



Coexistence for Organic Alfalfa Seed & Hay Markets

INTRODUCTION

In January, 2011, the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) announced its decision to grant non-regulated status for alfalfa that has been genetically enhanced to be resistant to the herbicide commercially known as Roundup®. After conducting a thorough and transparent examination of alfalfa through a multi-alternative environmental impact statement (EIS) and several public comment opportunities, APHIS determined that Roundup Ready® alfalfa (RRA) is as safe as traditionally bred alfalfa (USDA, 2011). While USDA has made this determination, not all markets accept this technology. Thus, it is important that the industry have mechanisms to maintain production practices for specific markets which may reject or be sensitive to genetically enhanced (GE) traits, while allowing for the adoption of new technologies – this is termed coexistence.

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

ORGANIC ALFALFA MARKETS

Organic farming has become one of the fastest growing segments of U.S. agriculture. Some U.S. producers are turning to certified organic farming systems as a potential way to lower input costs, decrease reliance on nonrenewable resources, capture high-value markets and premium prices, and provide an end-product which is increasingly in demand. It is vital to develop mechanisms which allow the coexistence of conventional, GE, and organic agricultural systems, all of which have an equally valid role in the marketplace.

Organic milk production is one the fastest growing segments of organic agriculture in the U.S. Between 2000 and 2005, the number of certified organic milk cows on U.S. farms increased by an average of 25% each year, from 38,000 to more than 87,000 (USDA, 2007). Organic milk cows comprised about 1% of all U.S. milk cows in 2005. USDA estimates that organic milk's share of U.S. fluid milk sales increased from 2% in 2006 to 3% in 2008. Rapid growth in the sector has recently slowed, however, as a weaker U.S. economy dampened demand for organic food products (USDA/ERS, 2010).

Many organic dairy producers feed a ration that is heavily forage-based. Hay is often used to supplement feed from pasture. Statistics for present and future requirements are not well documented, however, Organic Valley Dairy, the largest organic dairy cooperative in the U.S., estimated that organic dairy producers needed approximately 450,000 tons of organic hay in 2006 (Seimon, 2007). Organic hay sold to dairies is predominantly pure alfalfa or alfalfa/grass mixtures. The need for organic hay will increase correspondingly with the anticipated growth in the organic dairy industry.

The most recent USDA organic crop statistics are from 2011 (USDA/ERS, 2011). In 2005, organic alfalfa hay and haylage made up approximately 1% of U.S. harvested alfalfa acres (215,320 acres). In 2011, this had grown to 423,011 acres, or 2% of U.S. harvested alfalfa acres. (USDA/ERS, 2011). In most years, organic alfalfa hay can attract a significant premium over conventionally grown hay.

In a report titled "Organic 2006: Consumer Attitudes and Behavior, Five Years Later & Into the Future," the Hartman Group (2006), a marketing research firm, found that one of the primary reasons consumers buy organic food is to avoid GE products. The USDA National Organic Program (NOP) (USDA/NOP, 2005a; USDA/NOP, 2005b) is a process-based certification program for organic producers that prohibits, among other things, the use of feed produced from GE varieties. Under current NOP guidelines, if a product tests positive for GE, a producer would not lose the right to sell that product as USDA Certified Organic, as long as their "Organic Systems Plan" approved by a NOP certifier has been followed (USDA, 2005b). Although the NOP Certification is process-based and does not guarantee a non-detectable level of GE adventitious presence, some organic dairies fear that consumers' trust in the USDA certification system might be in jeopardy if organic foods are found with even low levels of GE traits. Commercial release of GE alfalfa may lead many organic dairy producers to test organic hay for GE traits prior to feeding and if GE alfalfa is found in organic alfalfa it would greatly compound the organic feed shortage. "If farmers can't source adequate organic feed, they will not be able to produce organic milk," George Siemon, President of Organic Valley Dairies, said in a press release (Siemon, 2007).

KEY PRODUCTION ISSUES

The following broad areas must be addressed in order to facilitate the continued successful production of non-GE organic alfalfa.

- Non-GE foundation seed must be available to conventional variety seed producers who produce commercial generation planting seed for organic forage producers. This is a genetic purity issue.
- Non-GE, commercial planting seed must be available to organic forage and seed producers. There must be sufficiently segregated seed production areas, field isolation standards, and/or crop management guidelines that allow for the commercial production of commercial seed that meets non-detect/adventitious presence (AP) standards established by the organic industry. These are commercial seed production issues (*NAFA BMP for APS Seed Production*).
- There should be a set of best management practices for organic hay producers to properly manage risk of introduction of GE-traits into organic alfalfa hay production. These best practices need to be effective tools enabling organic producers to meet non-detect/low level presence (LLP) alfalfa hay standards established by the organic industry.
- There must be an effective dissemination of trait stewardship and information programs that advise and direct producer activities to ensure non-detect and certified organic commercial production of seed and hay. This is an industry-wide coexistence issue, which includes the development of strategies for the mitigation of undesirable gene flow between GE and organic alfalfa hay and seed production fields. This document is designed to provide this information.

STRATEGIES TO PRODUCE SEED AND HAY FOR GE SENSITIVE ORGANIC MARKETS

ACCESSING AND PRODUCING NON-GE ALFALFA SEED

Although NOP requires organic alfalfa forage producers to use organic alfalfa seed, it allows the use of conventional seed when an organic equivalent is not available. Every major alfalfa seed production area in the U.S. is plagued by *Lygus* spp. and other insect pests that routinely cause very significant damage to alfalfa seed production. Seed production of organic alfalfa seed in the major alfalfa seed production areas of the U.S. has not been economically feasible. There are potential alfalfa seed production areas in western Canada where insect pressure is significantly less, and where there is an ongoing effort to develop a sustainable organic alfalfa seed production industry. Until this happens, many organic alfalfa hay producers will likely rely on seed of modern multiple pest resistant conventional alfalfa varieties that meet organic seed quality and seed treatment standards.

The single most important step in producing non-GE organic hay or seed is to plant the seed or hay production field with a high quality, conventional seed

lot that has been tested for adventitious presence of GE traits, and planting only non-GE seed. To service organic hay producers, several U.S. seed companies currently segregate seed lots of conventional varieties (with organic seed treatments) that meet stringent non-detect/AP seed quality standards that are consistent with the guidelines currently established by the organic industry. There are also several independent laboratories that can provide third-party testing of planting seed for presence of GE-traits.

A primary concern of the organic community is a guaranteed long-term supply of alfalfa seed meeting non-detect/AP seed quality requirements established by their industry. Though the seed quality standards for organic alfalfa will likely evolve with time, the current non-GMO project standards are very consistent with the current alfalfa industry standards for GE-sensitive seed export markets. Virtually all U.S. industry alfalfa breeding programs have very rigorous quality control programs that protect genetic purity of seed stocks, and specifically monitor and control unintended presence of GE-traits in seed of conventional breeding lines and seed stocks. USDA has provided funding to the alfalfa curator of the National Plant Germplasm System (NPGS) to insure these same quality control programs are applied to protect the many thousands of alfalfa genetic stocks maintained by NPGS.

Organic alfalfa seed production and/or conventional seed destined for organic hay production will be AP-sensitive. *NAFA BMP for APS Seed Production* outlines procedures for mitigating risk of AP in the production of alfalfa destined for organic hay markets.

PRODUCING ORGANIC ALFALFA HAY

Unlike the vast majority of biotech crops grown today, the primary commodity for alfalfa is forage/hay (99.5% in U.S.), not seed. Since a seed generation is required for gene flow and mature seeds are rarely formed in hay production fields, there is very little opportunity for gene flow to or between alfalfa hay fields (Putnam, 2006). For gene flow to occur in a hay field a sequence of events must all occur: concurrent flowering between GE and conventional hay fields, pollen flow between the fields from local pollinators and then, a viable cross-pollinated seed must be produced, dehisced, germinated and successfully compete in an established alfalfa hay field. This series of events requires five to seven weeks after flowering depending on climate. As it is desirable to harvest hay fields prior to bloom to maintain hay quality, producers strive to harvest well before viable seed is established. Even in grazing situations, the chance of viable seed being produced from a neighboring field, pollinating, and then establishing is very low, due to the sequence of multiple events that must occur, each having a low probability (Putnam, 2006). Harvest of organic hay before the ripe seed stage eliminates potential pollen mediated gene flow from feral plants, neighboring GE alfalfa seed or GE alfalfa forage production fields. Mandatory harvest timing will likely be a common certification requirement for U.S. organic hay producers to effectively mediate potential gene flow from GE alfalfa.

In addition to NOP certification, some organic hay or seed customers may require GE trait testing to assure non-GE status of the organic alfalfa end product. Protein-based detection kits are commercially available (e.g., Strategic Diagnostics, Inc., 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.

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. 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 the organic market are primarily a question of market preference. Buyers and sellers determine the value of such seed and hay in relationship to other quality classes of seed and hay.

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 30-40% of the U.S. seed market (Putnam, 2006). Approximately 2% of alfalfa forage is currently produced organically (USDA/ERS, 2008). The implementation and refinement of protocols to enable successful coexistence between diverse production systems, recognizing differing market tolerances, are critical steps to assure alfalfa seed and hay quality that is adequate for all primary markets for the crop.

CONCLUSIONS

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

- Rigorous quality control in alfalfa breeding programs ensuring maintenance of AP-free breeding lines and seedstocks;
- Use of the NAFA BMP for APS Seed Production to facilitate alfalfa seed production that meets non-GE seed quality standards;
- Sowing of non-GE seed that has been tested prior to planting;
- Use of organic hay production best management practices that facilitate meeting non-GE hay requirements;
- Application of identity preserved protocols to assure lot identity and non-GE status.

NOP and seed certification systems are both well established, process-based programs that have delivered high quality products. Both systems tolerate low level thresholds for impurities that reflect market classes for pesticides, weed seeds, or varietal seed impurities allowing producers to coexist and meet the needs of organic markets.

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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. NAFA believes 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 2008, NAFA adopted a document entitled, *Best Management Practices for Roundup® Ready Alfalfa Seed Production (BMPs for RRA Seed Production)*. In acknowledgment of their commitment to the industry coexistence strategy, the three NAFA genetic suppliers formally adopted the BMPs 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. These documents are updated periodically.

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