

**2004 RESEARCH SUMMARY
ARKANSAS CORN AND SORGHUM BOARD**

Title: Development of Effective Weed Control Programs with Crop Safety

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Crop: Grain sorghum

Status: Funded in 2004 for 3 years

OBJECTIVES AND ACCOMPLISHMENTS:

The funding allowed the weed science crews to conduct two field trials at Pine Tree Branch Experiment Station, Colt, and two at Cotton Branch Experiment Station, Marianna in 2004. Specific objectives to be answered in the field trials were:

(1) To evaluate various cultural practices and herbicide programs and develop effective weed control programs in grain sorghum with improved crop safety.

A study to evaluate atrazine rate and soil fertility level on early-season grain sorghum injury was established at Marianna. However, early-season rainfall patterns prevented uniform grain sorghum emergence and the test was terminated in 2004 but will be repeated the next two years.

(2) To provide information on new herbicides entering the market as to their effectiveness and fit in Arkansas grain sorghum programs.

The new or potentially new herbicides for grain sorghum are Aim (carfentrazone), Callisto (mesotrione), and Facet (quinclorac). Aim post-directed at 0.008 lb ai/A controlled all small weeds under the 14-inch grain sorghum. Callisto provided control equivalent to atrazine. However, initial grain sorghum injury was too severe for Callisto to be labeled. Facet at 0.375 lb ai/A PRE provides excellent crop tolerance and morningglory control but does not provide full-season Palmer amaranth control. The conventional herbicides Dual II Magnum (metolachlor) or Bicep II Magnum (metolachlor + atrazine) applied PRE still provide excellent control, but an additional follow-up postemergence treatment at 2 - to 4- leaf grain sorghum generally improves late-season weed control.

(3) To evaluate grain sorghum germplasm for tolerance to glyphosate drift.

The increase in glyphosate-resistant crops leads to an increase in the use of glyphosate; however, the increase in usage has also led to an increase in drift injury to non-glyphosate resistant crops, such as grain sorghum. Therefore, cultivars of susceptible grain sorghum were tested for tolerance to glyphosate.

The experiment was conducted at the Pine Tree Experiment Station in Pine Tree, AR, to evaluate grain sorghum tolerance to glyphosate drift. The test was established as two-row plots in a split-split plot design with four replications. Nine cultivars (Asgrow A571, Dyna Gro 751B, Dyna Gro 780B, Golden Acres 444E, Pioneer 83G66, Pioneer 84G62, Terral TV1050, Terral TV9421, and Triumph TR82-G) were planted. Glyphosate was applied at four application rates of 0, 0.001, 0.01, and 0.1 lb ai/A. Treatments were made at two grain sorghum growth stages (3 leaf and early boot stage) in 2003 and three growth stages (3 leaf, 12 inch, and early boot stage) in 2004.

No individual cultivar injury differences were noted due to concentrations of glyphosate. However, there were differences in the overall effect of glyphosate concentrations on injury, seedhead suppression, or yield only at the 0.1 lb/A. The 0.1 lb/A concentration caused more injury at the early boot stage in 2003 and 2004 than at the 3-leaf stage. However, in 2004 grain sorghum at the 12-inch stage was most susceptible to glyphosate drift (0.1 lb/A) resulting in >68 and >89% injury at 3 and 6 weeks after treatment, respectively. Yields were reduced >90% across all cultivars when glyphosate was applied at 12-inch grain sorghum. The 3-leaf grain sorghum yield was the least affected by glyphosate drift and suffered no more than 20% yield reduction in 2003 and 2004 across all cultivars. The low yield reduction was due to the lack of injury and time for recovery before grain sorghum began the reproductive stage. Yield reductions to the 12-inch and early boot sorghum were due to crop injury and some seedhead suppression occurring at the early boot stage.

In conclusion, glyphosate drift at a concentration of 0.1 lb ai/A can injure grain sorghum and reduce yields. Crop stage can affect injury level or yield loss. Thus, grain sorghum cultivars are not a method to avoid glyphosate drift.

PUBLICATIONS:

Alford, J.L., L.R. Oliver, K.L. Smith, and M.T. Bararpour. 2004. *Differential Tolerance of grain sorghum cultivars to glyphosate drift*. Abstr. Ark. Crop Protection Assoc. Research Conf. 8:5-6