CROP SAFETY AND WEED CONTROL AS INFLUENCED BY GLYPHOSATE FORMULATIONS Frank E. Groves and Kenneth L. Smith University of Arkansas Southeast Research and Extension Center Monticello, AR

Abstract

With the addition of new glyphosate formulations questions have arisen concerning inferior weed control and potential injury to cotton. To address these concerns, greenhouse and field studies was conducted in 2002 to evaluate the efficacy and crop safety of various glyphosate formulations in a cotton production system.

A greenhouse study was conducted at the University of Arkansas Southeast Research and Extension Center located at Monticello. DP451B/RR was planted in 4-inch pots and a complete randomized block design was utilized with six replications. Glyphosate formulations included Roundup Ultra Max[®], Touchdown IQ[®], Glyphomax[®], and ClearOut 41Plus[®] at 0.75 and 1.5 lb ai/A. No surfactant was added to any treatment. Cotton (*Gossypium hirsutum*) was treated at the three to four-leaf stage with visual ratings for injury occurring at 3, 8, 16, and 21 days after treatment (DAT).

Although chlorosis was observed (5% or less) with the 0.75 lb ai/A treatments, there was no difference between glyphosate formulations. At the 1.5 lb ai/A rate ClearOut 41Plus[®] caused > 12% injury at 3 DAT. Injury diminished curvilinearly to < 5% at 21 DAT. All other formulations applied at 1.5 lb ai/A caused < 5% injury.

The field study was conducted at the University of Arkansas Southeast Research Station located at Rohwer, and DP451B/RR was planted on conventional 38-inch rows. Plots were 12.67 x 30 ft and arranged in a complete randomized block design. Cotton was grown under normal cultural practices and sprinkler irrigated as required. The plots were over-seeded with Palmer amaranth (*Amaranthus palmeri*), barnyardgrass (*Echinochloa crus-galli*), and pitted morningglory (*Ipomoea lacunosa*). Postemergence applications of Roundup Ultra Max[®], Roundup WeatherMax[®], Touchdown IQ[®], Glyphomax[®], and ClearOut 41Plus[®] were applied at a volume of 12 gallons per acre using water as a carrier and CO₂ as a propellant. Application timings included 10 and 20 days after emergence (DAE). Weed control was visually rated on a scale of 0 to 100 with zero representing no control.

A single application of ClearOut 41Plus[®] or Glyphomax[®] at 0.25 lb ai/A at 10 DAE improved control (>80%) over Roundup WeatherMax[®] and Touchdown IQ[®] on Palmer amaranth. Glyphosate formulations applied at 0.5 lb ai/A provided > 85% control of Palmer amaranth and < 80% control of barnyardgrass. When the rates were increased to 3.0 lb ai/A, each formulation offered > 98% control of both species. However, at the 3.0 lb ai/A rate ClearOut 41Plus[®] caused 5.8% injury which was greater than that produced by Roundup WeatherMax[®], Roundup Ultra Max[®] and Glyphomax[®].

At 20 DAE sequential applications of ClearOut 41Plus[®] at 0.25 lb ai/A offered > 90 and 80% control of Palmer amaranth and barnyardgrass, respectively. This was superior to the control provided by the other glyphosate formulations. Treatments at the 0.5 and 3.0 lb ai/A rates offered > 90% control of Palmer amaranth and > 95% control of barnyardgrass with no significant levels of injury.

Season long control of Palmer amaranth, barnyardgrass, and pitted morningglory was > 90%. No rate response to herbicide efficacy nor injury was observed.