



# Genetically Engineered Products Violate Healthy Food Principles

A POSITION STATEMENT FROM HEALTH CARE WITHOUT HARM

**H**ealth Care Without Harm (HCWH) promotes the purchase of nutritious food that is produced, processed, and distributed in ways that are socially responsible and environmentally sustainable. Based on existing evidence, genetically engineered (GE) products violate these principles.\* Thus, HCWH opposes the production and marketing of GE foods.

Genetically engineered foods have not been adequately assessed for their effects on human health or impact on the environment. While calling for more research, HCWH advocates a precautionary approach to GE foods based on the small but growing body of scientific evidence demonstrating that GE technologies have harmful environmental and social impacts and may also potentially threaten human and animal health.

We encourage hospitals and health systems to purchase non-GE foods to the extent possible and to source from suppliers that demonstrate a commitment to providing non-GE products. To guarantee that the food you are purchasing is free of GE foods, look for third-party certified labels like “organic” and “Non-GMO Project Verified”, as well as the federally regulated label claim, “no genetically engineered ingredients”.

\* The term “genetically modified organism” (GMO) can be used to refer to broader practices of manipulating DNA in plants and animals, such as through hybridization. Health Care Without Harm uses the term “genetically engineered” in this position paper to refer explicitly to modern gene manipulation techniques that are taking place in laboratories, funded primarily by the private sector.



## BACKGROUND

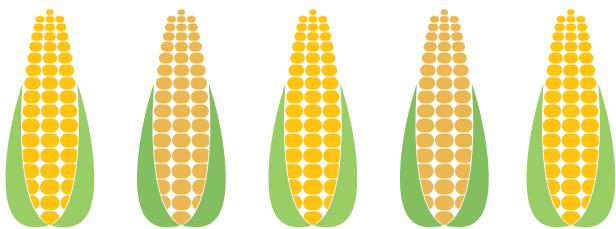
Genetic engineering of food crops is a recent technology that dates to the late twentieth century. The tools of genetic engineering allow scientists to move genetic material between organisms, including across species and kingdoms. Genetic material from one organism is inserted into another to achieve a desired trait. Genetic engineering technologies cannot be produced by farmers and must be purchased. Genetic engineering technologies are protected by patents. The two predominant traits engineered into food crops on the market today are Round-up Ready, which allows a crop to withstand the application of glyphosate herbicides and Bt (*bacillus thuringiensis*), which allows crops to produce their own pesticide.

The primary GE crops being grown in the United States are soybeans, corn, canola, and cotton with smaller quantities being grown of squash, alfalfa, sugarbeet, and papaya.<sup>1</sup> Estimates from the Grocery Manufacturers Association suggest that up to 80 percent of packaged foods in U.S. supermarkets may contain ingredients from GE food.<sup>2</sup>

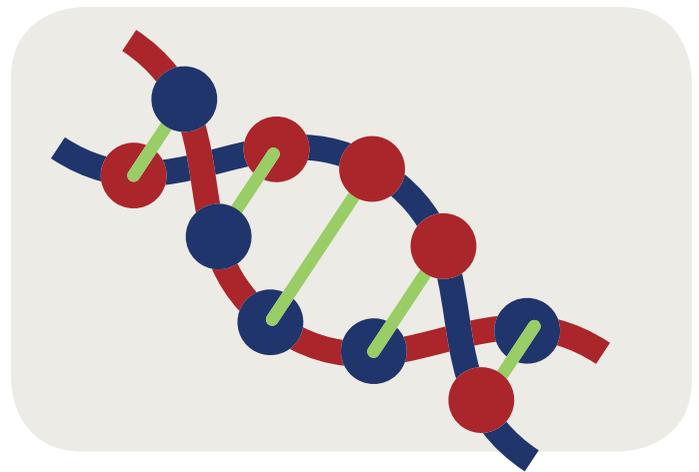
## CONSUMERS' RIGHT TO KNOW

The U.S. government does not require that food containing GE ingredients be labeled as such. As a result, many Americans consume GE foods without knowing it. Outside the United States, the situation is very different. More than 60 countries – including all of the European Union, Japan, Russia, China, and Australia – require some form of labeling of GE foods.<sup>3</sup> In February of 2011, the Parliamentary Assembly of the Council of Europe noted genetically modified organisms (GMOs) may “give rise to hazards in health, environmental, and economic terms”.

Environmental and public health advocates continue to push for labeling of GE foods in the United States. Two states, Maine and Connecticut, have passed GE labeling legislation. However, these bills will not go into effect until additional states pass labeling laws. At least 26 states have considered, or will be considering, GE labeling laws in the future.<sup>4</sup> Yet, the efforts of labeling advocates in the United States are financially dwarfed by the millions of dollars spent by commercial interests to defeat GE labeling legislation.<sup>5</sup> The economic and political clout of the GE industry threatens consumer safety and consumers’ “right to know”.



The efforts of labeling advocates in the United States are financially dwarfed by the millions of dollars spent by commercial interests to defeat GE labeling legislation.



## LACK OF SCIENTIFIC RESEARCH

Independent scientists assert that their ability to investigate the health and environmental impacts of GE crops is severely restricted by biotech companies since patent laws allow GE manufacturers to determine how their seeds are used.<sup>6</sup> As a result, independent research is often “ultimately subject to seed company approval.”<sup>7</sup> Furthermore, the increasing prevalence of industry-funded research at U.S. universities raises ethical questions about the neutrality of some academic research.<sup>8</sup>

## HUMAN HEALTH CONCERNS

The U.S. Food and Drug Administration (FDA) is responsible for determining whether GE foods are safe to eat. However, FDA policy, unchanged since the 1990s,<sup>9</sup> relies on the developer of the product to provide safety data, not independent scientific review, to assess the safety of GE foods.<sup>10</sup> The FDA rules are based on the assumption that GE foods are “generally recognized as safe,” and the agency has no requirements for long-term animal feeding studies or human monitoring programs to evaluate the safety of regularly consuming GE food.<sup>11</sup>

In general, few long-term studies have been conducted to ensure that the production and consumption of GE foods carry no adverse long-term health impacts. There is, however, emerging and compelling evidence that suggests GE foods could have a negative impact on human health.

## Antibiotic Resistance

Many GE technologies rely upon “antibiotic-resistant markers” to confirm that a new gene has been successfully introduced into a different organism. According to the Union of Concerned Scientists, “most genetically engineered foods in production today carry fully functioning genes that confer resistance to one or more antibiotics, inserted in order to help identify those cells that have successfully taken up the foreign genes.”<sup>12</sup> This is a practice that has been widely criticized: The World Health Organization has called for the use of technology without antibiotic-resistant genes,<sup>13</sup> the American Medical Association has acknowledged the risks associated with antibiotic-resistant marker gene transfers, and since 1999, the British Medical Association has been opposed to antibiotic-resistant markers, calling them an “unacceptable risk” to human health.<sup>14</sup>

Bacteria living in the human and animal gut regularly share genetic material in a process called “horizontal gene transfer”, which has been linked to the spread of antibiotic resistance.<sup>15</sup> Genetic engineering technology may contribute to the antibiotic resistance crisis, as GE antibiotic-resistant markers may be adopted by bacteria in the human gut, further proliferating the growth of antibiotic-resistant bacteria.<sup>16</sup> Two genetic engineers addressed this concern in a report published in 2012 where they pointed to the possibility for GE material to survive digestion as a sign that horizontal gene transfer could produce antibiotic-resistant disease-causing bacteria within animals.<sup>17</sup> Concerns have also been raised that people eating GE foods while taking prescribed antibiotics could find the therapeutic effectiveness of the latter blunted by the former.<sup>18</sup>

## Toxicity

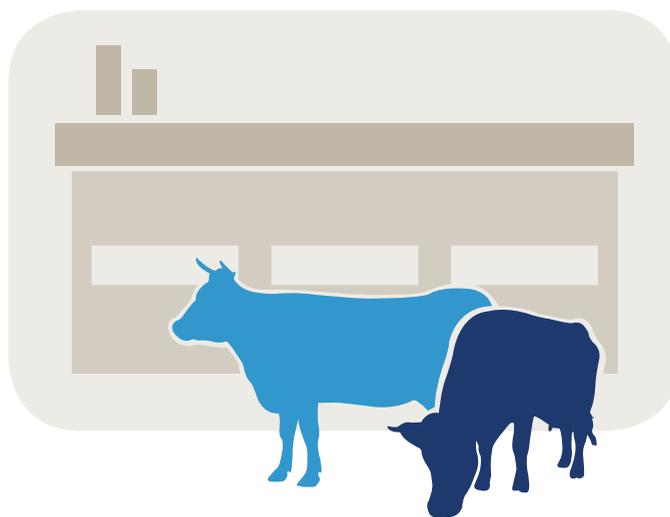
Genetic engineering can result in the production of new allergens or toxicants, or increased levels of those that naturally occur. This may be caused by the disruption of native genes, unexpected interactions between the GE genes and plant components, or the GE process itself.<sup>19</sup> Additionally, increased pesticide use that occurs alongside the planting of GE crops may contribute to increased exposure to toxicants by humans (see

below: *Increased herbicide use and Increased weed and insect resistance*). One study found residues of pesticides associated with GE foods and Bt toxins in pregnant women and the umbilical cord blood of their infants.<sup>20</sup>

.....

Many scientists believe that cloning may cause inherent defects that may be unpredictable and undetectable and that could cause food safety concerns.

.....



## Cloned and GE animals

In 2008, the FDA approved GE cloned animals for consumption.<sup>21</sup> However, many scientists believe that cloning may cause inherent defects that may be unpredictable and undetectable and that could cause food safety concerns. As one cloning scientist stated, “Even apparently normal clones have an abnormal regulation of many genes”.<sup>22</sup> The impacts of these cloned animals require long-term study to truly understand their impact. Releasing them into the food system prior to these studies could promote unintended and unrecognized negative impacts.

Despite inadequate safety testing, the FDA is moving ahead with approving GE animals. In 2013, the FDA began review on AquAdvantage salmon, a GE fish.<sup>23</sup> Concerns surrounding the fish include lessened nutritional value, elevated growth hormones, and farmed fish escapes, which pose a threat to natural fisheries worldwide.<sup>24</sup>



## ENVIRONMENTAL CONCERNS

### Increased herbicide use

One of the predominant GE traits in crops on the market worldwide is tolerance to the herbicide Round-up (glyphosate). Research demonstrates that use of Round-up Ready GE crops led to an overall increase in herbicide use in the United States from 1996 to 2011.<sup>25</sup> A host of new herbicide-tolerant crops are in the pipeline at the USDA, including IFT-resistant soy, 2,4-D resistant soy and corn, and dicamba-resistant soy and cotton. These herbicides are known toxicants. For example, the class of chemicals to which 2,4-D belongs (chlorophenoxy herbicides) has been linked to reproductive defects and is classified as possibly carcinogenic. 2,4-D is also one of the ingredients of the defoliant Agent Orange.<sup>26</sup>

### Increased weed and insect resistance

Weeds and insect pests can and do develop resistance to GE crops.<sup>27</sup> Scientists warn that the appearance of herbicide-resistant weeds, or “superweeds”, is requiring farmers to apply more herbicides and toxic chemicals,<sup>28</sup> leading to more chemical contamination of our food and of the environment. In 2010, *the New York Times* reported on the outbreak of Roundup-resistant weeds, noting that the problem has been growing nationwide since 2000.<sup>29</sup>

Insect resistance to GE crops is also a concern. Bt crops are engineered to act as their own insecticide using genetic material from *bacillus thuringiensis*, a naturally occurring bacterium. While Bt has been used as a topical insecticide since 1920, the widespread uptake of genetically engineered Bt corn, soy, and cotton has dramatically increased the prevalence of Bt in the agricultural environment, leading to the potential for more rapid development of pest resistance.<sup>30</sup> One example is Bt resistance found in field populations of the diamondback moth.<sup>31</sup> A meta-analysis of 41 studies found that resistance was species-dependent and that planting refuges of non-Bt host plants may delay resistance.<sup>32</sup>



### Threats to non-target species and soil ecology

Although there remains scientific controversy about the implications of the findings, lab studies and field trials have shown that GE crops can harm beneficial, non-targeted organisms, such as butterflies and other insects and wildlife.<sup>33</sup> This points to the potential for some GE crops to negatively affect ecosystem services like pollination, impacting food production and supply.

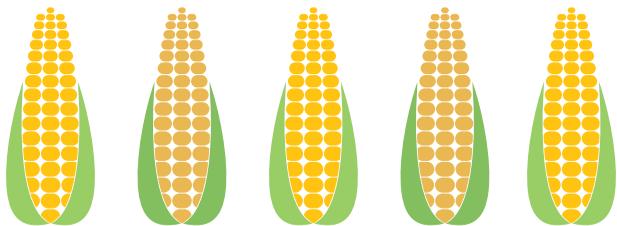
## THREATS TO ORGANIC AGRICULTURE

Genetic engineering poses both ecological and political challenges to organic agriculture. The use of genetic engineering is not allowed under USDA organic standards – this includes the prohibition of GE seeds, crops, and animals. Organic dairy cows and livestock must be fed GE-free feed.

Although proponents of GE crops argue that GE

and organic agriculture can co-exist, there have been documented cases of GE contamination of food and feed supplies.<sup>34</sup> This is particularly true for many organic farmers who feel they cannot protect themselves from natural pollen drifts and cross-pollination, which threatens to contaminate their non-GE crops and thereby their organic certification. The widespread use of GE seeds has also led to a culture of fear for U.S. farmers afraid of violating seed patents.<sup>35</sup>

The development of Bt-resistant pests is of particular concern to organic farmers who rely on the topical use of Bt as a form of emergency pest control.<sup>36</sup> If insects evolve widespread resistance to engineered Bt crops, organic farmers could face uncontrollable infestations.<sup>37</sup> Consequently, it is important to conduct more research to understand the impact of GE farming within diverse agricultural systems, including conventional non-GE and organic cultivation.<sup>38</sup>



Health Care Without Harm encourages health care providers to take action by requesting and preferentially purchasing non-GE foods from suppliers.

## RECOMMENDATIONS FOR HOSPITALS

Based on the available evidence of risks to human and animal health and to ecosystems, unresolved uncertainties about the full scope and scale of those

risks, and concerns about threats to sustainable food production from genetic engineering, HCWH encourages health care providers to take action by requesting and preferentially purchasing non-GE foods from suppliers. Health professionals can also urge policymakers to support food and agricultural regulations that protect the food supply, promote non-GE alternatives, and require the labeling of GE foods.



### Specific steps hospitals can take

- *Survey suppliers.* Since foods with GE ingredients are not currently labeled in the United States, hospital food service providers face challenges in avoiding them. Nonetheless, hospitals can let their food suppliers know that they are interested in sourcing non-GE foods, including those that carry third-party certified labels of “organic” and “non-GMO project verified”, as well as the federally regulated label claim “no genetically engineered ingredients”.
- *Avoid common GE ingredients.* Most GE foods are from three main crops: soy, corn, and canola. Hospitals can also look for the least-processed products with fewer ingredients. Additionally, buying organic food also insures against the use of GE crops, as USDA organic standards preclude the use of genetic engineering.
- *Advocate for robust regulation of GE crops.* Health professionals can play a key role in demanding regulations that will protect the food supply and require strict safety rules. This includes support for GE labeling.
- *Lobby against the approval of food from cloned or GE animals.* Hospitals should join public health, environmental, consumer, and animal welfare advocates in urging legislators to ban the marketing of food products from cloned and GE animals.



## REFERENCES

- <sup>1</sup> USDA. 2013. Adoption of Genetically Engineered Crops in the United States. Economic Research Service, <http://www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-us/documentation.aspx#.UuBFr7SIZ1s>
- <sup>2</sup> Non-GMO Project. 2014. "What is GMO? | Agricultural Crops That Have a Risk of Being GMO," <http://www.nongmoproject.org/learn-more/what-is-gmo/>;
- PR Newswire. 2014. "Studies Show GMOs in Majority of U.S. Processed Foods, 58 Percent of Americans Unaware of Issue," <http://www.prnewswire.com/news-releases-test/studies-show-gmos-in-majority-of-us-processed-foods-58-percent-of-americans-unaware-of-issue-104510549.html>.
- <sup>3</sup> Green America. 2012. "Who Requires Labels?" Green America: Economic Action for a Just Planet. <http://www.greenamerica.org/pubs/greenamerican/articles/AprilMay2012/Who-requires-GMO-labels.cfm>.
- <sup>4</sup> Just Label It. 2013. <http://justlabelit.org/>
- <sup>5</sup> Just Label It. 2013. "GMA Dumps \$5 Million Into Defeating I-522," <http://justlabelit.org/gma-dumps-another-5-million-into-defeating-i-522/>.
- <sup>6</sup> Stutz, Bruce. 2010. "Companies Put Restrictions On Research into GM Crops," *Yale Environment* 360. [http://e360.yale.edu/feature/companies\\_put\\_restrictions\\_on\\_research\\_into\\_gm\\_crops/2273/](http://e360.yale.edu/feature/companies_put_restrictions_on_research_into_gm_crops/2273/).
- <sup>7</sup> Just Label It. 2013.
- <sup>8</sup> Kloppenburg, Jack. 2005. *First the Seed: The Political Economy of Plant Biotechnology*, Cambridge: Cambridge University Press.
- <sup>9</sup> FDA. 2013. "Biotechnology," <http://www.fda.gov/food/foodscienceresearch/biotechnology/default.htm>.
- <sup>10</sup> FDA. 2007. "Consultation Procedures under FDA's 1992 Statement of Policy - Foods Derived from New Plant Varieties," <http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/Biotechnology/ucm096126.htm>.
- <sup>11</sup> Marden, Emily. 2003. *Risk and Regulation: U.S. Regulatory Policy on Genetically Modified Food and Agriculture*, 44 B.C.L. Rev. 733, <http://lawdigitalcommons.bc.edu/bclr/vol44/iss3/2>.
- <sup>12</sup> Union of Concerned Scientists. 2013. "Genetic Engineering Risks and Impacts," [http://www.ucsusa.org/food\\_and\\_agriculture/our-failing-food-system/genetic-engineering/risks-of-genetic-engineering.html](http://www.ucsusa.org/food_and_agriculture/our-failing-food-system/genetic-engineering/risks-of-genetic-engineering.html).
- <sup>13</sup> World Health Organization. 2014. "20 questions on genetically modified foods," [www.who.int/foodsafety/publications/biotech/20questions/en/](http://www.who.int/foodsafety/publications/biotech/20questions/en/).
- <sup>14</sup> British Medical Association. 2004. "Submission of the British Medical Association to the Health and Community Care Committee On The Health Impact Of Gm Crop Trials." Biosafety Information Centre. <http://www.biosafety-info.net/article.php?aid=34>.
- <sup>15</sup> OECD. 2010. Safety Assessment of Transgenic Organisms, Volume 4: OECD Consensus Document, 171-174.
- <sup>16</sup> Eckelkamp, Claudia, Manuela Jäger and Beatrix Tappeser. 1998. "Survival, Persistence, Transfer - An Update on Current Knowledge on GMOs and the Fate of their Recombinant DNA," Study for the German Environmental Protection Agency, *Institute For Applied Ecology*. <http://online.sfsu.edu/~rone/GFEssays/Survival%20PersistenceTransfer.htm>; J. van der Vossen, et.al.. 1998. "Development and application of an in vitro intestinal tract model for safety evaluation of genetically modified foods" in *Food Safety Evaluation of Genetically Modified Foods as a Basis for Market Introduction*, 81-99.
- <sup>17</sup> Antoniou, Michael, John Fagan and Claire Robinson. 2012. "GMO Myths and Truths." Earth Open Source. [http://earthopensource.org/files/pdfs/GMO\\_Myths\\_and\\_Truths/GMO\\_Myths\\_and\\_Truths\\_1.2.pdf](http://earthopensource.org/files/pdfs/GMO_Myths_and_Truths/GMO_Myths_and_Truths_1.2.pdf).
- <sup>18</sup> Netherwood, T. et.al.. 2004. "Assessing the survival of transgenic plant DNA in the human gastrointestinal tract." *National Biotechnology* 22,: 204-209; Heritage, John. 2004. "The fate of transgenes in the human gut." *National Biotechnology*, 22: 170-72.; C. Tebbe, et. al.. 2004. "Überleben der Untersuchungsstämme und Persistenz ihrer rekombinanten DNA" *BioEngineering*, 6 no.94: 14-21.; U.S. Food and Drug Administration. 1998. "Guidance for Industry: Use of Antibiotic Resistance Marker Genes in Transgenic Plants." Draft guidance for comment. <http://www.cfsan.fda.gov/~dms/opa-armg.html>.
- <sup>19</sup> Center for Science in the Public Interest. 2014. "Biotechnology Project FAQ." <http://www.cspinet.org/biotech/faq.html#29>.
- <sup>20</sup> Aris A, Leblanc S. 2011. "Maternal and fetal exposure to pesticides associated to genetically modified foods in Eastern Townships of Quebec, Canada." *Reproductive Toxicology*, 31 no. 4: 528-533.
- <sup>21</sup> Center for Veterinary Medicine, FDA. 2008. "Animal Cloning: A Risk Assessment," <http://www.fda.gov/downloads/AnimalVeterinary/SafetyHealth/AnimalCloning/UCM124756.pdf>.
- <sup>22</sup> Jaenisch, Rudolf and Ian Wilmut. 2001. "Don't Clone Humans," *Science*, Vol. 291, No. 5513, 2552.
- <sup>23</sup> FDA. 2013. "Animal and Veterinary General Q&A." <http://www.fda.gov/AnimalVeterinary/DevelopmentApprovalProcess/GeneticEngineering/GeneticallyEngineeredAnimals/ucm113605.htm>.
- <sup>24</sup> Ocean Conservancy. 2013. "Genetically Engineered Salmon," <http://www.oceanconservancy.org/our-work/aquaculture/aquaculture-genetically.html>.
- <sup>25</sup> Benbrook, Charles. 2012). "Impacts of genetically engineered crops on pesticide use in the U.S. – the first sixteen years." *Environmental Sciences Europe*. 24:24, <http://www.enveurope.com/content/pdf/2190-4715-24-24.pdf>
- <sup>26</sup> Pesticide Action Network North America. "Bad Idea: New GE Seeds," <http://www.panna.org/current-campaigns/24D>
- <sup>27</sup> Nandula, V.K. et.al.. 2005. "Glyphosate-resistant weeds: current status and future outlook." *Outlooks on Pest Management* 16:183-187.
- <sup>28</sup> Ohio State Extension and Purdue Extension. 2000. "Fighting Weeds in Biotech Crops Takes Skill." *Ag Answers: Business and Science of Agriculture*, <http://www.agriculture.purdue.edu/agcomm/aganswers/story.asp?storyID=2167>; Johnson, Andrea.

2005."Research shows value of pre-emergent herbicide in glyphosate systems." *Farm & Ranch Guide (Mandan)*; Burchett, Andrew. 2005. "Glyphosate Resistant Weeds On the Move." *Farm Journal*.

<sup>29</sup> Neuman, William and Andrew Pollack. 2010. "Farmers Cope With Roundup-Resistant Weeds," *the New York Times*, <http://www.nytimes.com/2010/05/04/business/energy-environment/04weed.html?pagewanted=all>.

<sup>30</sup> Altieri, Miguel. 2004. *Genetic Engineering in Agriculture*. Oakland: Food First Books.

<sup>31</sup> Morin, Shai, Robert W. Biggs, Timothy J. Dennehy, Judith K. Brown, Bruce E. Tabashnik, Mark S. Sisterson, Laura Shriver, Christa Eilers-Kirk, Dawn Higginson, Daniel Holley, Linda J. Gahan, David G. Heckel, and Yves Carrière. 2003. "Three cadherin alleles associated with resistance to *Bacillus thuringiensis* in pink bollworm." *Proceedings of the National Academy of Sciences of the United States of America* 100, no. 9: 5004-5009

<sup>32</sup> Tabashnik, Rensburg, and Carriere. 2009. Field Evolved Insect Resistance to Bt Crops. *Journal of Economic Entomology*. 102(6): 2011-2025.

<sup>33</sup> EPA FIFRA Scientific Advisory Panel. 2000. SAP Report No. 99-06, February 4, 2000, <http://www.epa.gov/scipoly/sap/1999/december/report.pdf>; A. Watkinson, et.al. 2000. "Predictions of Biodiversity Response to Genetically Modified Herbicide-Tolerant Crops." *Science*, 289: 1554-57; J. Losey, et.al. 1999. "Transgenic pollen harms monarch larvae." *Nature* 399 :214; Angelika Hilbeck, et.al. 2000. "Review of Non-target organisms and Bt-plants." Report to Greenpeace; Hoagland, R.E., Reddy, K.N., and R.M. Zablotowicz. 1999. "Effects of glyphosate on *Bradyrhizobium japonicum* interactions in Roundup-Ready soybeans," *Weed Science Society of America Annual Meeting Abstracts*, 39, <http://www.biotech-info.net/bradyrhizobium.html> ; King, C., Purcell, L., and E. Vories. 1999. "Plant growth and nitrogenase activity of glyphosate-tolerant soybeans in response to foliar application," *Agronomy Journal*, 93: 179-186, <http://agron.scijournals.org/cgi/content/full/93/1/179>.

<sup>34</sup> Bunin, Lisa. 2014. "USDA Policy Fails to Address GE Contamination of Organic Crops," Center for Food Safety, <http://www.centerforfoodsafety.org/blog/2946/usda-policy-fails-to-address-ge-contamination-of-organic-crops>.

<sup>35</sup> GM Contamination Register. 2013. "GM Contamination Register," <http://www.gmcontaminationregister.org/>.

<sup>36</sup> Center for Food Safety. 1999. "Greenpeace, Center for Food Safety and organic farmers sue EPA over gene-altered crops," <http://www.centerforfoodsafety.org/press-releases/947/greenpeace-center-for-food-safety-and-organic-farmers-sue-epa-over-gene-altered-crops>.

<sup>37</sup> Clark, E. Ann. "Re: BT Natural vs. GMO toxin release." *ibiblio*. <http://www.ibiblio.org/london/SoilWiki/message-archives/JoeCummins/msg00172.html>; National Research Council (NRC), Board on Agriculture. 2000. *Genetically Modified Pest-Protected Plants: Science and Regulation*. National Academy Press. [http://www.nap.edu/openbook.php?record\\_id=9795&page=R5](http://www.nap.edu/openbook.php?record_id=9795&page=R5); Center for Food Safety. 1999.

<sup>38</sup> Council of Europe, Committee on the Environment, Agriculture and Local and Regional Affairs. 2011. "Genetically modified organisms: a solution for the future?" [www.assembly.coe.int/Communication/Projetderesolution\\_E.pdf](http://www.assembly.coe.int/Communication/Projetderesolution_E.pdf).



## Genetically Engineered Products Violate Healthy Food Principles: A Position Statement from Health Care Without Harm

November 2014

Health Care Without Harm seeks to transform the health sector worldwide, without compromising patient safety or care, to become ecologically sustainable and a leading advocate for environmental health and justice.

This paper was produced by Health Care Without Harm's national Healthy Food in Health Care program, which harnesses the purchasing power and expertise of the health care sector to advance the development of a sustainable food system.

Visit [www.noharm.org](http://www.noharm.org) for more information.

