



Coexistence for Alfalfa Seed Export Markets

INTRODUCTION

The first genetically engineered (GE) trait in alfalfa, Roundup Ready®, was initially made available June, 2005, through March, 2007; plantings were subsequently suspended pending further regulatory review. Other GE traits for improved crop production and value are under development. It is important that the industry have mechanisms to maintain current production practices for specific markets which may reject or be sensitive to new GE traits, while allowing for the adoption of new technologies which are deemed to be safe, effective and economically valuable.

This National Alfalfa & Forage Alliance (NAFA) document addresses coexistence issues relevant to alfalfa seed exporters. Coexistence issues specific to alfalfa hay exporters and organic alfalfa seed and hay producers are addressed in companion documents.

ALFALFA SEED EXPORT MARKETS

USDA-FAS statistics report the value of the U.S. alfalfa seed export market averaged \$42.8 million dollars annually from 2003 to 2006. The quantity of exported seed ranged from 23.9 to 36.7 million pounds during the 2002 to 2006 period. When the quantity of coated seed is estimated and the coating weight is deducted from U.S. government statistics, the estimate of the quantity of raw seed exported is approximately 21 million pounds. Seed is exported to 63 countries. Mexico, Saudi Arabia, Argentina and Canada are the largest markets, accounting for over 75% of total U.S. alfalfa seed exports.

Non-dormant alfalfa varieties are adapted to geographies with very long growing seasons. Seed of non-dormant varieties make up greater than 80% of U.S. alfalfa seed export. Most of the non-dormant seed destined for export markets is produced in California. The California Crop Improvement Association estimates that 50% of the alfalfa seed produced in the state is exported out of the country (Larry Teuber, Director, California Crop Improvement Association, pers. comm.).

The Pacific Northwest (PNW) produces a small portion of the seed for the non-dormant export market and virtually all of the seed of the dormant variety (winterhardy germplasm) export market. About 60% of the U.S. alfalfa dormant variety seed export is to Canada.

Each country establishes its own policies and regulations with regard to the importation of seed. This includes rules specifically governing seed containing GE traits such as Roundup Ready alfalfa. While many countries have a science-based regulatory process for GE traits, similar to that in the U.S., some do not currently have a system for deregulating GE products (e.g., Saudi Arabia). Countries without a regulatory system currently do not accept the import of any GE variety seed.

In those countries with procedures in place to completely deregulate GE products, there are established mechanisms to remove legal barriers for import of GE seed. Roundup Ready alfalfa has been deregulated in Canada and Japan, and is currently in the deregulation process in Mexico and Argentina.

In countries where Roundup Ready alfalfa has not been deregulated, U.S. exporters may be required to provide written statements that their seed does not contain GE material. Prior to the deregulation of Roundup Ready alfalfa, the U.S. Federal Seed Lab was willing to provide U.S. alfalfa seed exporters with a GE declaration/warranty to accompany shipments; the Federal Seed Lab is no longer willing to provide this declaration. In the absence of international trading standards for GE seed, individual companies must determine their own policies, standards and procedures. Seed exporters bear the risks associated with actions that may be taken should the government of an importing country determine imported seed violates their policy. USDA FAS reports that producers across Germany were/are under threat to destroy about 3,700 acres (1,500 hectares) of sown rapeseed because, after planting, it was discovered that the seed contained trace amounts of an EU-unapproved biotech event (USDA FAS 2007). Prior to planting, the seed in question had tested negative for biotech content several times. This example underscores that the development and implementation of protocols to enable seed production for GE sensitive export markets is an essential, critical step towards coexistence.

The NAFA Best Management Practices for Roundup Ready Alfalfa Seed Production (BMP's for RRA Seed Production) are appropriate for conventional alfalfa seed grown for non-GE sensitive markets. Production of alfalfa seed for GE sensitive export markets requires additional precautions. A strategy to mitigate the risks of low level presence (LLP) of GE traits in alfalfa produced for GE sensitive export markets should be based on several principles pertaining to seed production including the following.

STRATEGY TO MITIGATE LLP OF GE TRAITS IN ALFALFA SEED PRODUCED FOR GE SENSITIVE EXPORT MARKETS

INDIVIDUAL SEED COMPANY ACTIVITIES

Verification of non-detectable GE trait(s) in seed stock used for export seed production. Protein-based detection kits are now commercially available from Strategic Diagnostics, Inc. and Envirologix Inc., and a testing protocol has been developed and validated by the manufacturers and others (Teuber et al., 2007). Third party commercial testing is available and widely used by the seed and grain industries today. Several state and private seed laboratories offer protein and/or DNA-based testing.

Classification of seed production based on end market risk. Seed production companies will need to identify the end market for specific lots of alfalfa seed in advance of production. If the seed is destined for export to a GE sensitive market it should be produced under more stringent isolation standards than seed being produced for non-GE sensitive markets. Seed companies and their producers will need to check with their local Seed Certification Authorities to determine the location(s) of planned GE seed production in their area prior to planting.

Higher standards for isolation of seed fields based on end market risk. Export seed producers who require GE free seed should consider using greater isolation from any other alfalfa field (e.g., greater than 900 ft, 1 mile or 3 miles when using leafcutter bees, alkali bees or honey bees for pollination, respectively).

Science-based, pollinator-specific pollen-mediated gene flow data are being collected to refine current isolation distances between GE alfalfa seed production and seed production for GE sensitive export markets. The basis for current isolation standards is discussed in a peer reviewed publication describing the biology of alfalfa and alfalfa production in the U.S.; a comprehensive overview of gene flow in alfalfa and procedures to mitigate gene flow (CAST, 2008).

Develop producer base and seed production areas designed for the production of value-added non-detect GE seed for GE sensitive markets. The NAFA BMP's for RRA Seed Production document recognizes the establishment of GE free seed production zones based on local seed producer consensus. The Imperial Valley of California produces more than 75% of the

California alfalfa seed export market, and is currently recognized by the industry as a de facto GE free alfalfa seed production zone.

Potential hay-to-seed pollen-mediated gene flow with honeybees has been examined (Teuber et al., 2007). Isolation of seed from flowering hay by 350 feet or more was adequate to reduce potential gene flow to non-detect levels.

Alfalfa seed production for GE sensitive export markets in the PNW is primarily pollinated by leafcutter bees. The production of non-detect GE seeds under leafcutter bee pollination will require almost six times the current NAFA best practice of a 900 feet isolation distance. Seed production in "de facto" GE free production areas that have a high density of conventional alfalfa seed production acres with multiple producers is one means of producing seed for GE sensitive markets. The companies producing GE alfalfa will respect any GE free alfalfa seed production zone designated as such by a consensus of local seed producers. Recognition and designation of such zones will be based on the requirements of each state. It is envisioned that the local state seed certification agency would play an active role in administering programs of this nature.

INDUSTRY ACTIVITIES

Commitment from all industry stakeholders and recognition of company/producer rights to produce to meet market specific standards for both GE and conventional varieties. NAFA is working to provide a forum and means to achieve coexistence. The current NAFA genetic supplier members are collaborating to provide leadership and direction in this area. Involvement and commitment of other industry stakeholders is essential. Industry input in drafting, adopting and implementation of NAFA BMP's for RRA Seed Production demonstrates the growing consensus that coexistence is an industry, rather than an individual company, concern and priority. It will be in the individual and collective best interests of companies to work with each other to ensure each company can produce seed of the required seed quality appropriate for various markets. This has been the basis for certified seed production since the early 1900's.

Communication between seed production companies to aid coordination of seed production planning. There are both formal (e.g., web-based seed field isolation "pinning" maps for sunflower seed production in California) and informal (e.g., sweet corn seed production in Idaho) examples of coordination between seed production companies successfully working today in other crops. A pinning map for alfalfa seed can be developed and serve as a useful tool in the overall coexistence strategy.

Industry/Association of Official Seed Certifying Agencies (AOSCA) collaboration for yearly monitoring of commercial seed production for LLP of GE traits to continue to provide for science based isolation distances. It would be highly desirable for the industry to collect data on LLP of GE traits. Testing of seed lots on a routine basis and pooling the data would be a real-world method of monitoring this issue. The data

could serve as a science based tool for making needed adjustments in isolation distances.

Process verification from seed certification officials indicating specific standards of production were met (process-based certification). The AOSCA now offers the Alfalfa Seed Stewardship Production Program, a voluntary, fee-based identity preserved program of process certification for the production of alfalfa seed destined for GE sensitive markets (2008). This identity preserved process certification includes the testing and third party verification of genetic origin and non-detect GE trait status of planting seedstock and observance of a minimum stated isolation distance from GE alfalfa seed production. The Idaho Crop Improvement Association (ICIA, 2008) manages a similar process-based certification for sweet corn seed produced for export markets. This certification has been widely embraced by both sweet corn seed producers and the export markets to which they sell. The alfalfa seed industry strongly encouraged the development and implementation of the new AOSCA identity preserved program which is well suited to serve the needs of the exporting GE sensitive alfalfa seed producers.

U.S. government assistance in export markets to mitigate risks associated with LLP. The industry encourages the assistance of the U.S. government to support U.S. alfalfa seed exports. Government to government communication to provide information and education regarding this issue would be useful. U.S. government involvement to encourage foreign governments to accept process based certification is encouraged. The U.S. alfalfa seed industry continues to strongly encourage national and international seed and governmental organizations to work toward the adoption of uniform low level presence (LLP) tolerance standards for GE traits that have been deregulated in one or more OECD countries. The adoption of uniform standards and official recognition of a process-based identity preserved seed production system would be of significant benefit to the U.S alfalfa seed industry. Strategies for production and global movement of seed for GE sensitive markets are well established for many crops. Scientific studies on gene flow in alfalfa and verified best management practices allow these basic principles to be applied to address GE and GE sensitive markets in alfalfa.

COEXISTENCE PRINCIPLES

Coexistence is not a new phenomenon in agriculture. For decades, it has been a requirement for many producers of crops, such as sweet corn and canola, in situations where neighboring crops may affect marketability of a specific quality trait. Scientific data and decades of experience in the seed and hay industries are the appropriate basis of coexistence and stewardship programs that are responsive to changing agricultural markets. Coexistence is based on good communication and mutual respect between neighbors and individuals who have adopted different approaches to agriculture. Furthermore, producers serving GE sensitive markets must understand contractual quality specifications and their ability to deliver those specifications to their customers (CropLife, 2006; SCIMAC, 2006; Sundstrom et al., 2003; Woodward, 2006). Likewise, the producer-licensees and

licensors of GE varieties must understand and observe GE variety stewardship requirements. Science and process-based principles, combined with the availability of tools for monitoring and communication, are the keys to producing alfalfa for diverse markets. The U.S. alfalfa seed export business is a well-developed industry that is amenable to addressing specialized contract requirements and has a proven history of successfully delivering quality products to an international customer base for decades.

MARKET TOLERANCES

In developing coexistence strategies, it must be acknowledged that commercial agricultural product purity is not absolute. Existing tolerances vary by customer preference. The Roundup Ready trait has been reviewed by the Food and Drug Administration (FDA) and has been found to be safe; that finding has not been disputed in the current regulatory review of Roundup Ready alfalfa. Thus, tolerances for low level presence should be considered in that context. Practical, acceptable low level tolerances for impurities such as variety off-types, weeds and inert materials have been established for many crop products and are managed within process-based strategies such as the Certified Seed (AOSCA, 2003) and the National Organic Program (NOP) (USDA, 2005a; USDA, 2005b). Tolerances of impurities for export alfalfa seed is primarily a question of market preference. Buyers and sellers determine the value of such seed in relationship to other quality classes of seed. To-date, there is no uniform tolerance established for low-level GE trait presence in conventionally grown crops (e.g., >5% and 0.9% GE in Japan and Europe respectively, must be labeled as such in food). GE trait sensitive markets are estimated to comprise less than 3-5% of the U.S. hay market and 30% of the U.S. seed market (Putnam, 2006), consisting primarily of export producers, and secondarily of organic producers. Tolerance for low level presence driven only by market preference is likely to differ between the two markets. The implementation and refinement of protocols to enable successful coexistence between diverse production systems, recognizing differing market tolerances, are critical steps to assure alfalfa quality that is adequate for all primary markets for the crop.

CONCLUSIONS

Methods of assuring export customers of the non-GE status of alfalfa seed destined for export are available using current methodology. These steps are neither extraordinary nor expensive. This process includes the elements of:

- Planting of non-GE foundation seed that has been tested prior to planting;
- Taking steps to ensure adequate isolation prior to planting;
- Application of an identity preserved protocol to assure lot identity and non-GE status;
- Use of AOSCA's Alfalfa Seed Stewardship Production Program for customer assurance of non-GE status.

Roundup Ready® and Roundup® are registered trademarks of Monsanto.

REFERENCES

AOSCA. 2003. Association of Official Seed Certifying Agencies (AOSCA) Operational Procedures, Crop Standards and Service Programs Publication. <http://www.aosca.org/2004%20Yellow%20Book,%20pdf.pdf> (verified March 5, 2008).

AOSCA. 2008. Association of Official Seed Certifying Agencies. <http://www.aosca.org>.

CAST. 2008. Council for Agricultural Science and Technology. Gene Flow in Alfalfa: Biology, Mitigation, and Potential Impact on Production. Special Publication 28. CAST, Ames, Iowa (in press).

CropLife. 2006. Cultivating Coexistence: A Best Management Practices Guide, pp. 4. http://www.croplife.ca/english/pdf/stewardship/CLCCoexistenceBMP_EN.pdf.

ICIA. 2008. Idaho Crop Improvement Association. <http://www.idahocrop.com>.

NAFA. 2008. National Alfalfa & Forage Alliance (NAFA), Best Management Practices for Roundup Ready Alfalfa Seed Production (January 22, 2008). <http://www.alfalfa.org/pdf/CSBMPForRRA.pdf>.

Putnam, D.H. 2006. Methods to Enable Coexistence of Diverse Production Systems Involving Genetically Engineered Alfalfa. Agricultural Biotechnology in California Publication 8193, University of California. <http://anrcatalog.ucdavis.edu/Alfalfa/8193.aspx>.

SCIMAC. 2006. Supply Chain Initiative on Modified Agricultural Crops. GM crop co-existence in perspective, 4 pp. http://www.scimac.org.uk/files/GM_crop_%20coexistence_perspective.pdf.

Sundstrom, F.J., J. Williams, A. Van Deynze, and K.J. Bradford. 2003. Identity Preservation of Agricultural Commodities. University of California Agriculture and Natural Resources. Publication 8077. <http://anrcatalog.ucdavis.edu/Biotechnology/8077.aspx>.

Teuber, L., S. Mueller, A. Van Deynze, S. Fitzpatrick, J. Hagler, and J. Arias. 2007. Seed-to-Seed and Hay-to-Seed Pollen Mediated Gene Flow in Alfalfa. Proceedings of the North Central Weed Science Society, Dec. 12-13, 2007, St. Louis, MO. <http://ncwss.org/>.

USDA. 2005a. The United States National Organic Program. <http://www.ams.usda.gov/nop/indexIE.htm>.

USDA. 2005b. The United States National Organic Program, Questions and Answers. <http://www.ams.usda.gov/nop/Q&A.html#Production/Handling>.

USDA FAS. 2007. Global Agriculture Information Network (GAIN) Report Number GM7042. Biotech Traces in German Rapeseed Seeds, July 9, 2007. <http://www.fas.usda.gov/gainfiles/200709/146292339.doc>.

Woodward, W.T.W. 2006. Roundup Ready Alfalfa Test Kits and Influence on the Marketplace. Washington State Hay Growers Association Annual Conference, Kennewick, WA. <http://www.wa-hay.org/Proceedings/>.

The National Alfalfa & Forage Alliance (NAFA) strongly supports the availability and continued use of biotechnology in agriculture. These advances will allow American farmers to effectively compete in the world market and will enable American farmers to supply abundant, safe, high quality food, fiber and renewable fuel desired by global consumers. NAFA acknowledges and respects different markets and methodologies of food, fiber and renewable fuel production. We believe that science based stewardship management practices allow for the coexistence of these different markets and methodologies in production agriculture. NAFA believes collaborative efforts among all stakeholders are required to develop methodologies that enable coexistence.

Thus, NAFA sponsored a national forum (2007) open to all alfalfa industry stakeholders to participate in the process of developing a coexistence plan. As a result of the forum, five documents have been created to guide a coexistence strategy for the alfalfa industry. Included among the five documents is a peer-reviewed publication describing the biology of alfalfa and alfalfa production in the U.S.; a comprehensive overview of gene flow in alfalfa and procedures to mitigate gene flow (CAST, 2008, in press). In 2008, NAFA adopted a document entitled, Best Management Practices for Roundup® Ready Alfalfa Seed Production (BMP's for RRA Seed Production). In acknowledgment of their commitment to the industry coexistence strategy, the three NAFA genetic suppliers formally adopted the BMP's for RRA Seed Production. In tandem, NAFA adopted three companion documents to address coexistence issues in each of the GE sensitive market sectors: hay export, seed export and organic alfalfa. Collectively, these five documents are essential tools toward enabling successful coexistence.

“Coexistence for Alfalfa Seed Export Markets”

Contributing Authors

Paul Frey, Cal/West Seeds, Woodland, CA
Mark McCaslin, Forage Genetics International, St. Paul, MN
Dave Miller, Pioneer Hi-Bred International, Arlington, WI

Coexistence Strategy Forum Steering Committee

Tom Braun, Midwest Forage Association, Reedsville, WI
Jim Cane, USDA-ARS, Logan Bee Lab, Logan, UT
Chuck Deatherage, CA Alfalfa Seed Prod. Research Brd., San Joaquin, CA
Paul Frey, Cal/West Seeds, Woodland, CA
Chep Gauntt, Washington Hay Growers Association, Kennewick, WA
Frederick Kirschenmann, Leopold Center for Sustainable Agric., Ames, IA
Mark McCaslin, Forage Genetics International, St. Paul, MN
Dave Miller, Pioneer Hi-Bred International, Arlington, WI
Dan Putnam, University of California, Davis, CA
Dan Undersander, University of Wisconsin, Madison, WI
Allen Van Deynze, University of California, Seed Biotechnology Ctr, Davis, CA
Mark Wagoner, Washington Alfalfa Seed Commission, Touchet, WA

Editor

Beth Nelson, President, National Alfalfa & Forage Alliance, St. Paul, MN

Published by NAFA

National Alfalfa & Forage Alliance
4630 Churchill St. #1 • St. Paul, MN 55126
www.alfalfa-forage.org