

## **TOLERANCE AND WEED MANAGEMENT IN GYPHOSATE-TOLERANT ALFALFA.**

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### **ABSTRACT**

The development of transgenic crops such as Roundup Ready cotton, soybeans, and canola have allowed producers to manage a broad spectrum of weeds with glyphosate. The absence of tillage during the life of an alfalfa stand may allow the invasion of tough to control annual and perennial weeds, which can reduce the value and yield of the forage. To broaden the spectrum of weed control in alfalfa, research has been conducted to develop an alfalfa variety tolerant to glyphosate. The objectives of this experiment were: to determine crop safety and yield of glyphosate-tolerant alfalfa as affected by sequential glyphosate applications and to compare the efficacy of glyphosate in a glyphosate-tolerant alfalfa weed control system to a conventional alfalfa weed control system.

The tolerance experiment was located at the Texas Agricultural Experiment Station near Lubbock on an Acuff clay loam soil. The plots were 6.67 x 25 ft and were arranged in a randomized complete block design with a factorial arrangement. The test consisted of three replications. Benefin was applied at 2.0 lb ai/A preplant incorporated (PPI) was applied to the test area. Glyphosate application timings included: 0.75 lb ae/A at the 3-4 trifoliolate followed by (fb) 1.5 lb ae/A at 10, 50, or 90% regrowth after the first cutting fb 1.5 lb ae/A at all combinations of these same regrowth stages after subsequent cuttings. All herbicide applications were made at 10 GPA. Plots were harvested using a flail shredder on June 30, July 28, August 25, and October 9 in 2003. In 2004, herbicide applications were repeated in the same manner as 2003, with exception of the benefin application and the glyphosate application at the 3-4 trifoliolate. Six cuttings were made approximately 28 days apart, beginning on April 29, 2004.

The weed control experiment was located at the Texas Agricultural Experiment Station near Plainview on an Olton clay loam soil. The trial was a randomized complete block design that was replicated four times. Plots, 6.7 x 50 ft, were planted on April 4. The glyphosate-tolerant system consisted of: benefin at 2.0 lb ai/A PPI fb a glyphosate application at 1.5 lb ae/A at the 3-4 trifoliolate fb glyphosate at 1.5 lb ae/A postemergence (PT-2). The conventional system consisted of: benefin at 2.0 lb ai/A PPI fb an application of imazethapyr + COC + AMS at 0.063 lb ae/ A + 1.0 % V/V + 15 lb/100 gal at the 3-4 trifoliolate fb 2,4-DB + NIS at 0.50 lb ae/A + 0.25% V/V PT-2. Plots were harvested June 27, July 28, and August 26. In 2004, imazethapyr + COC + AMS at 0.063 lb ae/ A + 1.0 % V/V + 15 lb/100 gal and glyphosate at 1.5 lb ae/A were applied in mid May fb an application of Glyphosate, at 1.50 lb ae/A, and 2,4-DB + NIS at 0.50 lb ae/A + 0.25% V/V in early August. Plots were harvested approximately every 28 days, beginning on April 29, 2004.

In these trials, excellent tolerance was observed in glyphosate-tolerant alfalfa to sequential applications of glyphosate. Up to 5.25 lb ae/A of glyphosate was applied at various regrowth timings and no adverse affects on alfalfa yield were observed. Total alfalfa yield, in both years, from all treatments were not different from untreated plots. In the weed control experiment, no alfalfa injury was observed from any glyphosate application compared to applications made in a

conventional weed control system, in both seasons. In 2003, Alfalfa dry weight from the first cutting in the glyphosate-tolerant system (1563 lb/A) was greater than in the conventional system (1275 lb/A), but no differences were seen at any other cutting or when the season dry weight totals were compared. Weed dry weights were slightly higher in the glyphosate-tolerant system at each cutting, but season total dry weights were not different. Benefin applied PPI combined with two in-season glyphosate applications controlled all weeds. Weed dry weight season totals, in 2004, were greater in the conventional system (41 lbs/A) compared to that of the Glyphosate system (17 lbs/A), however there were no differences when season totals were compared. Alfalfa dry weights were similar season long, and no differences in yields were observed, regardless of treatment.