

Genetically Modified Foods Unsafe? Evidence that Links GM Foods to Allergic Responses Mounts

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Genetically modified (GM) foods are inherently unsafe, and current safety assessments are not competent to protect us from or even identify most dangers. Overwhelming evidence to support this conclusion is now compiled in the book *Genetic Roulette: The documented health risks of genetically engineered foods*, which presents an abundance of adverse findings and theoretical risks associated with GM foods.¹

The book documents lab animals with damage to virtually every system studied; thousands of sick, sterile, or dead livestock; and people around the world who have traced toxic or allergic reactions to eating GM products, breathing GM pollen, or touching GM crops at harvest. It also exposes many incorrect assumptions that were used to support GM approvals. This article, excerpted from my book, summarizes some of the findings related to allergic and immune responses.

GM Soy and Allergies

Soy allergies jumped 50% in the U.K. just after GM soy was introduced.² If GM soy was the cause, it may be due to several things. The GM protein that makes Roundup Ready Soy resistant to the herbicide does not have a history of safe use in humans and may be an allergen. In fact, sections of its amino acid sequence are identical to known allergens.³

A portion of the transgene from ingested GM soybeans, along with the promoter that switches it on, transfers into human gut bacteria during ingestion.⁴ The fact that the transformed bacteria survives applications of Roundup's active ingredient, glyphosate, suggests that the transgene continues to produce the Roundup Ready protein. If true, then long after people stop eating GM soy they may be constantly exposed to its potentially allergenic protein, which is being created within their gut. (This protein may be made more allergenic due to misfolding, attached molecular chains, or rearrangement of unstable transgenes, but there is insufficient data to support or rule out these possibilities.¹)

Studies suggest that the GM transformation process may have increased natural allergens in soybeans. The level of one known allergen, trypsin inhibitor, was 27% higher in raw GM soy varieties. More worrisome, it was as much as sevenfold higher in cooked GM soy compared to cooked non-GM soy.⁵ Not only is this higher amount potentially harmful, the finding also suggests that the trypsin inhibitor in GM soy might be more heat stable and, therefore, even more allergenic than the natural variety.⁶

It is also possible that changes in GM soy DNA may produce new allergens. Although there has never been an exhaustive analysis of the proteins or natural products in GM soy, unpredicted changes in the DNA were discovered. A mutated section of soy DNA was found near the transgene, which may contribute to some unpredicted effects. Moreover, between this scrambled DNA and the transgene is an extra transgene fragment, not discovered until years after soy was on the market.⁷ The RNA produced is completely unexpected. It combines material from all three sections: the full-length transgene, the transgene fragment, and the mutated DNA sequence. This RNA is then further processed into four different variations,⁸ which might lead to the production of some unknown allergen.

Another study verified that GM soybeans contain an IgE-binding allergenic protein not found in nonGM soy controls, and that one of eight subjects who showed a skin-prick allergic reaction to GM soy had no reaction to nonGM soy.⁹ Although the sample size is small, the implication that certain people react only to GM soy is huge.

The increased residue of Roundup herbicide in GM soy might contribute to increased allergies.¹⁰ In fact, the symptoms identified in the U.K. soy allergy study are among those related to glyphosate exposure. The allergy study identified irritable bowel syndrome, digestion problems, chronic fatigue, headaches, lethargy, and skin complaints including acne and eczema.²

Symptoms of glyphosate exposure include nausea, headaches, lethargy, skin rashes, and burning or itchy skin.¹¹ It is also possible that glyphosate's breakdown product, AMPA, which accumulates in GM soybeans,^{12,13} might contribute to allergies.

Finally, mice fed GM soy had reduced levels of pancreatic enzymes.^{14,15} When protein-digesting enzymes are suppressed, proteins may last longer in the gut, allowing more time for an allergic reaction to take place. Any reduction in protein digestion could therefore promote allergic reactions to a wide range of proteins, not just to the GM soy.

Bt Toxin Triggers Immune Response

Bt toxin is consistently associated with immune and allergic-type responses. Although the unpredicted consequences of the GM transformation process might also contribute to allergic reactions from Bt crops, evidence suggests that the Bt toxin itself is a major factor. The Bt proteins found in most currently registered Bt-corn varieties would not pass the allergy test protocol described in the 2001 FAO/WHO report,¹⁶ because they have amino acid sections identical with known allergens¹⁷ and are too stable in simulated digestive solutions.^{18,19}

Furthermore, immune responses are triggered by both the natural Bt toxin in spray form and Bt crops. The concentration of Bt toxin in crops, however, can be thousands of times higher than in sprays;²⁰ and changes in its protein structure make the crop version more likely to provoke reactions in humans.^{21,22}

Additional evidence:

- When populations were exposed to Bt spray, hundreds complained of allergic reactions; exposed farm workers

also exhibited antibody responses.^{23–27}

- Indian farm workers exposed to Bt cotton developed moderate or severe allergic reactions.²⁸
- Bt toxin fed to mice induced a significant immune response and an increased reactivity to other substances.^{29–31}
- Male rats fed MON 863 Bt corn had a significant increase in three types of blood cells related to the immune system: basophils, lymphocytes, and total white cell counts.³²
- Thousands of consumers complained to food manufacturers about possible reactions to StarLink corn,³³ and an expert panel determined that its Bt protein had a “medium likelihood” of being a human allergen.³⁴

The consistency between the reactions related to Bt sprays and those reported by Bt-cotton workers is astounding. The Bt spray was associated with sneezing, runny nose, watery eyes, skin inflammation and irritation, rashes, itching and burning, swelling, red skin and eyes, exacerbations of asthma, facial swelling, and fever. Some people required hospitalization.^{23,24} Bt-cotton workers in India reported sneezing, runny nose, watery eyes, skin eruptions, itching and burning, red skin and eyes, facial swelling, and fever. Some people required hospitalization.²⁸ The two lists are nearly identical—only “exacerbations of asthma” was on the spray list and not the other.

Asthma and breathing difficulties were reported by Filipinos who inhaled Bt-corn pollen.³⁵ They also described swollen faces, flu-like symptoms, fever, and sneezing. Some individuals in both India and the Philippines also reported long-term effects after exposure. The list of symptoms in the Philippines, however, did contain items not reported by the other two groups. These included coughs, headache, stomachache, dizziness, diarrhea, vomiting, weakness, and numbness.³⁶

Toxicity and Reproductive Problems

In addition, there is substantial evidence of toxicity and reproductive effects associated with GM foods. Sheep that grazed on Bt-cotton plants in India, for example, exhibited nasal discharge, reddish and erosive mouth lesions, cough, bloat, diarrhea, and occasional red-colored urine. Shepherds report that 25% of their herds died within 5–7 days. Post mortems on some of the estimated 10,000 dead sheep in the region indicated toxic reactions.³⁷ Rats fed Bt corn showed toxicity in their livers and kidneys.³⁸ And farmers link Bt corn with deaths among cows,³⁹ water buffalo, horses, and chickens,³⁶ as well as sterility in thousands of pigs or cows.¹ Animal feeding studies with Roundup Ready soy indicated toxic livers,⁴⁰ altered sperm cells,⁴¹ significant changes in embryo development,⁴² and a fivefold increase in infant mortality, among others.⁴³

Our understanding of DNA has progressed rapidly since genetic engineering was applied to food crops, and many key safety assumptions have been proven wrong. Perhaps some day scientists will be able to safely and predictably alter food crops for the benefit of mankind and the environment.

Until then, it is not responsible to risk the health of the entire population with this infant science or to release these crops into the ecosystem where they may self-propagate for generations. An immediate ban of GM foods and crops is more than justified.

Notes

1. Smith, J.M. Genetic Roulette: The Documented Health Risks of Genetically Engineered Foods (Yes! Books, Fairfield, IA, 2007).

2. Townsend, M. Why soya is a hidden destroyer. Daily Express, Mar 12, 1999.
3. Kleter, G.A. & Peijnenburg, A.A.C.M. Screening of transgenic proteins expressed in transgenic food crops for the presence of short amino acid sequences identical to potential, IgE-binding linear epitopes of allergens. *BMC Struct. Biol.* 2 (2002): 8–19.
4. Netherwood et al. Assessing the survival of transgenic plant DNA in the human gastrointestinal tract. *Nature Biotech.* 22 (2004): 2.
5. Padgett, S.R. et al. The composition of glyphosate-tolerant soybean seeds is equivalent to that of conventional soybeans. *J. of Nutrition* 126, no. 4 (1996).
6. Pusztai, A. & Bardocz, S. GMO in animal nutrition: potential benefits and risks. Ch. 17, *Biology of Nutrition in Growing Animals* (Elsevier, 2005).
7. Windels, P. et al. Characterisation of the roundup ready soybean insert. *Eur. Food Res. Technol.* 213 (2001): 107–112.
8. Rang, A. et al. Detection of RNA variants transcribed from the transgene in roundup ready soybean. *Eur. Food Res. Technol.* 220 (2005): 438–443.
9. Yum, H. et al. Genetically modified and wild soybeans: an immunologic comparison. *Allergy and Asthma Proceedings* 26, no. 3 (May–Jun 2005): 210–216.
10. Benbrook, C. Genetically engineered crops and pesticide use in the United States: The First Nine Years. October 2004.
11. Cox, C. Herbicide fact sheet: glyphosate. *J. of Pest. Reform* 24, no. 4 (Winter 2004).
12. Duke, S.O. et al. Isoflavone, Glyphosate and aminomethylphosphonic acid levels in seeds of glyphosate-treated, glyphosateresistant soybean. *J. Agric. Food Chem.* 51 (2003): 340–344.
13. Sandermann, H. Plant biotechnology: ecological case studies on herbicide resistance. *Trends in Plant Sci.* 11, no. 7 (Jul 2006): 324–328.
14. Malatesta, M. et al. Ultrastructural analysis of pancreatic acinar cells from mice fed on genetically modified soybean. *J. of Anat.* 201, no. 5 (Nov 2002): 409.
15. Malatesta, M. et al. Fine structural analyses of pancreatic acinar cell nuclei from mice fed on GM soybean. *Eur. J. Histochem.* 47 (2003): 385–388.
16. FAO/WHO. “Evaluation of allergenicity of genetically modified foods.” (FAO/WHO, Jan 22–25, 2001).
17. Gendel. The use of amino acid sequence alignments to assess potential allergenicity of proteins used in genetically modified foods. *Advan. in Food and Nutrition Research* 42 (1998): 45–62.

18. Noteborn, H.P.J.M. Assessment of the stability to digestion and bioavailability of the LYS mutant Cry9C protein from *Bacillus thuringiensis* serovar tolworthi. Unpublished study to EPA (AgrEvo, EPA MRID No. 447343-05, 1998).
19. Engel, K. et al. Genetically modified foods: safety issues. American Chemical Society Symposium Series 605 (Washington DC, 1995): 134–47.
20. Mendelsohn, M. et al. Are Bt crops safe? *Nature Biotech.* 21, no. 9 (2003): 1003–1009.
21. Dutton, A. et al. Uptake of Bt-toxin by herbivores feeding on transgenic maize and consequences for the predator *Chrysoperla carnea*. *Ecol. Entomology* 27 (2002): 441–7.
22. Romeis, J., Dutton, A., & Bigler, F. *Bacillus thuringiensis* toxin (Cry1Ab) has no direct effect on larvae of the green lacewing *Chrysoperla carnea* (Stephens) (Neuroptera: Chrysopidae). *J. of Insect Phys.* 50, no. 2–3 (2004): 175–183.
23. Washington State Dept. of Health. “Report of health surveillance activities: asian gypsy moth control program (Washington State Dept. of Health, Olympia, WA, 1993).
24. Green, M. et al. Public health implications of the microbial pesticide *Bacillus thuringiensis*: an epidemiological study, Oregon, 1985–86. *Amer. J. Public Health* 80, no. 7 (1990): 848–852.
25. Noble, M.A., Riben, P.D., & Cook, G.J. Microbiological and epidemiological surveillance program to monitor the health effects of Foray 48B BTK spray (Ministry of Forests, Vancouver, B.C., Sept 30, 1992).
26. Swadener, C. *Bacillus thuringiensis*. *J. of Pest. Reform* 14, no. 3 (Fall 1994).
27. Samples, J.R. & Buettner, H. Ocular infection caused by a biological insecticide. *J. Infectious Dis.* 148, no. 3 (1983): 614.
28. Gupta, A. et al. “Impact of Bt cotton on farmers’ health (in Barwani and Dhar district of Madhya Pradesh)” (Investigation Report, Oct–Dec 2005).
29. Vazquez et al. Intragastric and Intraperitoneal Administration of Cry1Ac protoxin from *Bacillus thuringiensis* induces systemic and mucosal antibody responses in mice. *Life Sci.* 64, no. 21 (1999): 1897–1912.
30. Vazquez et al. Characterization of the mucosal and systemic immune response induced by Cry1Ac protein from *Bacillus thuringiensis* HD 73 in mice. *Brazilian J. of Med. and Biol. Research* 33 (2000): 147–155.
31. Vazquez et al. *Bacillus thuringiensis* Cry1Ac protoxin is a potent systemic and mucosal adjuvant. *Scandinavian J. of Immunology* 49 (1999): 578–584.
32. Burns, J.M. 13-week dietary subchronic comparison study with MON 863 corn in rats preceded by a 1-week baseline food consumption determination with PMI certified rodent diet #5002. (Monsanto Co. report, Dec 17,

2002).

33. Freese, B. The StarLink affair. Submission by Friends of the Earth to the FIFRA scientific advisory panel considering assessment of additional scientific information concerning StarLink corn (Jul 17–19, 2001).

34. Assessment of additional scientific information concerning StarLink corn (FIFRA scientific advisory panel report, No. 2001–09, Jul 2001).

35. Smith, J.M. Bt-maize (corn) during pollination, may

trigger disease in people living near the cornfield (Press release, Feb 2004).

36. Ho, M. GM ban long overdue, dozens ill & five deaths in the Philippines (ISIS press release, Jun 2, 2006).

37. Mortality in sheep flocks after grazing on Bt cotton fields—Warangal district (Andhra Pradesh report of the preliminary assessment, Apr 2006).

38. Seralini, G., Cellier, D., & Spiroux de Vendomois, J. New analysis of a rat feeding study with a genetically modified maize reveals signs of hepatorenal toxicity. *J. archives of Env. Contam. and Toxicology* (Springer, New York).

39. Strodthoff, H. & Then, C. Is GM maize responsible for deaths of cows in Hesse? Greenpeace e.V. 22745

(Greenpeace, Hamburg, Germany, Dec 2003).

40. Malatesta, M. et al. Ultrastructural morphometrical and immunocytochemical analyses of hepatocyte nuclei from mice fed on genetically modified soybean. *Cell Struct. Funct.* 27 (2002): 173–180.

41. Vecchio, L. et al. Ultrastructural analysis of testes

from mice fed on genetically modified soybean.

Eur. J. of Histochem. 48, no. 4 (Oct–Dec 2004):449–454.

42. Oliveri et al. Temporary depression of transcription in mouse pre-implantation embryos from mice fed on genetically modified soybean. (48th Symposium of the Society for Histochemistry, Lake Maggiore, Italy, Sept 7–10, 2006).

43. Ermakova, I. Genetically modified soy leads to the decrease of weight and high mortality of rat pups of the first generation. Preliminary studies. *Ecosinform* 1 (2006): 4–9.

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