

GMO--Questions and Answers

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- Is There a Difference in Yield between GMO and non-GMO Crops?
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- What is the Regulated Tolerance Level for Exporting non-GMO Crop?
- What is the Potential Demand for non-GMO Corn and Soybeans?
- Proposed Purchaser and Uniform Certification Documentation

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What is "GMO"?

GMO stands for genetically modified organism. A genetically modified organism is one where the genetic code from one organism is inserted into another organism.

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What is the difference between GMO and hybrids?

Scientists taking the genetic code from one organism and inserting it into another organism produce genetically modified organisms. Hybrids are the offspring that result from the breeding of 2 different races, breeds or varieties.

If a soybean plant has been genetically modified, that means that some foreign DNA has been spliced into the natural genetic sequence of the soybean plant.

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Should I feed my livestock GMO grain?

From a nutritional perspective, we do not know if GMO grain alters the nutritional profile of the grain, feeding quality or if there is any genetic/residue in the meat. Currently 50 % of the soybeans and about 30 % of the corn produced is GMO and there is no discernable difference in livestock performance.

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What problems are there in segregating grains?

GM crops don't provide any visual clues about their origins. The GM crops look identical to and otherwise have properties identical to non-GM crops. The only way to know something about the identity of these crops is to perform one of several tests designed to identify either the specific genetic material or certain proteins found only in the modified organism.

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What can farmers do at harvest to segregate grains?

Keeping non-GM grain separate from GM grain is much like growing identity preserved grains. In this case, the non-GM grain is the grain whose identity we seek to preserve. Make a list of possible sources of mixing and take steps to avoid mixing. Good communication and good written records are imperative.

Consider harvesting non-GM crops first if maturity date allows. When harvesting non- GM crops in fields adjacent to GM crops also consider treating a few passes at the edge of these fields as though they were GM crops to reduce the possibility of harvesting grain cross-pollinated with GM stock.

Thoroughly clean the combine when switching from GM crops to non-GM crops. The grain tank is, of course, the area that comes to mind. Combined with the clean grain elevator, threshing system augers and gathering mechanisms, a combine can hold as much as two to three bushels of the previous crop.

Trucks and other crop transportation vehicles are typically the easiest link in the system to clean. Any hauling vehicle that includes augers, though, should be cleaned thoroughly. Grain receiving pits, augers or conveyors, elevator legs, dryers and bins are all possible sources of mixing. Clean in and around these parts of the system to minimize mixing. Run some non-GM grain at maximum capacity through the system to clean out and dilute GM grain to reduce mixing.

Remember that the potential for mixing occurs at every step in the process from planting to harvest and from storage to delivery. Keep samples of everything including the seed that went in the ground, samples of what has been harvested, and samples of what's been delivered until you have all the documentation you need to know that the buyer is satisfied.

Inform all employees of the importance of preserving the identity of non-GM grain. Consider labeling bins and delivery systems with permanent color-coded labels and instructions to avoid mixing GM grain with non-GM grain. When two or more completely separate storage systems are available, consider segregating grain by storage site. On farms with systems large enough to duplicate many types of equipment, devote duplicated equipment to either GM grain or non-GM grain.

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What can I do in 2000?

Demand for non-GMO seed may increase relative to this year so consider buying your non-GMO seed early while a sufficient supply exists. Hold off on purchasing GMO seed in case a decreased demand for it causes GMO seed prices to drop.

Plan to grow GM and non-GM crops in distinctly different areas of your farm. Communicate with neighboring farmers about your intentions and cooperate to the highest degree possible to minimize cross-pollination.

As you expand your grain handling facilities design your system for identity preservation. You may not need it for GM and non-GM crops forever, but you will be ready to respond to other opportunities for capturing returns on crops with specific uses and extra value in the future. The most specific design feature you will need is easy and quick clean-out of grain handling components, especially those in hard-to-reach places.

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What Elevators are Willing to accept GMO's not yet approved by the EU?

The American Seed Trade Association is providing a data bank of [elevators](#) in the U.S. willing to accept GMO crops not yet approved by the EU.

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What are Processors Suggesting for Producer Marketings?

The National Corn Growers Association provides a list of what ADM, Conagra, Cargill, Consolidated Grain and Barge, and AE Staley are telling producers about [marketing this year's corn crop](#).

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Unapproved Hybrids for Export to EU

The National Corn Growers Association has information on the various corn hybrids [unapproved](#) for export to the EU.

Note: scroll to bottom of linked page.

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Approved Hybrids for Export to EU

The National Corn Growers Association has information on the various corn hybrids [approved](#) for export to the EU.

Note: scroll to bottom of linked page.

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Should I sign a Contract Specifying my Production is non-GMO?

Dr. Neil Harl lists the following "can" and "should not" for producers asked to promise their commodity is non-GMO:

Can state that:

- no seed represented by the seed company as GMO seed was planted
- seed represented by the seed company as non-GMO seed was planted
- care was taken in avoiding contamination in bins, augers, and in the combine

Should not state that:

- the crop in question has no GMO germplasm
- no contamination has occurred from mechanical handling and storage of crops
- no contamination has occurred from the pollen

Source: Dr. Neil E. Harl, Charles F. Curtiss Distinguished Professor in Agriculture and Professor of Economics, Iowa State University, Ames, Iowa; Member of the Iowa Bar.

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What are the Premiums for non-GMO Commodities?

Some Mid West terminals have reported a 0.02 - 0.04 cent premium for corn and up to a 0.35 cent/bushel premium for non-GMO soybeans (primarily STS soybeans). However, these premiums cannot be confirmed for Missouri elevators at this time. You are encouraged to contact your local elevator for premium schedules for non-GMO production.

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In which Countries is Consumer Preference for non-GMO Occurring?

Most European countries, Japan, and South Korea (importers to soybean and soybean meal) have indicated consumer preference for non-GMO crops. However, the Soviet Union has cleared the importing of GMO crops for feed use. It should be noted that the countries concerned with GMO produced crops are only applicable for certain imports. Some processed foods and most grain or oilseeds for feed use have not been affected by consumer preference.

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What is the Relationship Between the GMO and non-GMO Debate and Identity Preservation?

Identity preservation refers to the segregating of similar products based on different quality characteristics that are valued differently in the marketing chain. Because GMO and non-GMO grains and oilseeds must be segregated to maintain the qualities of each, this is a form of identity preserving the characteristics of the grain. Thus, when evaluating whether to segregate your GMO and non-GMO crop consider all the factors that you would consider if you were producing an identity preserve crop.

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What About Buying Seed for Next Year?

The demand for grains and oilseeds is substantially more extensive than the demand for only non-GMO varieties; however, the portion of the market that is affected by consumer preference for non-GMO varieties is in the high-value sector. To capture the value of these goods, processors may pay a premium for inputs (non-GMO grains or oilseeds). Some producers, especially those who have good weed and insect management skills, may have the potential to capture extra value from planting non-GMO varieties next year. Yet, because there may be additional costs in the production and handling of other varieties relative to other varieties, producers may require a premium to off-set these costs. The premium offered to produce non- GMO varieties should be weighed against the extra costs of producing non-GMO varieties. A producer considering producing non-GMO varieites for a premium should have a written contract similar to a contract for producing an identity preserve crop.

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What Commodities are being Produced through Modification?

Though this list is not all inconclusive, the list includes corn, soybean, cotton, rice, sunflowers, canola, tomatoes, milk, potatoes, sweet corn, squash, cantaloupe, and strawberries.

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What Percentage of U.S. Acres was Planted to GMO and non-GMO seed?

Estimates for 1999 crop

GMO:

35% of U.S. Corn acres planted

55% of U.S. Soybeans acres planted*

Non-GMO:

65% of U.S. Corn acres planted

45% of U.S. Soybeans acres planted*

*Values are estimated and may differ depending on the quantity of seed brownbagged from last year and used for planting this year.

Source: Dr. Robert N. Wisner, University Professor and Extension Economist, Dept. of Economics, Iowa State University

1996 through 1998

Extent of Bt and herbicide-tolerant seed technologies used in corn, soybean, and cotton production, by region, 1996-1998

Technology/Region	1996		1997		1998	
	Acreage	Production	Acreage	Production	Acreage	Production
Bt corn						
All surveyed states	1.4	1.5	7.6	7.8	19.1	20.7
Heartland	1.5	1.6	8.1	8	19.4	20.3
Northern Crescent	id	id	id	id	16.2	18.3
Prairie Gateway	id	id	id	id	19.2	23.7
Herbicide-tolerant corn²						
All surveyed states	3	3.1	4.3	3.9	18.4	19.4

Heartland	2.8	2.8	4.8	4.3	19.7	20.6
Northern Crescent	id	id	id	id	9.5	11.6
Prairie Gateway	id	id	id	id	18.3	16.7
Herbicide-tolerant soybeans						
All surveyed states	7.4	7.2	17	17.5	44.2	44.8
Heartland	6.9	2.8	14.7	16.1	44.3	45.1
Mississippi Portal	9.8	10.1	30.8	29.2	46.6	45.5
Northern Crescent	id	id	15.2	14.8	27.5	28
Prairie Gateway	id	id	17.5	20.2	59.2	64.4
Southern Seaboard	id	id	17.3	19.1	72	76.3
Eastern Uplands	id	id	id	id	59	57.4
Bt cotton						
All surveyed states	14.6	19	15	18.3	16.8	23.5
Mississippi Portal	23.8	25.3	23.1	23.3	34.8	38
Southern Seaboard	id	id	21.5	24.7	18.2	18.2
Fruitful Rim	id	id	22.2	22.9	18.9	22.7
Herbicide-tolerant cotton						
All surveyed states	id	id	10.5	11.1	26.2	29.3
Mississippi Portal	id	id	16.9	16.2	24.5	23
Southern Seaboard	id	id	16.1	14.5	28.1	31.7
Prairie Gateway	id	id	id	id	34.2	56.9

¹ 1998 estimates for corn and cotton include acreage and production with stacked varieties (with Bt and herbicide-tolerant genes).

² Includes seed obtained by traditional breeding but developed using biotechnology techniques that helped to identify the herbicide-tolerant genes.

id=insufficient data for a statistically reliable estimate

Source: USDA

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What Percentage of U.S. Production is GMO and non-GMO?

1999 Estimate

Corn-----35-75% of production in GMO*

Soybean---65-70% of production is GMO

*The significant increase in corn production, relative to planted acres, is due to the potential for cross pollination, or seed contamination.

Source: Dr. Robert N. Wisner, University Professor and Extension Economist, Dept. of Economics, Iowa State University

1996 through 1998

Extent of Bt and herbicide-tolerant seed technologies used in corn, soybean, and cotton production, by region, 1996-1998

	1996		1997		1998	
Technology/Region	Acreage	Production	Acreage	Production	Acreage	Production
Bt corn						
All surveyed states	1.4	1.5	7.6	7.8	19.1	20.7
Heartland	1.5	1.6	8.1	8	19.4	20.3
Northern Crescent	id	id	id	id	16.2	18.3
Prairie Gateway	id	id	id	id	19.2	23.7
Herbicide-tolerant corn²						
All surveyed states	3	3.1	4.3	3.9	18.4	19.4
Heartland	2.8	2.8	4.8	4.3	19.7	20.6
Northern Crescent	id	id	id	id	9.5	11.6

Prairie Gateway	id	id	id	id	18.3	16.7
Herbicide-tolerant soybeans						
All surveyed states	7.4	7.2	17	17.5	44.2	44.8
Heartland	6.9	2.8	14.7	16.1	44.3	45.1
Mississippi Portal	9.8	10.1	30.8	29.2	46.6	45.5
Northern Crescent	id	id	15.2	14.8	27.5	28
Prairie Gateway	id	id	17.5	20.2	59.2	64.4
Southern Seaboard	id	id	17.3	19.1	72	76.3
Eastern Uplands	id	id	id	id	59	57.4
Bt cotton						
All surveyed states	14.6	19	15	18.3	16.8	23.5
Mississippi Portal	23.8	25.3	23.1	23.3	34.8	38
Southern Seaboard	id	id	21.5	24.7	18.2	18.2
Fruitful Rim	id	id	22.2	22.9	18.9	22.7
Herbicide-tolerant cotton						
All surveyed states	id	id	10.5	11.1	26.2	29.3
Mississippi Portal	id	id	16.9	16.2	24.5	23
Southern Seaboard	id	id	16.1	14.5	28.1	31.7
Prairie Gateway	id	id	id	id	34.2	56.9

¹ 1998 estimates for corn and cotton include acreage and production with stacked varieties (with Bt and herbicide-tolerant genes).

² Includes seed obtained by traditional breeding but developed using biotechnology techniques that helped to identify the herbicide-tolerant genes.

id=insufficient data for a statistically reliable estimate

Source: USDA

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Is There a Difference in Yield between GMO and non-GMO Crops?

Yields from Bt and herbicide-tolerant seed technologies used in corn, soybean, and cotton production compared to all other seed technologies, by region, 1996-1998

Technology/Region	1996	1997	1998 ²
	Percent Difference¹		
Bt Corn			
Heartland	4.6	-1.6	5.7*
Northern Crescent	id	id	16.4
Prairie Gateway	id	id	30*
Herbicide-tolerant corn³			
Heartland	-1.5	-10.2	5
Northern Crescent	id	id	25.2
Prairie Gateway	id	id	-10.1
Herbicide-tolerant soybeans			
Heartland	-2.4	13.6**	4.4
Mississippi Portal	2.8	-6.2	-3.6
Northern Crescent	id	-4.6	4.8
Prairie Gateway	id	21.0**	24.2
Southern Seaboard	id	13.3*	21.4*
Eastern Uplands	id	id	-8
Bt Cotton			
Mississippi Portal	8.6*	0.6	15*
Southern Seaboard	id	19.6**	-0.3
Fruitful Rim	id	4.2	26.1**
Herbicide-tolerant cotton			
Mississippi Portal	id	-4.8	-7.9
Southern Seaboard	id	-11.9*	18.5

Praire Gateway

id

id

id

¹ Percent difference between the yield of Bt or herbicide-tolerant seed technologies and all other seed technologies. Differences were statistically compared using a difference of means tests. All other seed technologies include acreage planted to all other purchased and homegrown seed. Differences between the mean estimates cannot necessarily be attributed to the use of the seed technology since they are influenced by several other factors not controlled for, including irrigation, weather, soils, nutrient and other pest management practices, other cropping practices, operating management, etc.

² 1998 estimates for corn and cotton include acreage and production with stacked varieties (with Bt and herbicide- tolerant genes).

³ Includes seed obtained by traditional breeding but developed using biotechnology techniques that helped to identify the herbicide-tolerant genes.

id=insufficient data for a statistically reliable estimate.

** significantly different from all other at the 5 percent level.

* significantly different from all other at the 10 percent level.

Source: USDA

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What is the Impact of Adopting Biotechnology Crops-Summary?

The Impact of Adoption of Herbicide-Tolerant and Insect-Resistant Field Crops

	Effect with respect to change in the adoption of		
	Herbicide-tolerant soybean, 1997 ¹	Herbicide-tolerant cotton, 1997 ¹	Bt cotton, 1997 (Southeast) ¹
Change in yields	small increase ²	increase ³	increase ³
Change in profits	O ⁴	increase ³	increase ³
<u>Change in pesticide use</u>			
<i>Herbicide</i>			
Acetamide herbicides	O ⁴		
Triazine herbicides		O ⁴	
Other synthetic herbicides	decrease ³	O ⁴	
Glyphosate	increase ³	O ⁴	
<i>Insecticides</i>			
Organophosphate insecticides			O ⁴
Pyrethroid insecticides			O ⁴
Other insecticides			decrease ³

¹ Based on Fernandez-Cornejo, Klotz-Ingram, and Jans (1999). "Farm-Level Effects of Adopting Genetically Engineered Crops in the U.S.A." Selected Paper presented at the International Conference "Transitions in Ag Biotech: Economics of Strategy and Policy." NE-165, Washington, DC, June 24-25, 1999.

² Small increases or decreases are less than 1 percent change for a 10 percent change in adoption.

³ Increases or decreases are less than 5 percent change for a 10 percent change in adoption.

⁴ Underlying coefficients are not statistically different from zero.

Source: USDA

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How Much of a Handling Premium will I need for my non-GMO Crop?

A producer of non-GMO crop may incur additional costs due to the requirement of separating the crop on the farm, i.e., costs of cleaning the combine, wagon/truck, or bin. Some additional management may be needed to coordinate the separating of GMO from non-GMO crop. Also, the extra time waiting in line at the elevator, or storage costs if it is required that the crop is stored to capture a premium later in the year, will add to the costs of segregating non-GMO crops.

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What is the Regulated Tolerance Level for Exporting non-GMO Varieties?

Tolerance level refers to the amount of GMO allowed in non-GMO varieties and the non-GMO varieties still receiving approval as non-GMO. At this time there is no specified tolerance level.

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What is the Potential Demand for non-GMO Corn and Soybeans?

Dr. Robert Wisner estimates that the upper limit on demand for non-GMO corn is around 35% of U.S. corn production and stocks. This value accounts for all corn used in processing, exports, food, and sweetener. A more conservative figure offered by Dr. Wisner is 8-14% of the U.S. corn production and stocks.

Dr. Wisner estimates, based on 1998 utilize patterns, that up to 30% of soybean 1999 production and stocks could be used up by the market for non-GMO crop. The likely primary demand driver is non-GMO soyoil, which constitutes a small portion of the total lbs of soybeans to be produced in 1999. However, soyoil is a by-product from crushing soybeans. Therefore, to meet the potential demand for non-GMO soyoil around 30% of soybean production would have to be non-GMO.

Source: Dr. Robert N. Wisner, University Professor and Extension Economist, Dept. of Economics, Iowa State University

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Proposed Purchaser and Uniform Certification Documentation

The Office of the Iowa Attorney General and Iowa State University offers the following sample certification documents to be used:

- [Purchasing](#)
- [Uniform](#)

Note: These documents are in Adobe Acrobat Reader Format.

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