Why Many Farmers Oppose GMOs

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Farmers have their own reasons to be concerned about the spread of genetically modified organisms (GMOs). Genetic engineered plants do the following:

• contaminate natural plants and the environment,
• create superweeds and harm beneficial insects,
• intensify corporate concentration and ownership of seeds,
• encourage monocultures and large scale use of fossil fuels, and
• have created a two-tiered market for crops.

Pesticides and Superweeds

GMO crops are designed to emit their own pesticides (Bacillus thuringiensis, or Bt) or to be resistant to herbicide (glyphosate, also known as Roundup). Anytime specific biocides (poisons) are used in such volume, there are risks. This is exactly what has happened with GMOs. Glyphosate has been found toxic to humans, but the weeds it targets are developing resistance. To kill them, farmers are having to go to even more deadly poisons like 2-4-D, or return to tillage and other labor-intensive practices, for weed control.

• Superweeds that are no longer controlled by glyphosate have spread to over 70 million acres of US farmland and now cost $1 billion per year in crop damage. (http://www.nbcbnews.com/business/economy/superweeds-sprout-farmland-controversy-over-gmos-n214996)

• Glyphosate use is increasing by 25% per year in a failing effort to control superweeds by more of the same. (http://uk.reuters.com/article/2012/10/02/us-usa-study-pesticides-idUKBRE89100X20121002)
• Many insects are beneficial for crops, providing services such as pollination and pest control. Despite biotech company assurances, however, many of these beneficial insects are killed by Bt. Studies have shown that green lacewings show substantial mortality when exposed to Bt, as do ladybird beetles fed aphids reared on GMO potatoes. (http://www.psrast.org/insects.htm)

Also affected by engineered Bt are:

• monarch butterfly larvae, which are killed (http://www.news.cornell.edu/stories/1999/04/toxic-pollen-bt-corn-can-kill-monarch-butterflies)
• beneficial nematodes, whose growth and reproduction are reduced (http://www.ncbi.nlm.nih.gov/pubmed/18068780)
• earthworms, which experience significant weight loss after a period of exposure to Bt in corn, (http://www.ncbi.nlm.nih.gov/pubmed/12753225)

### Monocultures and Fossil Fuel

Monocultures are large plantings of a single crop. Most GMOs are planted that way to more easily spray with glyphosate. Such plantings cause accelerated soil exhaustion, water and biodiversity loss, carbon emissions, and nutrient immobilization. Those lead to use of synthetic fertilizers and pesticides in an attempt to revive the dead soil.

• Crop rotations, largely abandoned by industrial farms and their monocultures, typically increase yields by 20 or 30 percent, as well as improving water holding capacity of soils and reducing the need for pesticides. (http://www.technologyreview.com/view/525931/are-gmos-worth-the-trouble/)

• The inputs used in today's industrial farming monocultures (equipment, fertilizer, agro-chemicals) are all based on fossil fuels. Cornell's David Pimentel suggests that in pre-industrial times the energy spent to produce a calorie of food energy might have been 0.05 calories, for a ratio of 20 gained per 1 spent. Today, he says, that ratio is likely 10 or more calories used to put one calorie of food energy on your plate, or a ratio of 1 gained per 10 spent. This is not sustainable. (http://bit.ly/1FWj6HV)

• Many of these fossil fuel inputs are wasted. Less than 20% of synthetic nitrogen used in agriculture finds its way to crops. The rest is released into the environment to pollute waterways or to fuel algae blooms. (http://portfolio21.com/wp-content/uploads/dlm_upload/2014/10/Portfolio-21-The-Case-Against-GMOs.pdf)

### Two Tiers of Crops

Questions about the health and safety of GMO foods have resulted in many people choosing not to buy them and have fueled the growth of non-GMO foods. The result begins to look like a food system with two tiers: a higher, more expensive tier of organic and non-GMO foods, and a lower one of cheaper, less desirable GMO foods.

• The US market has rejected GMO crops, paying less for them than non-GMO crops and relegating them largely to animal feed. When crops that are used primarily for feeding humans such as rice or wheat or potatoes have been engineered, the market has rejected them. (http://www.casinapioiv.va/content/dam/accademia/pdf/sv125/sv125-paarlberg.pdf)

• Buyers here are paying premiums for non-GMO crops of $1 per bushel (for corn) to $2 per bushel (for soy). The non-GMO market grew by almost 240% between 2011 and 2013, and could comprise 20% of some commodity crops in five years. (http://www.offthegridnews.com/how-to-2/farmers-abandoning-gmo-seeds-and-the-reason-will-surprise-you/)
Contamination

Modifying plants involves inserting genetic material (DNA) from other organisms into a seed. When the plant grown from that seed flowers, the inserted DNA is passed in the pollen to other plants – any of which could be natural plants growing in an adjacent field. If this happens, the seed produced by the natural plant after pollination can contain the engineered genetic material.

Pollen is viable for hours and can travel miles during that time, given wind and weather factors. Thus no buffer zone is practical, and a neighboring farmer can find their crop contaminated by GMOs. If that farmer is organic, the crop is no longer saleable.

- In a 2004 pilot study, the Union of Concerned Scientists tested samples of non-GMO corn, soy and canola seed and found low-level, but pervasive, contamination with GMO genetic material. Some 50% of the corn and soy samples, and more than 80% of the canola samples, were contaminated with Monsanto genes. (http://www.ucsusa.org/food_and_agriculture/our-failing-food-system/genetic-engineering/eight-ways-monsanto-fails.html)

- Antibiotic resistance genes are routinely inserted into GMOs to mark cells that have taken up the new DNA. Health professionals are increasingly concerned that these genes are involved in horizontal transfer to bacterial pathogens, which makes the resulting diseases untreatable. A recent study in China found the antibiotic resistance marker gene blá, for ampicillin resistance, in all six of China’s major rivers. Sequencing confirmed that the gene is a synthetic version derived from a lab and different from the wild type. It is the same type as the version present in numerous GMO crops released in China commercially, or in field trials. (Chen, J.; Jin, M.; Qiu, Z.G.; Guo, C.; Chen, Z.L.; Shen, Z.Q.; Wang, X.W.; Li, J.W. A survey of drug resistance blá genes originating from synthetic plasmid vectors in six Chinese rivers. Environ. Sci. Tech. 2012, 46, 13448–13454. Also Sirinathsinghji, E. GM antibiotic resistance in China’s rivers. Sci. Soc. 2013, 57, 6–7.)

“Coexistence”, the idea that GMO and natural or organic agriculture can coexist, is refuted by the many examples of contamination to date. Mistakes happen, and when they involve GMOs the stakes are large.

- In the state of Washington in September, 2013, a field of non-GMO alfalfa was tested and showed positive for GMO genes. The Chinese buyer rejected the crop. Alfalfa is the fourth most valuable crop grown in the US. (http://www.theguardian.com/environment/2013/sep/12/gm-crop-contamination-alfalfa-monsanto)

- In Oregon in the spring of 2013 a strain of unapproved GMO wheat, last trialed in 2004, was found growing on a farm. The farmer could not explain how the wheat got there and the Japanese buyer rejected the crop. Wheat comprises an $8 billion export business for American farmers. (http://www.reuters.com/article/2013/05/31/us-wheat-control-idUSBRE94U06H20130531)

- In 2000 Star-Link corn, a variety which had not been approved for human consumption, was found in over 300 food products in the US. The recall of Taco Bell-branded taco shells, manufactured by Kraft Foods and sold in supermarkets, was the most publicized of the recalls. Aventis, the biotech company that had developed the corn, estimated at the time that the full recall would cost between $100 million and $1 billion. (http://en.wikipedia.org/wiki/Star-link_corn_recall)
Corporate Concentration

- The “Big 6” seed companies (Monsanto, DuPont, Syngenta, Bayer, Dow and BASF), through acquisitions and cross licensing, control the vast majority of the world’s seeds. Monsanto, DuPont, and Syngenta, the largest of the 6, themselves control over half. This consolidation by biotech companies has resulted in fewer seed varieties, higher seed costs but lower farm profits, and vigorous opposition to independent safety research while vigorously prosecuting patent infringement suits against farmers. ([https://www.morningagclips.com/consolidation-of-the-global-seed-industry/](https://www.morningagclips.com/consolidation-of-the-global-seed-industry/))

- Biotech companies in this country have been replacing natural seeds with GMO seeds. The number of available non-GMO corn seed varieties fell by 67% in the US from 2005 to 2010. But countries that ban GMOs, such as Germany, Austria, and Switzerland, have more non-GMO varieties available than in the 1990s. ([http://www.non-gmoreport.com/articles/march2013/farmers-seed-options-GMO-producing-countries.php](http://www.non-gmoreport.com/articles/march2013/farmers-seed-options-GMO-producing-countries.php))

- Because of this control, classical seed breeders at public universities and government agencies have fewer opportunities to introduce exciting, low-cost, unpatented new varieties to the public. ([http://www.ufcsusa.org/food_and agriculture/our-failing-food-system/genetic-engineering/marginalizingalternatives.html](http://www.ufcsusa.org/food_and agriculture/our-failing-food-system/genetic-engineering/marginalizingalternatives.html))

- GMO seeds are patented “intellectual property” and cannot legally be planted without a license from the seed company. Hundreds of farmers who do replant these seeds have been taken to court by Monsanto and in some cases have lost their farms as a result.


Why do Farmers Oppose GMOs?

Farmers do not want to grow crops that are rejected by discriminating buyers and seen as inferior. Organic farmers will be put out of business if GMOs are allowed to continue to contaminate non-GMO natural crops and seed. The requirements of GMO monocropping for extensive use of synthetic chemicals, insecticides and fossil fuels make those crops less attractive to farmers than crops that can be grown naturally. Corporate control of crop varieties limits farmer options and independence. Patented, licensed seeds prevent the age-old farmer practice of improving seeds by selection and saving.

Northeast Organic Farming Association/Massachusetts Chapter, Inc.

Through education and advocacy NOFA/Mass promotes organic agriculture to expand the production and availability of nutritious food from living soil for the health of individuals, communities and the planet.

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