide 80% control. All conventional treatments yielded better than Steadfast POST alone, Steadfast plus Callisto POST, and Steadfast plus Aatrex (0.75 lb/A) POST. All Roundup Ready treatments that included three applications of Roundup WeatherMax or Aatrex yielded better than Roundup WeatherMax applied at 2-4 inch weeds followed by Roundup WeatherMax applied at 2-4 inch regrowth. No treatment yielded higher than the standard treatment of Dual II magnum + Aatrex PRE fb Aatrex at 4 leaf corn. The conventional cultivar on the average yielded better than the Roundup Ready cultivar by 28 bu/A.

- 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).** 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 which is similar to Basis Gold except for the additional atrazine. However, there is more Nicosulfuron (the strong grass component) in Steadfast than in Basis Gold. Weed control has been slightly inconsistent but still very good. Steadfast does offer an alternative to atrazine for control of triazine resistant pigweeds. Lumax (metolachlor/mesotrione), Lumax + Aatrex, and Callisto PRE provided good control (>90%) of broadleaf signalgrass, Palmer amaranth, prickly sida, velvetleaf, and pitted and entireleaf morningglory throughout the season. Pitted and entireleaf morningglory control with Lumax and Lumax + Aatrex was better than Bicep II Magnum, Epic (flufenacet/isoaflutole), and Guardsman Max (dimethenamid/atrazine), Keystone (acetochlor/atrazine) and Keystone + Balance Pro (isoxaflutole) also provided good control (>90%) of all species.

Emerging weed problems that have been noted are honeyvine milkweed (*Ampelamus albidus*), horsenettle (*Solanum carolinense*), and of course, late-season morningglory.

- 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 (metibuzin) POST, metolachlor + Python (flumetsulam) PRE fb 2,4-D POST, and Axion (flufenacet + metibuzin) PRE fb 2,4-D POST. Even though Aatrex is not labeled for a follow crop of soybean for 10 months, there was no effect from the atrazine, when 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%) to subsequent crops in the rotations. The triple crop system will reduce irrigation cost, spread out cash flow, and potentially increase gross returns. Presently, the triple crop system doubled gross margin returns over herbicide cost as compared to a conventional full-season corn or double-crop wheat followed by soybean production system.

PUBLICATIONS:

Bararpour, M.T., D.O. TeBeest, and L.R. Oliver. 2003. Infection of grain sorghum, corn, and selected weed species by zonate leaf spot (*Gloeocercospora sorghi*). Abstr. Ark. Crop Prot. Assoc. 7:13

Brewer, C.E. and L.R. Oliver. 2003. Weed control strategies for short-season corn in a triple crop rotation. Proc. South. Weed Sci. Soc. 56:264

Stephenson, IV, D.O., J.A. Bond, E.R. Walker, M.T. Bararpour, and L.R. Oliver. 2003. Evaluation of mesotrione in Mississippi Delta corn production. Weed Technol. (accepted).