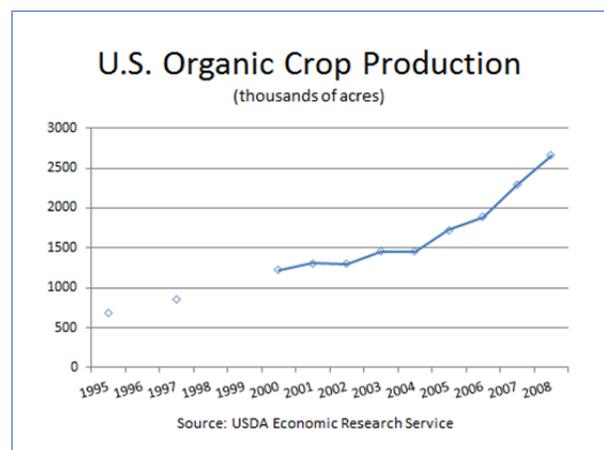
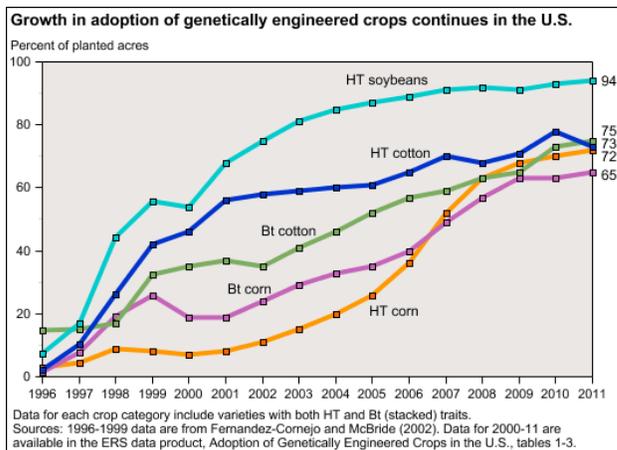


WHAT ARE THE KEY ELEMENTS TO IMPLEMENT COEXISTENCE BETWEEN GE AND NON-GE ALFALFA?

Mark McCaslin¹

In 2008 the USDA convened an advisory committee to examine coexistence issues. That committee defined coexistence as “the concurrent cultivation of conventional, organic and genetically engineered (GE) crops consistent with underlying consumer preference and choices”. A quick look at the recent history of U.S. crop production strongly supports the thesis that coexistence in American agriculture is alive and well. The first GE traits were introduced in the mid-1990’s in soybean, corn and cotton. During the next 10-15 years there was both rapid growth in U.S. crop acres planted to varieties containing GE traits and very significant increase in the acres of U.S. organic crop production. Grain exports also increased during this period. Coexistence between these various growers, markets and production systems is a testament to the long history of coexistence among related crops (e.g. white corn and field corn) and industry stewardship programs designed to facilitate such coexistence, to a careful crafting of process-based organic standards, and to an ongoing commitment from U.S. farmers to follow practices that respect their neighbors’, end-user and grower choice.



The National Alfalfa and Forage Alliance (NAFA) recently revised its document on best practices and strategies for coexistence², concisely capturing in this paragraph three key tenants of coexistence that have been widely embraced by all sectors of agriculture: “Alfalfa seed and hay growers benefit from a diversity of markets. Conventional, GE and organic seed and hay sold to domestic and export markets may require very different quality parameters, enforced by process, results-based certification and/or contracts between supplier and buyer. These provide a potential value-added opportunity to growers. Although it should be the right of every grower to choose the market he/she

¹ Mark McCaslin, CEO, Forage Genetics International, Minneapolis, MN. mccaslin@foragegenetics.com In: Proceedings, 2011 Western Alfalfa & Forage Symposium, Las Vegas, NV, 11–13 December, 2011. UC Cooperative Extension, Plant Sciences Department, University of California, Davis, CA 95616. (See <http://alfalfa.ucdavis.edu> for this and other alfalfa symposium Proceedings.)

² NAFA Coexistence documents can be found at <http://www.alfalfa.org/CSCoexistenceDocs.html>

produces for and the technology they employ in their production system, stewardship programs and required production practices may mandate minimum isolation standards to facilitate coexistence of these various products and markets.”

- 1) Multiple markets for agricultural products generally benefit farmers producing those products. These various markets may have independent quality parameters that merit added-value and those parameters will be market-based.
- 2) With reasonable mutual accommodation, growers should be able to choose what markets to produce for, and what production practices they employ.
- 3) Well-established stewardship programs and best practices are readily available to facilitate coexistence and maximize farmer choice.

MULTIPLE MARKETS FOR ALFALFA HAY AND SEED

Over 99% of the alfalfa acres harvested in the U.S. are harvested for forage, primarily as hay or haylage. About 99% of the forage acres harvested are fed on the farm or the forage is sold to domestic users. Nevertheless, there are hay export markets for some regions that are close to ports, offering a value-added opportunity for some alfalfa growers. Importantly, since there is negligible potential gene flow from one hay field to another (VanDenze et. al., 2008)³, even a hay grower producing for export (or organic) markets can virtually eliminate risk of adventitious presence of GE traits in conventional or organic hay by simply verifying that the planting seed was tested and had no detectable presence of the GE trait, and by cutting the hay/haylage before the ripe seed stage, approximately five weeks after first flower.

Approximately 25% of the alfalfa seed produced in the U.S. is exported. Generally the highest value seed is seed produced for the U.S. market, but seed export of non-dormant varieties has long been an important niche market for seed growers in California and other selected regions well adapted for non-dormant alfalfa seed production. NAFA Best Management Practices for Roundup Ready® alfalfa Seed Production and AP-Sensitive Seed Production⁴ are key tools in managing seed production to facilitate coexistence of GE and domestic and export conventional seed markets. Due to high insect pest pressure in key alfalfa seed production areas, there is no significant organic alfalfa seed production in the U.S.

GROWER CHOICE

There is currently complete grower choice in forage production. There is sufficient seed availability, meeting all market requirements, for forage growers producing conventional, organic or GE forage production for either domestic or export markets. The alfalfa seed industry appears committed to the continued availability of seed meeting applicable quality requirements for these various markets in the future.

³ Gene Flow in Alfalfa: Biology, Mitigation, & Potential Impact on Production (CAST, 2008)

⁴ AP-sensitive seed is seed produced for a market which is sensitive to low level adventitious presence (AP) of a GE trait. Certain export and organic seed markets may be AP-sensitive.

As part of their package of coexistence initiatives, NAFA has implemented a program where groups of alfalfa seed growers, who together offer a minimum number of acres with specific isolation requirements, can self-select as a seed production area for either GE or AP-sensitive alfalfa seed production. Such a program is a “bottom up” approach to configuring alfalfa seed production acres designed for specific markets. Rather than a top down mandated approach driven by government regulation or by the seed industry, this is a seed grower driven process reflecting a respect for grower choice and growers’ proven ability to discern medium/long term market opportunities and act in their own self-interest. As of November 1, 2011, NAFA has certified eleven alfalfa seed production grower opportunity zones.

ALFALFA STEWARDSHIP PROGRAMS

Only licensed growers can plant Roundup Ready alfalfa. The grower license obligates the Roundup Ready forage producer to specific terms and conditions on use of the technology, consistent with the achievement of key stewardship goals⁵. The forage grower must in all cases harvest Roundup Ready alfalfa forage prior to the green pod stage of maturity. Seed production is expressly prohibited. Forage growers producing in the proximity of alfalfa seed production are required to harvest forage at or before the 10% bloom stage to mitigate potential hay to seed pollen-mediated gene flow.

NAFA Best Management Practices for Roundup Ready Alfalfa Seed Production is the foundation for a network of stewardship programs designed to facilitate coexistence in alfalfa seed production for GE and conventional markets. This program requires that at planting time, there will be a minimum isolation distance between the new Roundup Ready alfalfa seed production field and the closest existing conventional alfalfa seed production field. The isolation distance required varies depending on the pollinator species used, and is based on pollen flow studies with these various pollinators summarized by Van Deynze, et. al. (2008). An expert committee of state crop improvement directors conducts an annual efficacy review of the NAFA Best Management Practices for Roundup Ready Alfalfa Seed Production, based on company testing for adventitious presence of the Roundup Ready alfalfa trait in conventional seed. This expert committee has consistently reported to the NAFA board of directors that the program appears to be effective and performing as designed.

In addition to NAFA Best Management Practices for Roundup Ready Alfalfa Seed Production, the industry has adopted other programs designed to facilitate appropriate isolation and segregation of GE and conventional alfalfa seed production, including:

- 1) Perhaps the most important of these is the NAFA-administered Grower Opportunity Zone (GOZ) program. In this program, groups of alfalfa seed growers, that together represent a minimum number of acres that meet specific

⁵ The Monsanto Technology Use Guide (<http://www.monsanto.com/SiteCollectionDocuments/Technology-Use-Guide.pdf>) describes the required stewardship practices for producing crops with seed containing Monsanto traits.

- isolation requirements, announce their intention to focus on either GE or AP-sensitive seed production. This allows seed companies to concentrate seed production of products with specific isolation requirements in clearly identified GOZs designed to meet those needs.
- 2) The American Organization of Seed Certifying Agencies (AOSCA) recently implemented an Alfalfa Seed Stewardship Program (ASSP), an identity preserved program for AP-sensitive alfalfa seed production. This program establishes a process-based certification program to be used as a tool in marketing conventional alfalfa seed to AP-sensitive export markets. Similar AOSCA identity-preserved seed production programs have been used to support marketing of U.S. produced sweet corn seed to global markets.
 - 3) The California Crop Improvement Association administers a “pinning map” on which seed companies pin the location of Roundup Ready alfalfa and ASSP seed production fields on a national online U.S. map, enabling seed companies to cluster seed production fields with similar seed quality requirements.

Collectively, these various stewardship programs are being used to successfully place and manage conventional and GE alfalfa seed production intended for various markets, each with specific seed quality needs.

CONCLUSIONS

Alfalfa has an exciting pipeline of GE traits that have the potential to add significant value for alfalfa forage producers. These include Reduced Lignin alfalfa, tolerance to abiotic stresses (e.g. drought, salt and cold), improved efficiency of protein utilization, and delayed flowering or senescence. GE traits, along with conventional and marker-assisted breeding are essential to keep alfalfa a competitive crop, attractive to both forage growers and end users. Maintaining alfalfa forage production as a key element of American agriculture is important in designing and maintaining sustainable animal production systems, and benefits the environment with reduced soil erosion and improved soil tilth.

For American farmers and consumers market choices are fundamental. We should not ask the question of which will or should survive, GE *or* organic, GE *or* export. Successful stewardship programs are enabling GE *and* organic *and* export markets to thrive for the mutual benefit of growers and consumers. Under the leadership of NAFA, alfalfa forage and seed growers and industry stakeholders have thoughtfully designed and effectively implemented stewardship programs that foster and enable coexistence in a way that honors and maintains grower choice.

NOTE ON THIS PUBLICATION:

*This article is published as a part of a panel discussion on Coexistence between Genetically-Engineered (GE) alfalfa and non-GE alfalfa held December 13, 2011 at Las Vegas, NV at the Western Alfalfa & Forage Conference. Each panelist was asked for their views on coexistence, guided by several specific questions. **Background:** As a general background, Roundup Ready alfalfa was first released in 2005, and subsequently*

the subject of a lawsuit which precluded further planting from 2007 through 2011, while USDA-APHIS conducted an Environmental Impact Study. A key component of both the lawsuit and the EIS was the question as to whether gene flow and contamination would harm non-GE growers. USDA-APHIS decided in 2010 that Roundup Ready alfalfa was safe for the environment and further plantings were authorized early in 2011. However, coexistence between divergent systems remains an important issue, particularly for organic growers, seed growers and companies, and exporters. Subsequent documentation and efforts to encourage coexistence and solve the issues between GE and non-GE production have been ongoing by farmers, companies, hay grower and seed groups, Universities, and government agencies.