

Weed Management and Thermal Dependence of Resistance in Glufosinate Tolerant Cotton. Peter A. Dotray, Todd A. Baughman, K.Marty McCormick, and J. Wayne Keeling. Texas Tech University and Texas Agricultural Experiment Station, Lubbock, TX; and Texas Cooperative Extension, Vernon, TX.

#### ABSTRACT

The use of glufosinate ammonium (Ignite) herbicide in LibertyLink cotton will be an option for growers in 2004. Glufosinate has broad spectrum postemergence activity on numerous annual and perennial broadleaf and grassy weeds. It is a fast-acting herbicide, but movement in plants is limited. Coker 312, stripper-type, and FiberMax cotton lines have been studied and all have excellent tolerance to glufosinate. Research comparing weed management and economic returns in LibertyLink, Roundup Ready, and non-transgenic cotton varieties is underway on the Texas High Plains. In the first year of a three year study, weed management and economic returns were greatest in the glyphosate tolerant cotton system. Additional research examining weed management in glufosinate tolerant cotton indicates that residual herbicides, such as a dinitroaniline herbicide preplant incorporated, prometryn preemergence (PRE), or pyriithiobac PRE or postemergence improved ivyleaf morningglory, Palmer amaranth, common cocklebur, lanceleaf sage, and devil's-claw control over glufosinate-only systems. Other studies in the High and Rolling Plains examined glufosinate efficacy at different rates (0.42 and 0.52 lb ai/A) applied to weeds at 2-, 4-, 6-, 8-, 10-, and 12-inches in size. Palmer amaranth and devil's-claw was controlled at least 90% 1-week after treatment (WAT) when glufosinate was applied to 2- and 4-inch weeds, respectively. Less effective control was observed following glufosinate applications to larger plants. Increasing the rate of glufosinate did not increase activity. By 2 WAT, glufosinate at either rate applied to 2-inch weeds and at 0.52 lb ai/A applied to 4-inch weeds controlled devil's-claw at least 90%. Ivyleaf morningglory and common cocklebur was controlled at least 90% when glufosinate was applied to weeds up to 6-inches in size. These weeds were controlled at least 80% 2 WAT regardless of rate or weed size. Glufosinate activity using adjuvants (non-ionic surfactant, crop oil concentrate, methylated seed oil, organosilicone surfactant, ammonium sulfate, water conditioning agent, drift control agent) rarely improved control when compared to glufosinate used alone. In the laboratory, phosphinothricin acetyl transferase (PAT) and glutamine synthetase (GS) were isolated from glufosinate tolerant cotton. Kinetics of both PAT (the detoxifying enzyme) and GS (the target site enzyme) were thermally dependent from 15 to 45 C.