

An Update on the Development of Roundup Ready Alfalfa

Mark McCaslin
Forage Genetics International

Product development

Roundup Ready ® alfalfa plants were first produced in late 1997. Early greenhouse proof of concept testing showed that these plants had excellent tolerance to Roundup ® herbicide,.. Field testing of Roundup Ready alfalfa began in 1999. Multiple year, multiple location experiments were used to identify alfalfa plants containing the Roundup Ready trait with excellent tolerance to Roundup and showing no impact on forage yield, forage quality or other agronomic traits.

The selected Roundup Ready alfalfa events were used in a series of modified backcrosses with elite and diverse breeding lines to produce Roundup Ready alfalfa populations with high trait purity (>90% of the population with the Roundup tolerance), and competitive agronomic performance (i.e. forage yield potential, multiple pest resistance, and forage quality). These elite populations range include fall dormancy groups 3-8. Populations with fall dormancy 9-10 are currently under development. In 2001 breeder seed of several Roundup Ready alfalfa experimental varieties was produced. Forage yield trials were established in Fall 2001 at several locations. A summary of first year performance in those trials is presented in the table below.

2002 Performance Summary of some typical 2001 RR Alfalfa Experimental Varieties

RR Exptl #	FD	% RR	Forage yield (% checks)*	# test locations
RR FD3	3.2	95.2	101.9	5
RR FD4	4.2	95.6	102.5	5
RR FD6	6.3	96.1	103.1	3
RR FD8	8.0	93.8	100.0	3

**% checks = DM T/A yield as a % of conventional check varieties in unsprayed tests*

Forage Genetics and Monsanto anticipate that Roundup Ready varieties, with performance competitive with the best local commercial standards, will be available for virtually all U.S. major alfalfa production areas at or near the time of completion of the Federal regulatory review for Roundup Ready alfalfa.

Cooperative product concept studies have been established to develop regional guidelines for best use of the technology in controlling weeds in alfalfa. University agronomists and weed scientists have been principle collaborators in these experiments. Several of these experiments also allow a comparison with alternative weed control treatments. Without exception, these tests have shown that compared to all alternatives, Roundup UltraMax ® use in Roundup Ready alfalfa offer the potential for more effective weed control with a unmatched crop safety.

Trait Stewardship

Forage Genetics and Monsanto are committed to commercialization of Roundup Ready alfalfa in a manner that is sensitive to potential disruption of existing markets. In addition to application for deregulation of Roundup Ready alfalfa in the U.S., application is being made for environmental release of RR alfalfa in Japan, Taiwan, South Korea, Mexico and Canada. These countries represent >95% of the U.S. alfalfa hay export. Regulatory approval in these countries will help insure that there is no disruption of the important alfalfa hay export industry in the U.S. Japan is by far the largest market for U.S. hay exporters. Monsanto and FGI have committed to coordinating U.S. commercial release of RR alfalfa with Japanese approval for environmental release. At this point we believe Japanese approval will be concurrent with U.S. deregulation. Application for environmental release will also be sought in Argentina, an important market for U.S. seed export.

Pollen Flow and Seed Quality

Experiments were conducted in 2000, 2001 and 2002 to assess alfalfa pollen flow with leafcutter bees, using the Roundup Ready trait as a genetic marker in field trials simulating commercial seed production. The 2000 and 2001 data has been summarized and is published on the Forage Genetics website (www.foragegenetics.com). In 2003 a similar experiment, performed in collaboration with UC Davis, will be conducted using honeybee pollinators in California. Forage Genetics will use the results from these pollen flow experiments to establish the isolation distance guidelines we will use to meet internal seed quality standards for trait purity (Roundup Ready alfalfa) and adventitious presence (non-Roundup Ready alfalfa).