

Support HB 2739, GE seed liability bill

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What Is The Truth About Genetically Engineered Food?

We know you hear a lot about genetically engineered, or GMO, crops and foods from their proponents, often the companies that profit from selling them or groups that are funded by them. But biotechnology in our food system and environment is not universally accepted as safe or harmless, and the concerns of those who are harmed by it, including many Oregonians, are not often talked about. We are a coalition of organizations, both state and national, which represent farmers, consumers, and Oregon voters, and we want to address the often-repeated myths around genetically engineered foods.



First, some basics: When we use the phrase genetically engineered or genetically modified organism (GMO), we mean the deliberate manipulation of a plant or animal's genes in a way that could never happen in nature. This does not include hybridization, but it does include newer techniques like gene silencing (or RNAi).

(1) **“Genetically engineered”** means produced from one or more organisms in which the genetic material has been changed through the application of:

(i) Vector-based recombinant deoxyribonucleic acid (DNA) or ribonucleic acid (RNA) techniques (like the use of bacteria as vectors to carry new genes), direct introduction of DNA or RNA into cells or organelles (like through the use of a “gene gun”) or other *in vitro* nucleic acid techniques (including processes in which DNA or RNA is prepared outside of an organism and then introduced into an organism to change its genetic material); or

(ii) Methods of fusing cells or protoplasts beyond the taxonomic family that overcome natural physiological, reproductive or recombination barriers.

(2) “Genetically engineered” does not mean resulting from conjugation, transduction, hybridization or other techniques used in traditional breeding and selection.

MYTH #1: Genetic engineering is the same as, or merely an extension of, traditional selective breeding.

REALITY: Genetic engineering is a new technology in use since the mid-1990s that was developed to overcome the barriers of traditional breeding. Traditional breeders, even those practicing artificial hybridization in a lab, have never been capable of crossing bacteria genes with corn. But now, by genetically engineering bacterial DNA into plants like corn, canola, soybeans and others, crop developers have been able to genetically engineer corn to survive when sprayed by Roundup or other herbicides. Indeed, the **vast majority** of genetically engineered crops approved by the USDA are genetically engineered to withstand herbicide spraying or to produce their own pesticides. Another recent example of GE technology being used to cross the species barrier is the genetically engineered Atlantic salmon, which was engineered to grow faster with genes from the unrelated ocean eel pout. With genetic engineering, these **entirely new organisms** can be created and released into the environment. In other words, genetic engineering circumvents the boundaries previously restricting the exchange of DNA, allowing both combinations of genetic material from totally unrelated species and the manipulation of genes within a single organism.

Because GE crops are fundamentally different from traditional breeding and have the potential for unforeseen consequences, they require different and more rigorous regulations and oversight than traditional crops.

Myth #2: GE or GMO crops reduce pesticide use



DEFINITION: “Pesticide” is an all-encompassing term for biologically active chemicals that kill or control living things, including herbicides (to kill plants), insecticides (to kill insects and invertebrates), and fungicides (to kill fungi). The federal statute governing the regulation of pesticides defines them as: “any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, . . .” 7 U.S.C. § 136(u).

Impacts of Increased Pesticide Use:

Pesticides are designed to kill living things, and therefore can be toxic to non-target organisms, including humans. Even pesticides touted as safe can turn out to have devastating impacts after more research is conducted, take DDT as a prime example. The exponential increase in glyphosate use over the last 2 decades is particularly disturbing given the recent finding that glyphosate is probably carcinogenic to humans by cancer experts at the World Health Organization, and California is likely to start labeling glyphosate products with a cancer warning label.(6) Other potentially serious health side effects from exposure to glyphosate are showing up; a very recent study on glyphosate shows an association between trace amounts of the chemical and non-alcoholic fatty liver disease in experimental animals.(7) The increase in use of other pesticides, like Bt, neonicotinoids, and fungicides have devastating impacts to pollinators, including honey bees and are linked to Colony Collapse Disorder.(8) Insecticides such as neonicotinoids, described as the "new" DDT by a Harvard professor, are now everywhere, including in Oregon's rivers, threatening a range of aquatic invertebrates including crabs and insects.(9)

Not only have GE crops caused this massive increase in glyphosate use, but the overuse of glyphosate has triggered an epidemic of glyphosate-resistant weeds, costing U.S. farmers millions of extra dollars in weed control.(10) Most disturbingly, older and more toxic herbicides are being touted as the solution to the rise of superweeds. Monsanto and Dow have already genetically engineered corn, soy, and cotton with "stacked" traits, so they are resistant to both glyphosate *and* either 2,4-D or dicamba.(11) 2,4-D is one of the ingredients in the infamous "Agent Orange" defoliant manufactured by Monsanto and used during the Vietnam War. EPA has now approved the 2,4-D and glyphosate combo for GE corn and soy, and dicamba for GE cotton and soy, despite public outcry and concern over the impacts of massive increases in use of these older and more dangerous herbicides.(12) Illegal use of dicamba on the GE crops has already caused massive damage to row crops and orchards.(13) When weeds and insects evolve resistance to Roundup and Bt, it also hurts non-GE farmers who rely on these tools, including organic farmers who use Bt.

We have already seen a massive increase in herbicide use over the life of GE crops, and are poised for a huge increase in older, less safe herbicides to combat the natural evolution of pests over-exposed to one type of pesticide. Companies like Monsanto and Dow *sell* pesticides – they did not engineer seeds to use *less* of their profitable products. They want to keep U.S. and Oregon farmers on the pesticide treadmill forever, but their claims that GE crops have reduced pesticide use are pure myths.

Endnotes:

- (1) See Relyea, R.A., 2011. "Amphibians Are Not Ready for Roundup", in J.E. Elliott et al. (eds.), *Wildlife Ecotoxicology: Forensic Approaches*, pp. 267 – 300, at 270 and Figure 9.1, available at <https://www.biology.pitt.edu/sites/default/files/facilities-images/Relyea%20286.pdf>.

- (2) USDA, Economic Research Service, *Recent Trends in GE Adoption*, <https://www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-us/recent-trends-in-ge-adoption.aspx> (last visited Jan. 27, 2017).
- (3) Benbrook, C., *Impacts of genetically engineered crops on pesticide use in the U.S. – the first sixteen years*, *Env'l Sci. Europe* 2012 24:24 (2012), available at <https://goo.gl/QnmCn0>.
- (4) Ramon Seidler, *Pesticide Use on Genetically Engineered Crops*, (Sept. 2014), http://static.ewg.org/agmag/pdfs/pesticide_use_on_genetically_engineered_crops.pdf.
- (5) USGS, Pesticide Use Maps – Glyphosate: 1992-2012. Pesticide National Synthesis Project, U.S. Geological Survey, https://water.usgs.gov/nawqa/pnsp/usage/maps/show_map.php?year=1995&map=GLYPHOSATE&hilo=L (last visited Jan. 27, 2017).
- (6) Guyton, Kathryn Z et al., *Carcinogenicity of tetrachlorvinphos, parathion, malathion, diazinon, and glyphosate*, *The Lancet Oncology*, Volume 16, Issue 5, 490 – 491, available at http://cal-ehi.org/Home_files/carcinogenicity%20of%20glyphosate.pdf; Associated Press, *California gets closer to requiring cancer warning label on Roundup weed killer*, *LA Times* (Jan. 27, 2017), <http://www.latimes.com/business/la-fi-roundup-cancer-20170127-story.html>.
- (7) Robin Mesnage et al., *Multiomics reveal non-alcoholic fatty liver disease in rats following chronic exposure to an ultra-low dose of Roundup herbicide*, *Scientific Reports* (Jan. 9, 2017) doi:10.1038/srep39328, <http://www.nature.com/articles/srep39328>.
- (8) See e.g. Wood, T. J., & Goulson, D, *The Environmental Risks of neonicotinoid pesticides: a review of the evidence post-2013*, bioRxiv, 098897 (2017), <http://biorxiv.org/content/biorxiv/early/2017/01/06/098897.full.pdf>; Mullin CA, Fine JD, Reynolds RD and Frazier MT (2016) Toxicological Risks of Agrochemical Spray Adjuvants: Organosilicone Surfactants May Not Be Safe. *Front. Public Health* 4:92. doi: 10.3389/fpubh.2016.00092, <http://journal.frontiersin.org/article/10.3389/fpubh.2016.00092/full>.
- (9) Hladik & Kolpin, *First national-scale reconnaissance of neonicotinoid insecticides in streams across the USA*, *Environmental Chemistry* 13(1) 12-20 (2015), <http://www.publish.csiro.au/en/EN15061>; Center for Food Safety, *Water Hazard: Aquatic Contamination by Neonicotinoid Insecticides in the United States* (2015) <http://www.centerforfoodsafety.org/reports/4048/water-hazard-aquatic-contamination-by-neonicotinoid-insecticides-in-the-united-states>.
- (10) Service R., *A growing threat down on the farm*, *Science* 316: 1114-1117 (2007); William Neuman & Andrew Pollack, *Farmers Cope With Roundup-Resistant Weeds*, *NY Times* (May 3, 2010), <http://www.nytimes.com/2010/05/04/business/energy-environment/04weed.html?pagewanted=all>; and see <http://weedsience.org/summary/moa.aspx?MOAID=12>.
- (11) S. Kilman, *Superweed outbreak triggers arms race*, *Wall Street Journal*, (June 4, 2010) <http://www.wsj.com/articles/SB1000142405274870402530457528439077746822>.
- (12) CFS, *After Cursory Review, EPA Proposes Dramatic Expansion of Toxic Pesticide Blend Enlist Duo*, (Nov. 1, 2016), <http://www.centerforfoodsafety.org/press-releases/4559/after-cursory-review-epa-proposes-dramatic-expansionof-toxic>

pesticide-blend-enlist-duo; CFS, Public Interest Groups, Farmers File Lawsuit Challenging Monsanto's Toxic Pesticides (Jan. 23, 2017), <http://www.centerforfoodsafety.org/press-releases/4744/public-interest-groups-farmers-file-lawsuit-challenging-monsantos-toxic-pesticides>.

- (13) Jack Kaskey & Lydia Mulvany, *Monsanto Seeds Unleash Unintended Consequences Across U.S. Farms*, Bloomberg (Sept. 1, 2016); Lorraine Chow, *Missouri's Largest Peach Farmer Sues Monsanto for Losses From Illegal Herbicide Use*, EcoWatch (Dec. 8, 2016) <http://www.ecowatch.com/missouri-peach-farm-sues-monsanto-dicamba-drift-2133507960.html>.