

## IS THE MARKET READY FOR BIOTECH ALFALFA

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Genetic engineering has proven to be a valuable tool for crop improvement. This technology allows plant breeders to introduce desired traits not naturally found in their species, greatly expanding the potential for crop improvement. Growers around the world currently enjoy the broad range of production benefits related to transgenic varieties of corn, soybean, cotton and canola. Worldwide acreage of transgenic crops has been growing by approximately 15% per year. This year, in the U.S., over 105 million acres were planted to transgenic crop varieties that contain introduced genes for herbicide tolerance and/or insect resistance. Transgenic crops with increased nutritional content are currently under development.

Genetic engineering is now being applied to alfalfa. Transgenic traits of interest include those that improve efficiency of forage and/or seed production (i.e. input traits). Yield enhancement, herbicide tolerance, insect resistance and stress tolerance are examples of transgenic “input” traits that are now being investigated. Output traits are those that affect the quality of the crop product. Genetic engineering for key output traits in alfalfa, such as improved fiber digestibility and increased efficiency of protein utilization, will result in significant increases in milk and beef production from animals fed the transgenic forage. Both of these transgenic output traits are under development and have the potential to add hundreds of millions of dollars to the value of the annual U.S. alfalfa forage and seed crops.

Outside of Europe, market acceptance of transgenic crops has been excellent. Virtually every country in North America, South America and Asia grow and/or import transgenic crops. Products derived from U.S. grain, oil and fiber crops are exported world-wide. Channel management of these crops has effectively segregated biotech vs non-biotech products for specific international (or domestic) markets, when necessary. Approximately 90% of the alfalfa produced in the U.S. is consumed domestically, much of it consumed on the farm where it is produced. Over 98% of U.S. alfalfa hay/hay products exported is concentrated in five countries: Japan, South Korea, Taiwan, Canada and Mexico. Japan represents over 75% of all U.S. alfalfa hay/hay product exports. All five countries have a process for approving import of biotech crops and currently import products derived from U.S. produced biotech soybean, corn, canola and/or cotton.

Roundup Ready<sup>®</sup> alfalfa will likely be introduced in the U.S. in 2005. The transgene responsible for Roundup<sup>®</sup> tolerance was first introduced in soybeans in 1996, and has been commercialized in several other crops in many countries around the world. Since this will be the first transgenic trait commercialized in alfalfa, current strategies with

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Roundup Ready trait can be used as an illustrative example of management tools for export related issues with transgenic alfalfa.

Regulatory approval – Regulatory approval in key export markets is critical. Japanese approval for Roundup Ready alfalfa hay import is expected to be concurrent with U.S. Food and Feed approval. Approval in Canada, Mexico, South Korea and Taiwan is expected shortly thereafter.

Market channeling – Independent of regulatory approval, there will likely be some markets, both domestic and international, that will request or require “non-biotech” alfalfa hay. For example, some Japanese importers may initially require a process certifying “non biotech” alfalfa hay. (Note: In Japan a “non-biotech” food or feed product has less than 5% adventitious presence of a biotech trait). To assist in such situations, quick and easy-to-use protein-based test strips are being developed to detect the presence of the Roundup Ready gene in alfalfa hay and forage. Forage Genetics, Monsanto, scientists from the University of California and Washington State University and key alfalfa exporters are working to develop a sampling and testing system that can be used as part of a routine quality control process to insure efficient and effective channeling of biotech vs non-biotech hay for markets requiring “non-biotech” alfalfa hay/hay products.

Roundup Ready is the first of several biotech traits that may be incorporated into alfalfa. The stewardship strategies outlined above will be a model for commercializing other biotech traits. Many of these new potential traits will enhance forage quality, potentially adding significant value to the forage produced. Our survey of both domestic and international alfalfa hay consumers suggests very strong demand for new biotech alfalfa hay products that improve animal performance.

Alfalfa hay production acreage and the alfalfa seed production acres that support it, have been in gradual decline for the last decade. Biotechnology and the potential it offers to alfalfa improvement, is a critical factor keeping the crop competitive. Genetic engineering offers potential breakthroughs in improving the efficiency of alfalfa forage and seed production, and improving forage quality in ways not possible through conventional plant breeding. It is up to the larger alfalfa industry to work together to develop systems that allow U.S. alfalfa growers the benefits of new technology without jeopardizing foreign markets. Current efforts are adapted from successful models developed and adopted by U.S. corn, soybean and cotton stakeholders and their industries.

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