

## GLYPHOSATE TOLERANT ALFALFA

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**Background.** Weed control is a common problem in crop production. Weed control in alfalfa is no exception. Weeds compete for sunlight, soil water, and plant nutrients, and lower the nutritive value of alfalfa hay. Weed-infested alfalfa hay spreads weed seeds to other farmsteads. Some weeds considered difficult to control in alfalfa include pigweed (*Amaranthus retroflexus*), dodder (*Cuscuta spp.*), barnyard grass (*Echinochloa crus-galli*), Dallisgrass (*Paspalum dilatatum*), buttercup (*Ranunculus spp.*), crabgrass (*Digitaria spp.*), chickweed (*Stellaria media*), henbit (*Lamium amplexicaule*), common bermudagrass (*Cynodon dactylon*), and curly dock (*Rumex crispus*). Pigweed, bermudagrass, and dock, in particular, have been difficult to control in studies on alfalfa production on Coastal Plain soils conducted by Texas Agricultural Experiment Station scientists at Overton in conjunction with farm and ranch stakeholders.

Monsanto Company and Forage Genetics International (FGI) combined their efforts to develop genetically modified alfalfa germplasm that is tolerant to glyphosate. This Roundup Ready<sup>®</sup> alfalfa tolerates glyphosate sprayed over the top at any stage of growth, including at emergence. This genetically enhanced glyphosate-tolerant alfalfa will provide growers with an effective means to manage difficult-to-control weeds in alfalfa.

**Research Findings.** Texas Agricultural Experiment Station scientists at Overton have evaluated several lines of Roundup Ready alfalfa. Treatments with glyphosate at 1.5 lb acid equivalent (ae)/acre effectively controlled any weeds that germinated in the alfalfa planting. Since glyphosate has no residual effect in the soil, additional weeds germinate and grow. Follow-up sequential treatments with the label rate of Roundup<sup>®</sup> at 1.5 lb ae/ac controlled any new weed growth. This technology, similar to that used in Roundup Ready corn, soybean, canola, and cotton, is proving effective in overcoming difficult-to-control weeds in alfalfa.

**Application.** In order for a genetically modified herbicide tolerant crop to reach the market, it must receive a determination of non-regulated status by the United States Department of Agriculture that oversees seed shipping and field-testing. In addition, the Food and Drug Administration evaluates the food and animal feed safety and the Environmental Protection Agency evaluates environmental and human health effects of the herbicide and establishes residue tolerances for food and feed crop commodities. For example, EPA has established a US tolerance level for glyphosate in alfalfa hay. According to Monsanto, residue data currently under review at EPA indicate that glyphosate residues in Roundup Ready alfalfa made into hay following the proposed maximum application rates, would not exceed the established tolerance.

Even though this genetically enhanced alfalfa is tolerant to applications of Roundup agricultural herbicides, it is easily killed in research studies by use of a tank mix of 2,4-D and Dicamba or 2,4-D and Banvel.

Roundup Ready alfalfa varieties are the same as any other alfalfa variety except that they are tolerant to proposed labeled rates of Roundup agricultural herbicides applied over-the-top of an actively growing crop. Extensive food and feed safety assessments have been completed for alfalfa varieties that contain the Roundup Ready trait. Before this technology is released, test results will undergo an extensive regulatory review.

Monsanto and FGI are developing Roundup Ready alfalfa jointly and upon regulatory clearance plan to make this trait available to growers in a wide variety of germplasm through license agreements with seed companies. Alfalfa varieties with fall dormancy rating from three to eight are expected to be available in the first releases of this Roundup Ready technology. Commercialization of this technology will occur in the United States only after Roundup Ready alfalfa has received the necessary approvals in the U.S. and Japan. Japan is the leading importer of U.S. produced and exported alfalfa. Commercial release of the first Roundup Ready alfalfa varieties is expected within one to two years. In order to grow Roundup Ready alfalfa, producers will be required to sign a technology license that includes a technology use guide and pay a fee for use of the technology. The price of Roundup Ready alfalfa is not determined at this time.

Analytical tools and procedures, similar to those for biotechnology traits in corn, soybeans, and other crops are being developed to detect the presence of the Roundup Ready trait in alfalfa, and will be available when Roundup Ready alfalfa is commercialized. Roundup Ready alfalfa seed will have a purple coating to reduce the likelihood of inadvertent mixing with seed of non-Roundup Ready alfalfa varieties. Additional information concerning the safety of genetically modified crops is available on the Internet website at [www.animalbiotechnology.org](http://www.animalbiotechnology.org), or directly from Monsanto Company. Roundup and Roundup Ready are registered trademarks of Monsanto Technology LLC.