

GLYPHOSATE RESISTANT ALFALFA: THREE YEARS OF OBSERVATIONS. Jerry D. Doll, Sharie Fitzpatrick and Daniel J. Undersander, Extension Weed Scientist, Department of Agronomy, University of Wisconsin, Madison, WI; Director of Trait Integration, Forage Genetics Intl., West Salem, WI 54669; and Extension Forage Agronomist, Department of Agronomy, University of Wisconsin, Madison, WI 53706.

An alfalfa variety with the CP4 gene for glyphosate resistance was evaluated in a field trial for herbicide tolerance and weed control. The experimental variety was planted at 18 lb/a on Apr. 19, 2000 in a conventionally prepared seedbed at the University of Wisconsin Agricultural Research Station near Arlington, WI. Plots were 3 by 16 ft and all herbicides were applied in 15 gal/a of water with their appropriate adjuvant. All glyphosate applications included AMS at 2.5 lb/a.. Two rates of glyphosate were applied one, two or three times to direct seeded and companion seeded glyphosate resistant alfalfa. This variety and a conventional variety ('LegenDairy') also received standard postemergence treatments with sethoxydim, clethodim or imazethapyr. Visual ratings of weed control or pressure and alfalfa vigor and forage harvests were taken regularly to measure herbicide performance and glyphosate tolerance. First cutting harvest data is presented as this one has the most biomass and usually the highest proportion of weeds.

Weed control in the seeding year was as expected for glyphosate and the standard herbicides. Quackgrass was present in the fall of 2000 in the companion seeded treatments that received glyphosate and in all treatments of the conventional variety. No quackgrass was observed in the direct seeded glyphosate resistant variety in 2000 nor at any time in this system when glyphosate was applied in the fall of each year. In spring 2002, quackgrass pressure averaged 13% in the glyphosate resistant variety that received only conventional treatments following seeding; in the conventional variety, quackgrass pressure averaged 17%. Common dandelion appeared in the summer of 2001 and was present in all systems in the fall of that year. Glyphosate applied in October 2001 controlled all dandelions in the spring of 2002. Fall-applied glyphosate seems to offer excellent potential to maintain alfalfa free of common winter annual and perennial weeds and in-season applications would do the same with summer annual species.

The maximum quantity of glyphosate applied was 3.375 lb ae/a (1.125 lb in each of three applications). No injury was observed from this nor any other glyphosate treatment and alfalfa density after seeding and herbicide application was similar for all treatments. Yields for the first harvest were compared to the highest yielding treatment within each year and expressed as a percentage of that yield. The yield of direct seeded glyphosate resistant alfalfa treated three times with glyphosate averaged 89, 98 and 94% of the maximum yield in 2000, 2001 and 2002, respectively. The highest yielding treatment each year was always among these treatments. In 2001, first cutting yields of all treatments were similar, but in 2002 yields of the glyphosate resistant variety treated with glyphosate averaged 94% of the maximum versus 75% for all other systems with the same variety. The conventional variety that only received herbicides in the seeding year averaged 71% of the maximum first cutting yield in 2002. Alfalfa vigor was excellent for all treatments and both varieties in 2001 but in 2002, the glyphosate resistant variety was more vigorous than the conventional variety (average vigor rating over all treatments of 72% vs. 53%).

Glyphosate resistant alfalfa has excellent glyphosate tolerance and will allow complete and flexible weed management applications for nearly all weeds that appear after alfalfa establishment in any phase of the stand life. This technology may foster the adoption of no-till seeding methods to establish alfalfa and may enhance the use of temporary cover crops. Questions to be answered are whether this technology will increase the stand life alfalfa in the rotation, how often and when might glyphosate be used, the optimum rate to apply, and how the yield and feed value of varieties with the glyphosate resistance gene compare to commercial varieties.