Appendix R. Impacts on United States Trade of Deregulation of Glyphosate-Tolerant Alfalfa

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Impacts to United States Trade of Deregulation of Glyphosate-Tolerant Alfalfa

Executive Summary

U.S. exports of alfalfa hay and processed alfalfa are considerably concentrated in Japan, and U.S. exports of alfalfa seeds have largely gone to Saudi Arabia, although are less likely to do so in the future, given Saudi Arabia's recent policies aimed at reducing production of water-intensive crops. Japan and South Korea are the world's largest importers of forage and Saudi Arabia is the largest importer of alfalfa seed, after the United States.

Saudi Arabia would not import glyphosate-tolerant (GT) alfalfa seeds. Non-GT alfalfa seed exporters might face increased stewardship costs for access to GT sensitive markets, including testing, and could find themselves at an increased disadvantage in competing with alfalfa seed exporters from countries where GT alfalfa is not deregulated.

There is evidence that Japan could decrease its imports of non-GT alfalfa hay from the United States with GT alfalfa deregulation. This decline in imports would be motivated mainly by businesses concerned with negative reactions from consumers, even in the absence of labeling requirements for downstream dairy and meat products.

U.S. imports of alfalfa hay and seed come mostly from Canada. To the extent that GT alfalfa deregulation reduces foreign demand for U.S. exports, alfalfa hay and seed production previously destined to foreign markets could be channeled to the domestic market. As the domestic market for non-GT alfalfa hay and seed is expected to decrease with GT alfalfa deregulation, U.S. production is likely to substitute for imports.

1.0 Introduction

1.1 Scope of Report

This report analyzes impacts to United States trade of deregulation of GT alfalfa.

1.2 Methodology

Analysis of the potential impact of deregulation of GT alfalfa on U.S. trade was divided into its impact on U.S exports and its impacts on U.S. imports. Exports and imports of alfalfa seed, alfalfa hay, and processed alfalfa are examined. We also look at exports of downstream products such as dairy and meat.

On several occasions the analysis makes use of conclusions drawn from Technical Reports *Economic and Social Impacts on Conventional and Organic Farmers of Deregulation of Glyphosate-Tolerant Alfalfa* (appendix S), and *Downstream Effects to Organic Production and Marketing of Deregulation of Glyphosate-Tolerant Alfalfa* (appendix T).

Section 2 of this report analyzes exports and section 3 looks at imports. We explain our bibliographic search methods in appendix R-2 of this technical report. In appendix R-3, we present a few considerations of foreign trade implications with respect to the county-level analysis in appendix K-3.

1.2.1 Assumptions

The impact of GT alfalfa deregulation on international demand for U.S. exports stems from the availability of GT alfalfa in the U.S. market, potentially generating perceptions by foreign clients that U.S. exports of non-GT alfalfa and animal products produced from non-GT alfalfa-fed livestock could contain GT alfalfa. How this would affect demand depends on a) whether there is any GT sensitivity among foreign clients for U.S. alfalfa; and b) how clients react to potential unintended presence. There could be no impact on demand at all, or markets could distinguish between GT alfalfa and non-GT alfalfa, as well as between products made from animals fed with GT alfalfa and non-GT alfalfa, with different conditions for acceptance in each of these markets (market segmentation).

On the side of the U.S. supply for exports, the impact of GT alfalfa deregulation would depend on the capacity of U.S. producers to meet their clients' demands and whether this capacity comes at a higher cost than before.

Figure R-1 below illustrates the cause-effect links to be analyzed.

For:
1) Alfalfa seed
2) Alfalfa hay and processed alfalfa
3) Dairy, beef, livestock and pet care products

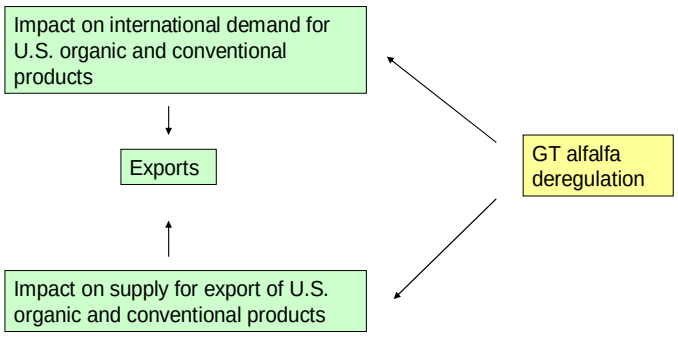

Figure R-1: Deregulation impact on exports.

Impacts on imports could occur if GT alfalfa deregulation increases or decreases the need of domestic markets for imports or the costs of domestic products competing with imports. This would affect U.S. demand for imported alfalfa and derived products. We illustrate this with figure R-2 below.

For:
1) Alfalfa seed
2) Alfalfa hay and processed alfalfa
3) Dairy, beef, livestock and pet care products

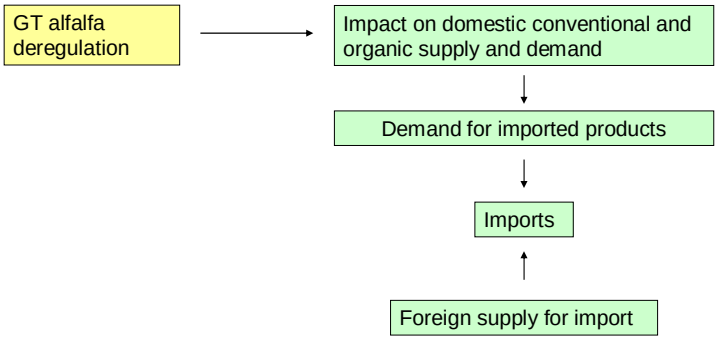

Figure R-2: Deregulation impact on imports.

1.2.2 Data and Information Sources

Most U.S. trade data were obtained from the United States Department of Agriculture's (USDA) Foreign Agriculture Service (FAS) that reports exports and imports since 1989 as classified under the U.S. 10-digit Harmonized System and compatible with the World Customs Organization's 6-digit Harmonized System. Trade data as reported by the U.S. Harmonized System do not identify organic products.

For trade data for other countries we made use of foreign government data sources or the United Nations' Commodity Trade Statistics Database (Comtrade).

Data were complemented with information obtained from articles, typically of an academic nature and peer reviewed whenever possible, under the assumption that these documents are subject to standards that should help reduce if not eliminate bias.

2.0 Impacts on Exports

2.1 Trends

2.1.1 Alfalfa Seed

Data on alfalfa seed exports are provided by USDA FAS through its U.S. Trade Internet System (FASonline). Saudi Arabia has been typically the largest export market of U.S. alfalfa seed with Mexico a distant second. However, exports to Saudi Arabia decreased by two thirds in 2009, falling below exports to Mexico, possibly reflecting a recent Saudi agricultural policy to phase out production of water-intensive crops (USDA FAS, 2009a). Exports to Mexico grew noticeably in 2008 and 2009. Table R-1 shows the size of the major export markets over a six-year period.

Table R-1. U.S. Exports of Alfalfa Seed, $1000

	2005	2006	2007	2008	2009
Mexico	9,955	10,018	9,578	15,163	16,013
Saudi Arabia	12,233	17,173	38,075	47,932	15,025
Canada	5,573	5,042	2,955	3,020	4,383
Argentina	6,792	5,521	5,062	4,253	4,270
Other*	15,017	7,387	10,379	11,344	11,876
Total	44,958	45,141	66,049	81,712	51,567

Source: USDA FAS (FASonline). Code 120921 of the US Harmonized Tariff System; *Includes Peru, Spain, and Romania, among others.

FASonline does not provide price data for the different export markets. However, by comparing quantities exported to the value of the export market, table R-2 shows value per metric ton of exported U.S. alfalfa seed. Saudi Arabia not only purchased the most U.S. alfalfa seeds from 2005 to 2009, it usually also paid the highest price.

Table R-2. U.S. Exports of Alfalfa Seed, $ value per Metric Ton

	2005	2006	2007	2008	2009
Saudi Arabia	3,393	3,919	4,852	4,231	5,150
Mexico	3,018	3,346	3,438	3,298	3,658
Argentina	3,080	3,573	3,769	4,848	3,599
Canada	2,874	3,829	3,963	4,681	5,116
Other	3,105	3,570	4,087	3,856	3,717
Total	3,122	3,668	4,328	4,007	4,114

Source: USDA FAS (FASonline). Code 120921, value of export / quantity of export.

2.1.2 Alfalfa Hay and Processed Alfalfa

Total U.S. exports of alfalfa hay grew considerably in 2002 and then again in 2008 and 2009, with the latter increase reflecting largely a growth in quantities exported.[1] Japan is by far the main destination of U.S. alfalfa hay exports, typically followed by South Korea, although exports to the United Arab Emirates passed those to South Korea in 2009. Japan's share of U.S. exports

[1] FASonline reports quantities traded of the "greatest number of like units of measure for grouped commodities."

fell in recent years but still accounts for 46 percent of the total. Table R-3 shows the growing value of U.S. alfalfa hay exports.

Table R-3. U.S. Exports of Alfalfa Hay, $1000

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Japan	77,527	66,705	114,749	120,994	136,193	125,663	120,791	115,888	134,686	164,513
United Arab Emirates	458	1,149	1,053	444	143	1,409	2,562	5,812	21,925	111,113
South Korea	17,915	18,437	22,590	21,888	19,974	19,979	25,318	31,778	37,528	36,611
China	208	97	99	63	12	41	82	451	4,394	18,356
Other*	7,771	9,439	15,078	14,959	15,211	17,995	16,439	17,320	16,648	23,481
Total	103,879	95,827	153,569	158,348	171,533	165,087	165,192	171,249	215,181	354,074

Source: USDA FAS (FASonline). Code 1214900010 of the U.S. Harmonized Tariff System; *Includes Taiwan, Canada and Mexico, among others.

Woodward (2006) notes that demand for imported alfalfa hay by Japan and South Korea, the two major export markets for U.S. alfalfa hay, has steadily increased. Milk production has remained stable in both countries and livestock production has declined, but there have also been declines in forage production. Japan saw a decrease in forage production of 17 percent between 1995 and 2004, and South Korea faced a decline of 53 percent over the same period, resulting in a steady demand for imported alfalfa hay.

The above numbers do not include hay processed into meal and pellets. The value of U.S. exports of meal and pellets, dehydrated or sun-cured, in cubes or other form, was in 2009 approximately $36 million. Exports of processed alfalfa increased about 8 percent between 2000 and 2009. However, during that time total processed alfalfa exports experienced year-to-year fluctuations ranging from a 34-percent decline (between 2000 and 2001) to a 27-percent increase (between 2002 and 2003), as illustrated in table R-4. These fluctuations can be attributed primarily to the variation in export volumes to Japan. Japan is the largest importer of U.S. processed alfalfa, with on average 85 percent of the U.S. export market over the past decade.

Table R-4. U.S. Exports of Processed Alfalfa, $1000

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Japan	26,685	20,328	25,666	32,085	26,233	24,735	20,734	23,170	28,306	27,764
South Korea	4,755	1,247	517	853	165	111	109	3,568	2,432	5,726
Taiwan	838	337	635	1,138	2,212	2,510	2,729	2,374	1,597	1,118
Other*	1,498	431	529	570	2,229	1,346	777	1,281	1,876	1,870
Total	33,776	22,343	27,347	34,646	30,839	28,702	24,349	30,393	34,211	36,478

Source: USDA FAS (FASonline). Code 121410 of the U.S. Harmonized Tariff System; *Includes China, Oman, and the United Arab Emirates, among others.

The United States' share of Japan's imports of alfalfa hay and cubes has been declining. In the ten years, 1995-2004, Japan's total forage imports increased by 18.5 percent, but U.S. forage exports to Japan only increased by 7.5 percent. While Canada's share of this market has remained stable, Australia's share grew 800 percent from 1995 to 2004 (Woodward, 2006). Table R-5 shows how Australia's exports grew significantly, from accounting for less than 3 percent of alfalfa hay and cubes imported by Japan to making Australia the second largest

supplier. During the same period, U.S. market share fell from over 81 percent to just over 70 percent.

Table R-5. Share of Japan Export Market for Alfalfa Hay and Cubes (%, by tonnage)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
USA	81.64	80.90	80.68	77.74	78.22	77.83	77.21	74.86	77.16	70.01
Australia	2.29	4.17	5.11	5.62	7.01	7.96	8.67	12.39	13.54	16.50
Canada	13.18	11.73	10.62	13.17	11.73	12.83	13.41	12.12	8.66	12.97
China	2.43	2.79	2.88	2.85	2.49	0.66	0.02	0.03	0.19	0.19

Source: Woodward, 2006

Most of the U.S. loss in market share is accounted for by hay. The U.S. share of Japan's alfalfa cube imports actually increased over the same period from 74 percent in 1995 to 87 percent in 2004. This gain in market share for alfalfa cubes is largely accounted for by a significant decline in Canadian alfalfa cube exports to Japan while Australian alfalfa cube exports fluctuated but without an increasing trend (Woodward, 2006).

2.1.3 Dairy, Beef, Livestock, and Pet Care Products

Exports of dairy, beef, livestock, and pet care products are downstream markets of alfalfa production. Particularly relevant is the dairy market, which consumes a major share of alfalfa hay produced in the United States and has seen foreign markets become increasingly important for U.S. dairy producers, with 9.5 percent of all U.S. dairy production in 2007 exported (USDEC, 2008). The export value of dairy products grew by 158 percent from 2000 to 2009. A large part of this increase in exports went to Mexico, which remains the largest importer of U.S. dairy products. The U.S. Dairy Export Council predicts these increases to continue as further tariffs are lifted under the North American Free Trade Agreement. Table R-6 shows U.S. dairy product exports to the top importing nations. A depressed world market in 2009 led to an excess supply of dairy products and decreased price competitiveness of U.S. products (USDA ERS 2009a).

Table R-6. U.S. Dairy Product Exports, $1000

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Mexico	149,397	218,488	179,124	226,786	313,283	392,470	379,471	731,374	822,568	583,368
Canada	109,923	109,034	99,641	101,449	148,463	138,185	133,806	203,341	232,046	198,509
Philipp.	24,237	29,611	23,914	31,018	59,153	56,740	86,431	135,506	204,904	75,302
Japan	151,079	116,868	75,137	64,951	79,872	105,574	103,164	125,347	200,550	135,876
Other*	312,542	330,513	287,696	307,763	557,779	600,720	788,232	1,279,625	1,821,146	936,334
Total	747,178	804,514	665,512	731,967	1,158,550	1,293,689	1,491,104	2,475,193	3,281,214	1,929,389

Source: USDA FAS (FASonline). Code 04 of the U.S. Harmonized Tariff System; *Includes China and Indonesia, among others.

Similarly to foreign dairy markets, U.S. exports of meat and edible offal also grew considerably between 2000 and 2009 with a small reduction, however in 2009 (table R-7).

Table R-7. U.S. Meat and Edible Offal Exports, $1000

	2002	2003	2004	2005	2006	2007	2008	2009
Mexico	1,065,423	1,190,968	1,215,429	1,520,551	1,772,591	1,707,454	2,099,541	1,966,479
Japan	1,851,960	2,129,149	997,052	1,116,641	1,120,258	1,409,774	1,939,507	2,007,317
Canada	547,196	589,440	528,098	659,988	902,873	1,169,748	1,317,138	1,218,492
Other*	2,367,999	2,779,774	1,966,944	2,725,645	2,749,941	4,045,218	6,301,891	5,361,269
Total	5,832,578	6,689,331	4,707,523	6,022,825	6,545,663	8,332,194	11,658,077	10,553,557

Source: USDA FAS (FASonline). Code 02 of the U.S. Harmonized Tariff System; *Includes China and the Russian Federation, among others.

Exports of U.S. live animals have fluctuated between 2000 and 2009 with its lowest values in the years 2003 and 2004. In 2009 exports were slightly less than exports in 2000. Table R-8 shows U.S. exports of live animals over a 10-year period.

Table R-8. U.S. Live Animal Exports, $1000

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Canada	250,247	223,359	118,416	92,665	70,633	76,317	98,056	116,072	123,482	116,523
UK	76,935	97,607	70,132	70,845	60,902	150,776	147,983	109,406	88,063	119,996
Mexico	121,561	144,996	140,992	69,365	65,853	67,924	64,367	91,645	126,981	88,424
Japan	87,528	88,082	54,862	73,604	66,567	71,277	89,767	79,963	45,020	44,991
Other*	323,039	335,257	251,874	279,309	240,222	278,421	344,948	322,716	442,166	415,082
Total	859,310	889,301	636,276	585,788	504,177	644,715	745,121	719,802	825,712	785,016

Source: USDA FAS (FASonline). Code 01 of the U.S. Harmonized Tariff System; *Includes China and United Arab Emirates, among others.

2.1.4 Exports of Organic Products

As explained in section 1.2.2, trade data as reported by the U.S. Harmonized System do not identify organic products. The United States is by far a net importer of organic products. Exports are estimated by the Organic Trade Association to be over $300 million or 1 percent to 2 percent of organic production, and growing at a 5 percent annual rate (USDA FAS 2008c). Exports include soybeans, food ingredients, fruit juices, frozen vegetables, and dried fruit. Major exports markets include Canada and Japan, followed by other Asian countries and Europe. Canada's market is valued between $75 million and $100 million (USDA FAS 2008c).

2.2 Impacts of GT Alfalfa Deregulation

There is considerable heterogeneity among countries on regulations pertaining to genetically engineered (GE) food and feed (Gruère, 2006). While most countries lack any regulations at all, the main U.S. markets for alfalfa and downstream products do have regulations. These regulations involve food safety approval processes, labeling, or both.

Of all regions, the European Union has arguably the most stringent regulations. GE food and feed must be approved for safety. Once approved, labeling is required even if there are no detectable GE traits in the final product, as long as GE products were intentionally used in the production process. For foods and feed where no GE products were intended, a traceability process must be implemented throughout the chain whenever potential GE content exists and labeling is required for any presence of GE content above 0.9 percent of total content. Both

traceability and labeling imply considerable costs to producers (Gruère, 2006; Gruère and Rao, 2007). Animal products such as meat, dairy and eggs, however, are exempt of such labeling and traceability requirements.

Japan, Saudi Arabia, and South Korea, main alfalfa export markets, all have approval processes for GE products and labeling requirements.

2.2.1 Standards in Main Export Markets

For alfalfa seed, the most important export market in the recent past has been Saudi Arabia. Although the country allows imports of labeled GE variety grains and plant/vegetable processed foodstuffs, imports of GE variety seeds have been banned since 2004 (USDA FAS 2007a). Imports of alfalfa seeds by Saudi Arabia fell considerably in 2009 and could reflect a long-term trend, given Saudi's recent attempts to reduce production of water-intensive crops (USDA FAS 2009a). Other important export markets for seed are Mexico, Canada, and Argentina. Mexico's biosafety law requires genetically modified (GM) seed to go through experimental and pilot phases before it is allowed to be used in commercial planting. Currently, Mexico has not approved GM seed for commercial planting, including GT alfalfa, even though Monsanto's J101 and J163 Alfalfa have been approved for food and feed consumption. Mexico's legislation requires GM seed for planting to be labeled as such (USDA FAS 2010a). Canada has approved GT alfalfa seed, but commercial use would require registration, and there are currently no registered GT alfalfa seed varieties in Canada. The GT alfalfa approval process is still under way in Argentina.

Unintended presence of GE content in exports of non-GT alfalfa seeds would still be limited by existing standards of seed purity (and by consumer preferences, discussed further below). The Organization for Economic Cooperation and Development (OECD) has developed seed schemes to facilitate international seed trade by establishing rules and requirements for varietal certification of seeds (ASTA, 2004). These schemes establish standards for production and levels of varietal purity that are typically not prescribed by OECD standards, but inferred from the quality checks of the production process (ASTA, 2004). Assessments of varietal purity are traditionally based on phenotypic characteristics but testing is increasingly required. As in the United States, certified conventional seed varieties often require less than 1 percent presence of biotech traits. Strip tests for protein can detect much lower levels of presence of biotech traits (e.g., 0.1%) and are relatively inexpensive.

Japan is the main export destination for alfalfa hay grown in the United States. The approval of GE foods in Japan is the responsibility of the Japanese Ministry of Health, Labor, and Welfare (MHLW). MHLW has zero tolerance for unapproved GE foods and conducts inspection and testing of cargoes arriving in Japan, inspecting up to 50 percent of all cargoes (Grueré, 2006). Monsanto's J101 and J163 have completed MHLW's approval process (MHLW, 2008). Labeling is mandatory for all GE foods as long as GE content can be detected, the GE ingredient is one of the first three ingredients of a product, and accounts for more than 5 percent of the total weight (Grueré, 2006).

Approval of GE feed in Japan is the responsibility of the Ministry of Agriculture, Fisheries, and Forestry. In cases where a GE product has not yet been approved for use in Japan, a 1 percent

threshold for presence of GE content in feed is allowed as long as the GE product has been approved by the exporting country and the exporting country is considered to have safety assessments equivalent to Japan's (Grueré, 2006). Because Monsanto's J101 and J163 are approved for use as feed in Japan, there are no restrictions on its sale.

South Korea has separate approval processes for GE food and feed: the South Korean Ministry for Food, Agriculture, Forestry and Fisheries regulates labeling for unprocessed GE products and provides approval for GE crops, while the South Korean Food and Drug Administration regulates food safety and labeling of processed foods. As of July 2009, South Korea had approved 57 biotech products for food and 48 for feed, including Monsanto's J101 and J163 Alfalfa (USDA FAS 2009b). Labeling in South Korea is mandatory for unprocessed GE food and for unprocessed non-GE food containing more than 3 percent of GE content. In the case of processed foods, labeling is required if the GE ingredient is among the top five and is detectable in the final product. Processed food with nondetectable levels of GE content, such as dairy, meat, and vegetable oils does not require labeling. GE animal feed must be labeled, but up to a 3-percent adventitious presence of GE components is tolerated in unprocessed non-GE products (USDA FAS 2009b).

Taiwan currently only regulates imports of GE corn and soybeans and their products, but in October of 2009 announced its intention to extend regulation to all other GE crops (USDA FAS 2009d). Approval is required for imports of GE corn and soybeans for food, feed, or processing. Taiwan requires labeling for food containing more than 5 percent GE content (USDA FAS 2009c).

Mexico, the main downstream export market for dairy, seems to have no significant trade barriers to foods derived from biotechnology. GT alfalfa has been approved for food and feed and Mexico imports and consumes regularly GE corn, soybeans, and cotton from the United States (USDA FAS 2008b). Mexico does not require labeling for GE content in packaged food and feed, although labeling is required for GE seed (USDA FAS 2010a). In the case of Canada, another important market for alfalfa downstream products from the United States, GT alfalfa has also been approved. There is no mandatory labeling for GE products (Gruère, 2006). Canadian standards for voluntary labeling requires the level of adventitious presence of GE content in non-GE food to be less than 5 percent. The standard is not applicable to feed (USDA FAS 2010b). Regarding organic standards, the United States has an equivalence agreement with Canada, the main importer of U.S. organic products, recognizing the national organic standards of each country as equivalent, and allowing (National Organic Program) NOP certified products to be sold as organic in Canada. An export arrangement allows U.S. organic products to be sold as organic in Japan, the second largest foreign market for U.S. organic products, conditional to specific requirements.

2.2.2 Beyond Standards in Main Export Markets

The acceptable levels of unintended presence of GE content in conventional seeds are typically determined by the market and the seed industry has typically adopted self-governing processes to meet such market demands. In a scenario of GT alfalfa deregulation, each export market would gradually determine what levels of unintended presence of GE content are acceptable in

conventional alfalfa seeds. Private contracts can require much lower levels than those resulting from standards such the OECD seed schemes, even zero.

As in the case of Europe, mandatory labeling requirements for food in Japan have resulted in an incentive for producers to substitute non-GE ingredients for GE ingredients (Gruère and Rao, 2007). Because of the higher threshold of GE content and exemptions of highly processed foods, there are still many products with GE ingredients that are sold in Japan without GE labeling, such as cheese, soy sauce and soy oil (Gruère and Rao, 2007). Corn used for feed is typically GE corn, since meat fed with GE corn does not need to be labeled. Corn used for food consumption and soybeans used for Tofu, on the other hand, are typically GE free (Grueré, 2006).

Because alfalfa hay is predominantly used as feed, the impacts of deregulation associated with the export market in Japan could be similar to those of soybean and corn. Japanese regulations do not seem to have had a significant impact on these crops and labeling is not required for products from GE fed animals, at least not for meat (Grueré, 2006). However, for retail products where labeling is not required, there could still be a share of consumers that would prefer not to consume products with GM ingredients. Several consumer surveys suggest Japanese consumers would prefer not to consume foods with GE ingredients and would be willing to pay an extra amount for GE-free products (Chern et al., 2002; Bertolini et al., 2003). In these cases, it is up to producers to decide whether using GE ingredients – or GE feed in animal products – poses a risk to businesses.

There is evidence that businesses have often chosen to protect themselves against market risks associated with commercializing GE products, in face of consumer negative perceptions, even in the absence of labeling, at least in countries other than the United States. A USDA (2005) document notes how business associations have sometimes adopted lower required levels of unintended presence for acceptance of products than those required by legislation (United Kingdom). The same document notes that some insurance companies have added exclusions to insurance contracts to protect themselves from potential losses triggered by the presence of GE content.

There is some indication that Japanese alfalfa importers are concerned with importing GE alfalfa. Putnam (2005) states that foreign importers have asked for GE-free alfalfa and that this has lead U.S. exporters to require signed contracts from producers asserting the GE-free status of alfalfa sold to them. Similar anecdotal evidence is provided by Woodward (2004) and recognized in NAFA (2008b).

The attitude of businesses in the absence of required labeling in retail products can be explained by the perception of market risks associated with GE products, given consumer negative perceptions. The extent to which this attitude of businesses changes with time could depend on consumer information as well as on perceived and real liabilities in cases of losses due to the presence of GE content.

In the case of South Korea, Non-Government Organizations have increasingly pressured for expansion of labeling requirements to products using GE ingredients, independently of whether

these can or cannot be detected in the final product (USDA FAS 2008a). USDA FAS (2008a) notes that labeling of feed does not seem to have an impact in the market because most feed is GE, but that an expansion of food labeling requirements to include use of GE ingredients even when not detectable could turn South Korea into a non-GE market. As in the case of Japan, there is evidence of consumer negative views of GE products (Cho Undated and USDA FAS 2008a). South Korean businesses, however, have been opposing expansion of GE labeling given the potential increase in their costs from buying non-GE products.

2.2.3 U.S. Alfalfa Supply for Export Markets

Somewhere between 1.1 percent and 1.5 percent of U.S. alfalfa hay production was exported in 2007 (in metric tons, calculated comparing USDA FAS export data with production data as reported by USDA ERS [2007]). An exact number is not easy to achieve because exports are reported in hay, meal and pellets and weights must be compared to production alfalfa hay production. In 2007, exports of alfalfa seed represented approximately 54 percent of the quantity produced (in metric tons, calculated comparing USDA FAS export data with 2007 Census of Agriculture data).

Various documents suggest a concentration of alfalfa hay and seed for exports in Western states. Woodward (2004) suggests 99 percent of hay exports come from Western states. Putnam (2005) suggests about 4.5 percent of alfalfa from six Western states (California, Washington, Oregon, Idaho, Nevada, Utah) is exported. Woodward (2004) notes some 20 percent of Washington alfalfa could be exported reaching 35-50 percent in the Columbia Basin where the counties of Grant, Adams, Benton and Franklin produce almost 70 percent of the state's alfalfa hay. Putnam (2005) also suggests California's Imperial Valley production is highly aimed at export markets. Mueller (2005) estimates that about 80 percent of California alfalfa seed production goes for export. In all of these export-heavy regions, growers do not necessarily export their entire crop but possibly only a few cuttings (Putnam, 2005). This means that export markets could have a greater influence on production decisions than their share of the market.

As previously noted, access to seed export markets sensitive to the presence of GE content could depend on industry led self-governing processes to meet such market demands. The National Alfalfa & Forage Alliance (NAFA) has recommended measures to be taken by the seed industry to enable coexistence of GT alfalfa and non-GT alfalfa seed production for access to sensitive export markets (NAFA 2008a) as well as for coexistence of GT alfalfa and non-GT alfalfa hay production for access to sensitive export markets (NAFA 2008b).

2.2.4 Discussion

The main U.S. client for alfalfa seed, Saudi Arabia, would currently not purchase GT alfalfa seeds. Whether Saudi Arabia would continue purchasing non-GT alfalfa seeds from the United States would likely depend on the extent to which non-GT alfalfa seed producers are able to avoid unintended presence of GT alfalfa traits. Saudi Arabia, however, could be gradually reducing their imports of alfalfa seeds due to internal policies stimulating the growth of less water intensive crops. In other important export markets (Mexico, Canada, Argentina) GT alfalfa seed may not currently be planted due to lack of approval (Mexico, Argentina) or registration (Canada). Non-GT alfalfa seed exporters could face increased stewardship costs for

access to GT sensitive markets, including testing, and could find themselves in a position of increased disadvantage in competing with alfalfa seed exporters from countries where GT alfalfa is not deregulated.

U.S. sales of alfalfa for forage to Japan could decrease with GT alfalfa deregulation. There is evidence of precautionary resistance from Japanese importers for GT alfalfa and the United States has already been losing market share to competitors (Australia). Exporters could have to show that any unintended presence of GT traits would fall well below Japan's one percent threshold level for presence of GM feed.

Beyond the above, there is much uncertainty surrounding the future or trade of GM products. In our Technical Report *Downstream Effects to Organic Production and Marketing of Deregulation of Glyphosate-Tolerant Alfalfa* (appendix T), we present evidence that there is little information in Europe, Japan, United States, or other countries regarding GE products. To the extent that familiarity is related to acceptance (or rejection) of GE products, there is space for consumer receptivity to change or consolidate over time. Many countries do not have or must still implement their own regulatory systems for GE products (Gruère and Rao, 2007) and the analysis above is focused mostly on U.S. main trading partners.

2.3 Summary of Findings

U.S. exports of alfalfa hay and processed alfalfa are considerably concentrated in Japan, and U.S. exports of alfalfa seeds have increasingly gone to Saudi Arabia, although could be less likely to do so in the future. Japan and South Korea are the world's largest importers of forage and Saudi Arabia is the largest importer of alfalfa seed, after the United States.

Saudi Arabia currently does not import GT alfalfa seeds. Non-GT alfalfa seed exporters could face increased stewardship costs for access to GT sensitive markets, including testing, and could find themselves in increased disadvantage in competing with alfalfa seed exporters from countries where GT alfalfa is not deregulated.

There is evidence that Japan could decrease its imports of non-GT alfalfa hay from the United States with GT alfalfa deregulation. This seems to be motivated mainly by businesses concerned with negative reactions from consumers, even in the absence of labeling requirements in downstream dairy and meat products.

3.0 Impacts on Imports

3.1 Trends

3.1.1 Alfalfa Seed

Alfalfa seed imports by the United States have been growing since 2002, with some larger fluctuations in the last couple of years (table R-9). In 2009, the value of US. alfalfa seed imports was approximately $33.4 million.

Table R-9. U.S. Alfalfa Seed Imports, $ millions

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
11.8	12.7	10.9	13.4	16	18	25	36.4	56.1	33.4

Source: USDA FAS (FASonline). Code 120921 of the US Harmonized Tariff System. Includes certified and uncertified seeds.

Re-exports (imports that are subsequently resold to foreign markets) are relatively small but fluctuate considerably; for example, from $2,582,000 in 2008 to $173,000 in 2009 (FASonline).

Alfalfa seed imports are mostly from Canada and some are from Australia (table R-10). Most alfalfa seed imports are non-certified.

Table R-10. U.S. Alfalfa Seed Imports by Main Suppliers, $ millions

	2005	2006	2007	2008	2009
Canada	10,489	17,794	29,669	34,622	30,170
Australia	7,228	6,914	5,954	18,546	2,633
Others*	251	228	740	2,911	549
Total	17,968	24,936	36,363	56,079	33,352

Source: USDA FAS (FASonline). Code 120921 of the US Harmonized Tariff System. Includes certified and uncertified seeds. *Includes Greece, Italy, and Mexico, among others.

According to Revision 1 of the 2010 U.S. Harmonized Tariff Schedule, alfalfa seed imports from Canada, Australia and several other countries are free from the 1.5 cents per Kg normal import tariff.

3.1.2 Alfalfa Hay and Processed Alfalfa

Imports of alfalfa hay were approximately $3.8 million in 2009. Alfalfa hay imports increased steadily up to 2007, spiked in 2008, and sharply decreased the following year, likely following fluctuations in U.S. dairy markets and hay supply. The United States typically receives the vast majority of its alfalfa hay imports from Canada (table R-11). Most of the remaining imports are from Mexico.

Table R-11. U.S. Alfalfa Imports (Hay Bales), $1,000

	2005	2006	2007	2008	2009
Canada	2,376	3,471	5,493	7,371	3,735
Mexico	5	75	1,298	8,696	110
Others*	49	67	9	12	3
Total	2,430	3,613	6,800	16,079	3,848

Source: USDA FAS (FASonline). Code 1214900010 of the U.S. Harmonized Tariff System. *Includes Denmark, Argentina, New Zealand and Japan, among others.

Imports of processed alfalfa were approximately $11 million in 2009 after a 2007 peak of $16 million. Almost all U.S. processed alfalfa imports come from Canada (table R-12).

Table R-12. U.S. Processed Alfalfa Imports, $1,000

	2005	2006	2007	2008	2009
Canada	9,163	8,474	14,628	11,697	9,826
Mexico	0	1,257	1,379	1,819	1,162
France	191	1,696	336	216	252
Others*	18	704	61	0	1
Total	9,372	12,131	16,404	13,732	11,241

Source: USDA FAS (FASonline). Code 121410 of the U.S. Harmonized Tariff System. *Includes China, among others.

3.1.3 Imports of Organic Products

Imports of organic products were estimated to be around $1 billion – $1.5 billion in 2002 but have since grown considerably (USDA ERS 2009b). Imports of organic products are many times larger than exports given a domestic demand that is large relative to domestic supply and foreign providers certified to sell to the U.S. market that often face lower production costs. Imports include fresh fruits and vegetables, soybeans, and products not grown in the United States such as coffee, tea, and cocoa and tropical produce. In 2007, half of the foreign farmers and handlers certified to NOP standards were from Canada, Italy, Turkey, China, and Mexico (USDA ERS 2009b).

3.2 Impacts of GT Alfalfa Deregulation

3.2.1 The Demand for Alfalfa Imports

In our Technical Report *Economic and Social Impacts on Conventional and Organic Farmers of Deregulation of Glyphosate-Tolerant Alfalfa* (appendix S), we argue that deregulation of GT alfalfa would likely generate downward pressure on prices of conventional alfalfa hay (both GT alfalfa and non-GT alfalfa). This would likely lead to increased domestic consumption of both alfalfa hay and alfalfa seed. This increase in consumption would be accompanied by market segmentation, where the consumption of non-GT alfalfa hay and seed would cede space to the consumption of GT alfalfa hay and seed.

If the United States loses export markets due to GT alfalfa deregulation (as we argued in section 2 could happen), this would generate additional domestic supply of conventional non-GT alfalfa hay and seed, likely further decreasing its price. If exported hay and seed is now channeled to domestic markets, the result could be a decrease in demand for imports. The United States is highly competitive in forage and alfalfa seed, as revealed by its position as one of the largest net exporters (tables R-13 and R-14) and domestic production should be able to compete with imports.

Table R-13. Largest Net Exporters of Forage, 2009, US$

	Exports	Imports	Net Exports
United States	705,042,398	63,761,024	641,281,374
Australia	445,810,418	37,195	445,773,223
Canada	144,177,697	5,371,282	138,806,415

Source: UN Comtrade 2009. Code 1214 of the Harmonized System. Includes swedes, mangolds, fodder roots, hay, lucerne (alfalfa), clover, sainfoin, forage kale, lupines, vetches, and similar forage products, whether or not in the form of pellets.

Table R-14. Largest Net Exporters of Alfalfa Seed Used for Sowing, 2009, US$

	Exports	Imports	Net Exports
Australia	41,981,365	319,705	41,661,660
Canada	41,173,213	4,009,886	37,163,327
United States	84,233,286	56,649,925	27,583,361

Source: UN Comtrade 2007. Code 120921 of the Harmonized System.

If, however, imported alfalfa hay and seed are qualitatively different from local produced hay and seed, imports might not be affected and could actually grow in some segments. One segment in which imports could grow is that of non-GT alfalfa seed, if U.S. stewardship programs are seen as insufficient to guarantee seed purity levels. We have no reliable information on variety details of exports and imports of alfalfa hay and seed.

In our Technical Report *Downstream Effects to Organic Production and Marketing of Deregulation of Glyphosate-Tolerant Alfalfa* (appendix T), we found no evidence that GT alfalfa deregulation would have a negative impact on main domestic downstream markets. We thus do not foresee impacts on imports in downstream markets.

3.2.2 The Supply of Alfalfa Imports

The main world providers (exporters) of alfalfa seed other than the United States (largest exporter) are Canada and Australia. These are also the main providers of alfalfa seed to the United States and Canada's exports are already heavily focused on the U.S. market (table R-15). Australia's exports are more diversified (table R-16).[2]

Table R-15. Canada Alfalfa Seed Exports, $1,000

	2005	2006	2007	2008	2009
United States	10,424	17,929	30,484	35,117	31,502
Other	4,545	9,078	9,517	5,799	4,231
Total	14,969	27,007	40,001	40,916	35,733

Source: Statistics Canada, as reported by Industry Canada, www.ic.gc.ca. Code 120921 of the Harmonized System.

Table R-16. Australia Alfalfa Seed Exports, $1,000

	2009
Saudi Arabia	5,633
United States	2,888
Argentina	2,242
South Africa	1,236
Other	4,536
Total	16,535

Source: UN Comtrade, 2007. Code 120921 of the Harmonized System.

[2] Data on Canada and Australia exports to the United States of a particular product may not match U.S. data on imports of the same product from those countries, depending on export and import controls and reporting of each country.

In the case of forage, the United States is again the world's largest provider followed by Australia and Canada. The United States' main provider (Canada) exports considerably larger sums to Japan of forage in general (table R-17) and alfalfa meal and pellets in particular (table R-18) than to the United States.

Table R-17. Canada Forage Exports, $1,000

	2005	2006	2007	2008	2009
Japan	94,631	106,582	124,028	83,839	66,634
United States	23,976	28,660	43,126	49,513	40,324
Other	15,778	17,174	17,478	9,924	8,028
Total	134,385	152,416	184,632	143,276	114,986

Source: Statistics Canada, as reported by Industry Canada, www.ic.gc.ca. Code 1214 of the Harmonized System.

Table R-17. Canada Alfalfa Meal and Pellets Exports, $1,000

	2005	2006	2007	2008	2009
Japan	25,223	22,679	22,470	21,755	14,244
United States	2,933	3,983	6,813	3,859	3,510
Other	2,534	2,699	3,974	1,655	931
Total	30,690	29,361	33,257	27,269	18,685

Source: Statistics Canada, as reported by Industry Canada, www.ic.gc.ca. Code 121410 of the Harmonized System: subset of 1214 reported above.

If GT alfalfa deregulation reduces U.S. exports to Japan, it is likely that Canada and Australia would try to fulfill the existing gap left by the United States. This would possibly reduce the supply of foreign non-GT alfalfa available for import to the United States. This would impact U.S. trade only to the extent that particular varieties are imported rather than domestically produced, assuming the domestic market would already be facing an excess supply of non-GT alfalfa hay and seed.

3.3 Summary of Findings

U.S. imports of alfalfa hay and seed come mostly from Canada. To the extent that GT alfalfa deregulation reduces foreign demand for U.S. exports, alfalfa hay and seed production previously destined to foreign markets could be channeled to the domestic market. As the domestic market for non-GT alfalfa hay and seed is expected to decrease with GT alfalfa deregulation, U.S. production is likely to substitute imports.

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Appendix R-2. Literature Search

1.0 Literature Search Strategy

Most U.S. trade data were obtained from USDA's Foreign Agriculture Service. For other countries we made use of foreign government data sources or the United Nations' Comtrade.

Much of the literature researched was on the market receptivity to GMOs. As in our Technical Report *Downstream Effects to Organic Production and Marketing of Deregulation of Glyphosate-Tolerant Alfalfa* (appendix T), the search started with general Internet searches and then expanded from references found in various papers.

We found particularly useful reports elaborated by the Global Agriculture Information Network of USDA's Foreign Agriculture Service.

Appendix R-3. County-Level Analysis

In the Technical Reports *Changes in the Economics of Alfalfa Farming with Deregulation of Glyphosate-Tolerant Alfalfa* (Appendix K) and *Economic and Social Impacts on Conventional and Organic Farmers of Deregulation of Glyphosate-Tolerant Alfalfa* (Appendix S) we included appendices analyzing county-level implications of the information raised in each of those reports. The analysis done was limited to the scope of the reports they were a part of. In the present appendix R-3, we make a few considerations on the county-level analysis done in those two reports, given the information on foreign trade that we have now gathered.

In the first of the two reports mentioned above, a ranking of counties that would most likely benefit from deregulation of GT alfalfa was completed based on the likelihood that a randomly picked acre from that county harvested forage alfalfa treated with herbicide. This ranking ignored any considerations regarding sensibilities in the end markets. In the present report we observed that foreign markets are often sensitive to the presence of GE content in food and feed. Counties producing for such markets might find it in their best interest to not plant GT alfalfa, even if ranked highly in the first of the above Technical Reports.

Unfortunately, there is no information available on alfalfa hay exports by county of origin. However, a few considerations can be made regarding our previous ranking. First, the highest ranked county in the Technical Report (appendix K) was Brown County, Wisconsin, and the hay produced in that county is unlikely for export and could adopt GT alfalfa. However, the second ranked county, Imperial County, California is unlikely to adopt GT alfalfa (telephone and email exchanges with two alfalfa experts, Dan Putnam and Shannon Mueller, between July 24 and August 06). Among the various reasons, the production of seed for foreign markets could be one of them. Second, as with Imperial County, other counties could be particularly interested in export markets and thus not be willing to adopt GT alfalfa even if they were previously ranked as likely to benefit. Third, a few counties have already banned GM crops. Marin, Mendocino, Santa Cruz, and Trinity have all passed legislation banning production of GE crops. Of these counties, only Mendocino had some alfalfa production in the 2007 Agricultural Census and was ranked among the 220 counties least to benefit from GT alfalfa deregulation (from 2,305 counties with alfalfa production) in the first Technical Report (appendix K) mentioned above.

In the second of the two reports mentioned above, we ranked counties according to their revealed economic interest in producing alfalfa seed, while relatively little in producing alfalfa for forage with herbicide. Imperial County appears in first place, potentially explaining its resistance to GT alfalfa deregulation by the importance of alfalfa seed in that county.

Additional considerations would be possible if data were available for the source by county and country of destiny of U.S. alfalfa seed and forage exports.