

# GMO CONTAMINATION PREVENTION

## What Does it Take?

By Jim Riddle, Organic Outreach Coordinator

### Best Management Practices for Producers of GMO and Non-GMO Crops

**Farmers** need to be able to provide customers with a choice between GMO (genetically modified organisms), non-GMO, and organic crops and products. Since different types of agriculture are practiced on adjoining fields, suitable measures during planting, cultivation, harvest, transport, storage, and processing are needed in order to prevent the accidental mixing of GMO and non-GMO materials. Contamination may result from seed impurities, wind or insect-borne crosspollination, volunteer or feral plants, and/or inadequate harvest and handling practices.



Producers of GMO crops, including herbicide resistant canola, soybeans, alfalfa, sugar beets, and corn; insecticidal (Bt) corn, sweet corn and cotton; and industrial crops, such as alpha-amylase corn for ethanol, have a responsibility to implement best management practices (BMPs) to minimize genetic drift and other forms of contamination, which can negatively impact organic, identity preserved (IP), and other non-GMO producers.

Organic, transitional, IP, and other non-GMO crop farmers also need to implement BMPs to minimize risks of GMO contamination. This publication outlines some BMPs that GMO and non-GMO growers can implement to prevent, or at least minimize, genetic drift, commingling, and other forms of GMO contamination.

## Before you grow:

### Know What's Out There

**For all growers** – Know which crops have been approved or “non-regulated” by Federal agencies. As of 2012, numerous varieties of GMO field corn have been released, with traits including herbicide resistance, insecticidal properties to kill corn borers and/or corn rootworms, and alpha-amylase to break down starch for production of ethanol. Herbicide resistant soybeans, canola, sugar beets, alfalfa, and summer squash have been released, along with insecticidal cotton and sweet corn and disease resistant papaya. Many crops are “stacked” to contain multiple traits of herbicide resistance and insecticidal proteins. The Non-

GMO Sourcebook maintains a list of approved GMO crops at:

<http://www.nongmosourcebook.com/geneticallymodifiedcropsmarket.php>

USDA/APHIS Biotech Regulatory Services (BRS) maintains a searchable database on biotech, which is updated daily. The website has a series of tables that document petitions for non-regulated status (granted and pending) and graphs with aggregated data by type of GMO crop, location, and more, at:

<http://www.aphis.usda.gov/biotechnology/status.shtml>



### Know the Regulations

**GMO growers** - Become informed about the regulations pertinent to GMO crops. For example, farmers who plant certain Bt corn varieties are required to plant non-Bt corn “refuges” in an attempt to delay the development of resistance among target pests. Make sure to follow all GMO planting regulations, as stated on seed labels and in technology agreements that you sign.



**Non-GMO growers** – While there are no regulations pertaining to non-GMO production practices and label claims, organic growers are prohibited by the Organic Foods Production Act (OFPA) and the National Organic Program (NOP) Regulation from planting or using any genetically engineered crops, inputs, or planting stock, referred to as “excluded methods.” Any organic growers who knowingly plant or use GMOs are subject to revocation of their organic certification and may be prosecuted for violation of OFPA.

## Know Your Crop

**GMO growers** - Prior to planting, farmers who intend to plant genetically engineered crops should verify the type of GMO seeds to be planted. Read and understand licensing agreements issued by biotech seed suppliers. Follow all planting instructions. Retain copies of licensing agreements you have signed and all other communications with GMO seed suppliers. Know the distance pollen is likely to travel. The isolation distance required for the production of certified seed provides guidance on the distance pollen is likely to travel for any given crop. Know the types of tests used to establish the presence of the biotech crop(s) you are growing. Manage herbicide resistant crops to minimize the development of herbicide resistant weeds. Rotate between herbicide resistant and non-resistant varieties. Rotate herbicide chemicals. Make sure that GMO crops do not "volunteer" the following year, presenting additional risks of contamination. To avoid potential liability, clean up, and compensation issues, consider not growing promiscuous GMO crops in areas where contamination of organic and other non-GMO crops is likely.

**PLATELESS PLANTER SUGGESTIONS**  
ALWAYS MAKE FIELD CHECKS TO ENSURE PROPER SETTINGS  
For more specific recommendations, please visit [www.dekalb.com](http://www.dekalb.com).

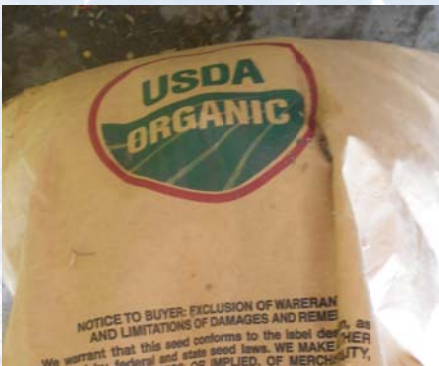
Manufacturer/Model	Recommended Vacuum Level (Inches of Water) Apply to:									
<b>John Deere Vacuum Master &amp; Pro Series</b>	32 to 36	37 to 40	41 to 46	46 to 49	50 to 53	54 to 57	58 to 61	62+	62+	62+
Bag Wt. (lbs.) of 80K seeds	8 to 9	9 to 10	11 to 12	12 to 14	14 to 16	16 to 18	18 to 21	21 to 24	24 to 28	28 to 32
Standard Disc (A50917)	-	-	-	-	-	-	-	-	-	-
Small Disc (A43215)	-	-	-	-	-	-	-	-	-	-
<b>Kluge RidgeView Master</b>	Recommended Vacuum Level (Inches of Water)									
Bag Wt. (lbs.) of 80K seeds	32 to 36	37 to 40	41 to 45	46 to 49	50 to 53	54 to 57	58 to 61	62+	62+	62+
Corn Disc 30 call (D14465)	17 to 19	17 to 19	17 to 19	17 to 19	19 to 21	19 to 21	19 to 21	19 to 21	19 to 21	19 to 21
<b>Finger Pickup (John Deere, Kluge)</b>	Follow manufacturer's recommended speed and use graphite.									
<b>White Air</b>	Recommended ounces of pressure (PSI)									
Bag Wt. (lbs.) of 80K seeds	32 to 36	37 to 40	41 to 45	46 to 49	50 to 53	54 to 57	58 to 61	62+	62+	62+
Regular Disc (852435)	-	-	1.5 to 1.8	1.8 to 2.0	2.0 to 2.2	2.2 to 2.4	2.4 to 2.6	2.6 to 2.8	2.8 to 3.0	3.0 to 3.2
Small Disc (852436)	2.5 to 3.0	3.0 to 3.4	3.5 to 3.7	3.8 to 4.0	-	-	-	-	-	-
<b>Case IH Vacuum</b>	Regulator Setting of 3.0. Recommended Vacuum Setting (Inches of Water). Use graphite.									
Bag Wt. (lbs.) of 80K seeds	32 to 36	37 to 40	41 to 45	46 to 49	50 to 53	54 to 57	58 to 61	62+	62+	62+
Seed Disc 4855 (192995)	18 to 20	18 to 20	18 to 20	20 to 22	20 to 22	20 to 22	20 to 22	20 to 22	20 to 22	20 to 22
<b>Case IH Cyclone</b>	Use standard A-pocket drum with 0.220 inch holes. 36 hole Part #6277030 to #6277036. 24 hole Part #64877780 to #64877786. If population is too low (may occur with long, thin seed) use the E-pocket drum, 0.100 inch hole. Part #1548935C1.									
Bag Wt. (lbs.) of 80K seeds	32 to 36	37 to 40	41 to 45	46 to 48	50 to 53	54 to 57	58 to 61	62+	62+	62+
Pressure (oz.)	8 to 9	8 to 9	8 to 9	8 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16
Brush	Full Up	Full Up	Half Down	Half Down	Half Down	Half Down	Full Down	Full Down	Wire Down*	Wire Down*

**Notes:**

1. Check planter base, planting mechanism and other parts for excessive wear.
2. Consult operator's manual for correct tire pressure and field speed.
3. These suggestions are only a guide! Adjust settings to your conditions.
4. Always check accuracy of seed drop where the planter has traveled at field speed.

This seed was produced following industry standard practices for the production of commercial seed and in accordance with all applicable seed quality laws, regulations and standards, and meets the quality standards achievable through the application of current standards and practices. In accordance with applicable governmental regulations, Monsanto does not warrant that this seed is free of all other seeds or contains trace amounts of unintentional phenotypic and/or genotypic (biotech) traits.

**Non-GMO growers** - One option to avoid GMO contamination is to not plant crops, which have genetically engineered counterparts that can cross-pollinate or otherwise contaminate the crops you intend to grow. If you intend to grow crops with GMO counterparts, prior to planting, verify that certified organic or non-GMO seeds will be used. Obtain statements from seed companies concerning the non-GMO status of the varieties to be planted. Ask for test results of seeds, for all applicable GMO "events." Retain copies of test results, seed samples, and letters from seed suppliers. Make sure not to use genetically engineered legume inoculants. (e.g. Dormal Plus is a GMO.)



In addition, organic growers are required to use organically grown seeds, in the form, quality, quantity, and equivalent variety needed by the operation. Keep records of all attempts to source organic seeds for all crops, including cover crops, especially if you find that organic seeds are not commercially available in the varieties you need. Work with seed companies that are developing pollen-blocking varieties; companies who specialize in organic seeds or that have taken the "Safe Seed Pledge"; and companies involved in "Purity Plus" or other non-GMO seed certification systems.

## Know Your Farm

**For all growers** – Know your fields - determine which have the highest risk of creating or receiving GMO contamination, and which are least susceptible to GMO contamination to or from neighboring crops. Select isolated fields for planting wind and/or insect pollinated crops such as corn and canola. Know the prevailing wind direction. Establish physical buffers, such as windbreaks and hedgerows, to minimize contamination from GMO pollen drift.



## Know Your Neighbors

**For all growers** – Establish good lines of communication with your neighbors, especially those whose fields directly adjoin fields where GMO or non-GMO crops are to be planted.

**GMO growers** - Notify neighbors that you are planting GMO crops. Let them know which crops are being planted and the steps you are taking to minimize GMO pollen drift.

**Non-GMO growers** - Let your neighbors know where your organic and/or designated non-GMO fields are located. Get to know the farmers who farm adjoining fields, even if they rent the land. Post "Organic Farm" signs along field margins, where needed.

## Know Your Neighbors' Crops

**For all growers** – Gather information from neighbors, seed dealers, Extension educators, and input suppliers on the types of crops being grown in the vicinity of your farm.

**GMO growers** - Know which neighbors grow organic, IP and other non-GMO crops. If your neighbor is growing non-GMO corn and you are growing Bt corn and planting "refuges" of non-Bt corn, plant your non-GMO acres next to your neighbors' non-GMO fields, unless the non-GMO seed is pre-mixed in the bag with the GMO seed. Be careful to make sure that pesticides used to control corn pests do not drift onto adjoining fields. If possible, adjust your planting dates so that your GMO crops do not pollinate at the same time as neighboring non-GMO crops. Be willing to provide your cropping information to neighbors so they can make appropriate adjustments.

**Non-GMO growers** - Know which GMO-related plantings are in the area. If neighbors are growing Bt crops and maintaining "refuges" of non-BT corn, ask them to plant their refuges in areas that adjoin non-GMO fields to provide some buffer protection. Be aware that non-BT corn may be sprayed with insecticides – take steps to protect your crops from chemical drift. Also be aware that the neighbor's use of BT corn may decrease pest pressures on your farm. If possible, in order to minimize cross-pollination with GMO crops, delay your planting dates so that your non-GMO crops do not pollinate at the same time as adjoining GMO crops.

## Know Your Equipment

**For all growers** – Know how your equipment is used, calibrated, and cleaned. This includes rented and borrowed equipment and equipment used by custom operators. Know how to clean all pieces of equipment, including planters, combines, balers, wagons, trucks, etc. If the equipment is to be used for planting, harvesting, or handling any non-GMO crops, make sure to thoroughly clean and purge equipment prior to use. Don't let your equipment contaminate your own or someone else's non-GMO crop. Keep records to document your equipment cleaning activities.



## Know Your Crop Storage

**For all growers** – Carefully inspect and clean storage units prior to use. Make sure that storage units are well segregated and that GMO and non-GMO crops are not stored in the same vicinity. Dust and grain from GMO crops can contaminate non-GMO crops. Thoroughly clean augers, elevators, bins, grain dryers, rotary screen cleaners, etc., if they are to be used for both GMO and non-GMO crops. Have proper cleaning equipment, such as air compressors or vacuums, on hand. Document your cleaning activities.



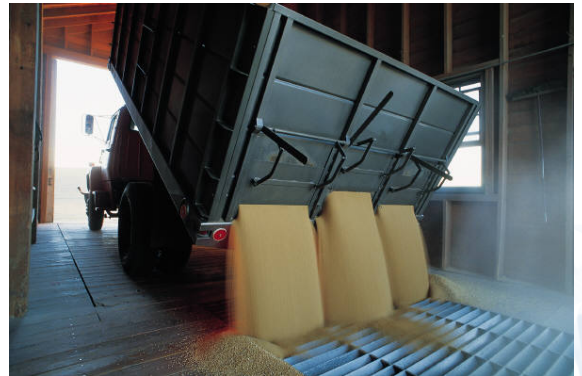
## Know Your Harvest

**Non-GMO growers** - Submit crop samples prior to harvest for GMO testing. If contamination is likely, collect samples along a grid pattern, going from areas with the highest risk to areas with low risk. Maintain and submit the samples separately in case only part, but not all of the field is contaminated. Make sure samples are tested for all applicable GMO events, including stacked traits. Retain duplicate crop samples and copies of test results.

## Know Your Transport

**GMO growers** - Carefully inspect and clean trucks and trailers after your crops have been unloaded. This includes tarps and trailer covers. Keep records to document the cleaning of transport units. By keeping records to document that you clean storage and transport units when you are finished using them, you can help verify that your GMO crops did not contaminate someone else's non-GMO crops.

**Non-GMO growers** - Carefully inspect and clean trucks and trailers prior to loading with non-GMO grain. Make sure that transport units, including overseas shipping containers, are free of grain, dust, and other foreign material. Keep records to document cleaning activities, including clean transportation affidavits and bills of lading.



## Know Your Buyers

**GMO growers** - Know the market requirements for the GMO crop(s) being grown. Not all GMO crops are accepted by all buyers. Be prepared to segregate crops to meet buyer expectations. Know your buyer's sampling and testing protocols. Know if your crops are likely to be exported to foreign markets. Know the market-driven GMO rejection levels (tolerances) for the crops grown. Know the labeling requirements for GMO crops, if crops are being exported. Communicate with buyers, GMO seed companies, and Extension agents concerning GMO market issues.

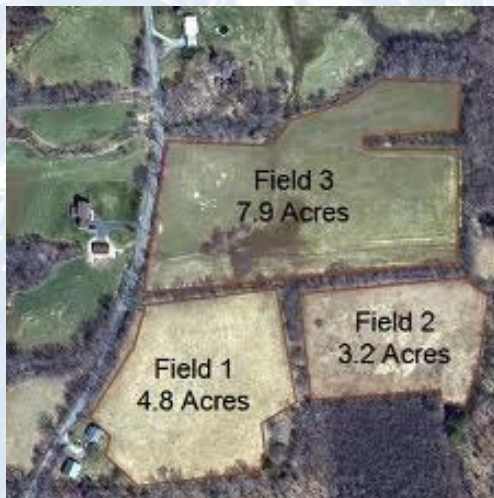
**Non-GMO growers** - Know the contract specifications under which non-GMO crops are being grown. Know your buyer's sampling and testing protocols. Know the market-driven GMO rejection levels (tolerances) for the crops grown, especially if the crops are destined for export. Know if your buyer requires organic certification or other non-GMO certification, such as certification offered by the Non-GMO Project. Communicate with buyers and organic certifying agents (or non-GMO certification body) concerning GMO contamination issues.



## Know Your Records

**GMO grower** - Keep records of all fields where GMO crops are planted. Maintain field maps or GPS/GIS systems to record GMO and non-GMO crop locations. Document harvest and handling activities. Document your efforts to minimize GMO contamination. With good records, you will have a better chance of identifying sources of GMO contamination, eliminating them, and determining liability, if needed. Valid records of BMPs can help protect you from being held liable should contamination occur.

**Non-GMO growers** - You must document efforts to minimize GMO contamination, especially if you are certified organic. With good records, you will have a better chance of limiting losses, identifying causes of problems, rectifying the situation, and determining liability, if needed. Valid records of crop yields, test results, cleaning activities, storage, transport, and sales may help establish claims for losses, should contamination occur.



## Know Your Potential Risk

**For all growers** – Discussions are underway at the Federal level to establish some sort of GMO compensation fund to cover losses incurred by non-GMO growers who experience losses caused by GMO contamination, but such a system is not yet in place. Until such a system exists, clear communication, good neighbor-to-neighbor relations, and adoption of Best Management Practices are the best mechanisms to minimize risks.

**GMO growers** - Be clear on your risks and liability coverage. Review your farm's liability insurance policy to determine if you are covered for genetic drift and related damages. Talk with your seed dealer and GMO company representatives concerning liability. If

possible, establish who is liable for potential damages.

**Non-GMO growers** – Explore your risks, especially when planting crops that have GMO counterparts in your region. Talk with your insurance agent. Does your crop insurance policy cover losses due to GMO contamination? Document all of your attempts to minimize contamination, along with your crop production, yield, and sales records. These records will be invaluable, should you suffer harm and seek compensation for damages.

## For more information on GMO contamination prevention, contact:

USDA National Organic Program - <http://www.ams.usda.gov/AMSV1.0/nop>

USDA/APHIS Biotech Regulatory Services (BRS) - <http://www.aphis.usda.gov/biotechnology/status.shtml>

Genetic ID (testing lab) - <http://www.genetic-id.com/>

Non-GMO Project - <http://www.nongmoproject.org/>

Center for Food Safety - <http://www.centerforfoodsafety.org/>

Non-GMO Report - <http://www.non-gmoreport.com/>

The Organic Center - <http://www.organic-center.org>

National Organic Coalition - <http://www.nationalorganiccoalition.org/>

Blue River Hybrids - [www.blueriverorgseed.com/docs/PuraMaize-Fact-Sheet.pdf](http://www.blueriverorgseed.com/docs/PuraMaize-Fact-Sheet.pdf)

*Over the past 30 years, Jim. Riddle has been an organic farmer, inspector, educator, policy analyst, author, and consumer. He was founding chair of the International Organic Inspectors Association, (IOIA), and co-author of the IFOAM/IOIA International Organic Inspection Manual. He has trained hundreds of organic inspectors worldwide. Jim served on the Minnesota Department of Agriculture's Organic Advisory Task Force 1991-2009, and was instrumental in passage of Minnesota's landmark organic certification cost-share program. Jim currently works as Organic Outreach Coordinator for the University of Minnesota Southwest Research and Outreach Center and is the elected Chair of the Winona County Soil and Water Conservation District Board. Jim is former chair of the USDA National Organic Standards Board.*

This publication has been reviewed by Jeff Coulter, University of Minnesota; Bruce Potter, University of Minnesota; and Lisa Bunin, Center for Food Safety.



**Southwest Research  
and Outreach Center**

**UNIVERSITY OF MINNESOTA**

The University of Minnesota shall provide equal access to and opportunity in its programs, facilities, and employment without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression.

©2012 Regents of the University of Minnesota. All rights reserved.