

**2006 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 2005 for 3 years.

**OBJECTIVES AND ACCOMPLISHMENTS:**

The funding allowed the Weed Science crews to conduct 16 excellent field trials in 2005 (eight at the Northeast Research and Extension Center, Keiser, and eight 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 tremendous seed numbers back to the weed seedbank in the soil. When a residual herbicide such as Callisto or Steadfast was tankmixed with the last application of glyphosate, late-season morningglory control was greatly improved in the Roundup Ready system. Liberty herbicide utilized in the Liberty Link system is slightly better than glyphosate on morningglory and slightly weaker on pigweed. Over the past 4 years, the most consistent late season morningglory control has been provided when a late post (24-30" corn) application was made. 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).** A corn producer has two production system options, conventional or Roundup Ready®. In past years, the yield potential of herbicide-tolerant corn has been somewhat less than

conventionally grown hybrids; however, the genetic potential relating to yield of Roundup Ready® corn has increased to average nearly the same as conventional corn. Thus, weed control programs in Roundup Ready® vs. conventional corn hybrids need to be compared. Several herbicide options are available in conventionally grown corn. Our study focused on nicosulfuron + rimsulfuron (Steadfast) and metolachlor + atrazine (Cinch ATZ) compared to glyphosate (Roundup WeatherMax). The study was conducted from 2003 through 2005 at the Northeast Research and Extension Center in Keiser, AR. The experiment was randomized complete block with 17 treatments. In 2003, Pioneer 31B13BT and DeKalb C64-10RR were chosen for yield. In 2004 and 2005, the varieties used for the test in 2003 were unavailable, so Pioneer 32P76BT and DeKalb C69-71BT/RR were utilized.

Hybrid selection influenced yield potential of conventional and Roundup Ready® hybrids. At the 7 weeks after emergence (WAE) rating, Steadfast applied alone to 2- to 4-inch weeds in corn provided 63 and 75% control of velvetleaf and pitted morningglory, respectively. However, when tank mixed with Aatrex and Callisto, weed control was at least 95% for pitted morningglory, velvetleaf, and broadleaf signalgrass, 95, 98, 99%, respectively, at the 7 WAE rating. Two applications of Roundup WeatherMax at 4- and 12-inch corn gave at least 89% control of weed species in the field, while two applications at 12- and 20-inch corn gave at least 94% control. Because of the yield reduction due to weed regrowth, two applications of Roundup WeatherMax should be applied at 4- and 20-inch corn as opposed to 4- and 12-inch corn. The addition of Aatrex at 1.5 lb/A to the second application of Roundup WeatherMax or three applications of Roundup WeatherMax at 4-, 12-, and 20-inch corn did not improve control or yield.

Data suggests that the yield potential for Roundup Ready® corn is comparable to that of conventional hybrids. Weed control options for both production systems are effective; however, Steadfast should be tank mixed with another herbicide such as Callisto or Aatrex for best results.

In 2006, the Liberty Link cultivar (Pio 31G96) was the highest yielding cultivar in our Keiser experiments. The weed control programs were also extremely effective.

- 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 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 (foramsulfuron) and Equip Corn Herbicide (foramsulfuron + iodosulfuron) are effective broadleaf herbicides but are weak on grasses such as broadleaf signalgrass. Lexar or Lumax (metolachlor + mesotrione + atrazine) applied PRE improved residual weed control over that of Bicept II Magnum and Lexar has been added to MP-44 as an option for a total PRE program.

At present, numerous formulations of metolachlor are in the marketplace, our testing indicates Dual II Magnum is more active on an active ingredient (ai) bases but all are comparable products with rate adjustments. Impact and glyphosate applied early postemergence has also shown promise as a single application for season long weed control.

- 5) **Glyphosate drift tolerance by grain sorghum variety:** Glyphosate drift continues to be a problem with grain sorghum production. Ten varieties of grain sorghum have been sprayed with 0, 0.1 and 0.01 rates of glyphosate at three different growth stages to determine if there are any differences in tolerance to glyphosate drift. Low rates of glyphosate at the 3 leaf stage of growth are not as detrimental to yield as when applied at the 12 inch or boot stages of growth. There were no differences in varietal response to glyphosate; therefore, no alternatives for planting grain sorghum in drift sensitive areas could be identified.
  
- 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).**  
Research completed in 2004.

#### **PUBLICATIONS:**

Doherty, R. C., K. L. Smith, L. R. Oliver, and J .R. Meier. 2006. Cutting herbicide applications to “one” in corn. Abstr. Ark. Crop Protection Assoc. Res. Conf. 10:2.