Washington Law Review

Volume 89 | Number 2

6-1-2014

Much Ado about Something: The First Amendment and Mandatory Labeling of Genetically Engineered Foods

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MUCH ADO ABOUT SOMETHING: THE FIRST AMENDMENT AND MANDATORY LABELING OF GENETICALLY ENGINEERED FOODS

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INTRODUCTION

Since first becoming commercially available in the mid-1990s, genetically engineered varieties of certain major food crops have come to dominate the American agricultural landscape. More than eighty percent of the corn and ninety percent of the soybeans grown in the United States are now produced from genetically engineered (GE) seed.[1]

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1. *Recent Trends in GE Adoption*, ECON. RES. SERV., U.S. DEP'T OF AGRIC., http://www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-us/recent-trends-in-ge-adoption.aspx (last updated July 9, 2013).

Correspondingly, food containing ingredients produced through biotechnology has become ubiquitous—if not readily apparent—in American grocery markets. The Congressional Research Service estimates that two-thirds of processed conventional foods contain ingredients produced through genetic engineering.[2]

The proliferation of GE foods[3] has raised concerns about possible adverse impacts, which have in turn prompted calls for laws requiring that such foods be labeled. Sixty-four countries around the world now require labeling of GE foods,[4] up from fewer than twenty in 2003.[5] Although surveys reveal that Americans overwhelmingly support mandatory labeling,[6] efforts to enact legislation have encountered stiff, well-funded opposition from manufacturers of GE seed and the processed food industry. Citizens' initiatives that would have imposed labeling requirements were narrowly defeated in California in 2012 and in Washington the following year.[7] And although bills in Connecticut and Maine have been signed into law, labeling of GE foods sold in those states will not be required until certain conditions, including the enactment of similar laws in other states, have been met.[8] To date, only

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2. TADLOCK COWAN, CONG. RESEARCH SERV., RL32809, AGRICULTURAL BIOTECHNOLOGY: BACKGROUND AND RECENT ISSUES 6 (2011), *available at* http://justlabelit.org/wp-content/uploads/2011/09/CRS%20Agricultural_Biotechnology2011.pdf.

3. Throughout this Article, the phrase "GE foods" refers to any food containing at least one ingredient produced through genetic engineering.

4. *See International Labeling Laws*, CTR. FOR FOOD SAFETY, http://www.centerforfoodsafety.org/issues/976/ge-food-labeling/international-labeling-laws (last visited July 22, 2013).

5. Colin A. Carter, & Guillaume P. Gruère, *Mandatory Labeling of Genetically Modified Foods: Does It Really Provide Consumer Choice?*, 6 J. AGROBIOTECHNOLOGY MGMT. & ECON. 68, 68–70 (2003), *available at* http://www.agbioforum.org/v6n12/v6n12a13-carter.htm.

6. THOMSON REUTERS, NATIONAL SURVEY OF HEALTHCARE CONSUMERS: GENETICALLY ENGINEERED FOOD 4 (2010), *available at* http://www.justlabelit.org/wp-content/uploads/2011/09/NPR_report_GeneticEngineeredFood-1.pdf; *see, e.g.*, Carey Gillam, *U.S. Consumer Groups Demand GMO Labeling, Question Food Safety*, REUTERS (Mar. 27, 2012), http://www.reuters.com/article/2012/03/27/usa-food-idUSL2E8ERK7C20120327 (ninety-one percent support GE food labeling); Allison Kopicki, *Strong Support for Labeling Modified Foods*, N.Y. TIMES (July 27, 2013), http://www.nytimes.com/2013/07/28/science/strong-support-for-labeling-modified-foods.html (ninety-three percent of Americans support GMO labeling).

7. California's Proposition 37 and Washington's Initiative 522 were defeated by margins of 51.4%–48.6% and 51.09%–48.91%, respectively. CAL. SEC'Y OF STATE DEBRA BROWN, STATEMENT OF VOTE: NOVEMBER 6, 2012, GENERAL ELECTION (2012), *available at* http://www.sos.ca.gov/elections/sov/2012-general/sov-complete.pdf; *Initiative to the Legislature 522 Concerns Labeling of Genetically-Engineered Foods*, WASH. SECRETARY OF ST., http://vote.wa.gov/results/20131105/State-Measures-Initiative-to-the-Legislature-522-Concerns-labeling-of-genetically-engineered-foods.html (last updated Nov. 26, 2013).

8. An Act Concerning Genetically-Engineered Food, 2013 Conn. Legis. Serv. P.A. 13–183 (West) (to be codified at CONN. GEN. STAT. § 21a-92); An Act to Protect Maine Food Consumers'

one state, Vermont, has passed a GE food labeling law with a specified effective date.[9]

The passage of similar legislation in other jurisdictions seems increasingly likely. In 2013, state legislators in twenty-six states introduced GE food labeling bills.[10] In early 2014, the Grocery Manufacturers Association (GMA), a leading opponent of mandatory labeling, itself proposed federal legislation that would establish standards for voluntary labeling and would effectively preempt states from imposing stricter requirements.[11] In the meantime, the GMA and other labeling opponents prepare to challenge existing and prospective state laws on several constitutional grounds. First, they will likely contend that certain existing federal laws, including those that prohibit misbranding and require disclosure of certain nutritional information, preempt states from requiring labels on GE foods. Second, they will likely assert that any state law would violate the commerce clause. Third, they will likely argue that compulsory labeling would infringe on producers' First Amendment rights by obligating them to communicate information to consumers they would rather not disclose.

This Article evaluates the free speech implications of laws requiring that GE foods be labeled and concludes that such regulations would meet all First Amendment requirements for compelled commercial speech. Part I traces the history of food labeling in the United States, the advent of genetic engineering, and the application of that technology in agriculture and the food industry. Part II evaluates the scope of commercial free speech and the appropriate test to be applied in determining whether a GE food labeling law would violate the First Amendment. Part III examines the impacts of an agricultural and food system increasingly dominated by GE crops. It explains how controversy

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Right to Know about Genetically Engineered Food, 2014 Me. Laws ch. 436 (HP 490) (LD 718).

9. *See* An Act Relating to the Labeling of Food Produced with Genetic Engineering, H.B. 112, 2013–2014 Leg. Sess. (Vt. 2014) (to be codified at 9 VT. STAT. ANN. tit. 9, §§ 3041–3048), *available at* http://www.leg.state.vt.us/docs/2014/Acts/ACT120.pdf; Vermont Journal of the House 2250 (2014) (the Act was signed by Vermont's Governor on May 8, 2014, and is scheduled to become effective in July 2016).

10. These states are Alaska, Arizona, Colorado, Connecticut, Florida, Hawaii, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Minnesota, Missouri, Nevada, New Hampshire, New Jersey, New Mexico, New York, Oregon, Pennsylvania, Rhode Island, Tennessee, Vermont, Washington, and West Virginia. *State Labeling Initiatives*, CTR. FOR FOOD SAFETY, http://www.centerforfoodsafety.org/files/ge-state-labeling-fact-sheet-42014_69728.pdf (last visited Dec. 21, 2013).

11. Jenny Hopkinson & Helena Bottemiller Evich, *Food Industry to Fire Preemptive GMO Strike*, POLITICO (Jan. 7, 2014), http://www.politico.com/story/2014/01/gmo-labeling-bill-101853.html.

over a single issue, whether GE foods pose a potential risk to human health, has stunted the debate over whether mandatory labeling serves a useful purpose by diverting attention from other material impacts. It concludes that greater consumer and public awareness of the adverse environmental, economic, cultural, and social impacts of GE foods would serve a substantial government interest.

I. BACKGROUND

A. History of Food Labeling

For most of human history, there was little reason to label food for retail sale. Food was typically sold in its natural state, or at least in some easily recognizable form, so buyers could rely on their physical senses both to identify it and to determine its quality. And because most food was purchased and consumed in proximity to where it was produced, sellers understood that it might be unwise to offer goods that their customers and neighbors could readily identify as inferior.[12]

By the mid-1800s, advances in packaging, storage, and transportation—canning, refrigeration, and rail networks, primarily—opened new, distant markets for many food products.[13] Their increased distance from these markets created new opportunities for producers to improve their profit margins by compromising on quality.[14] By the end of the nineteenth century, adulteration of food emerged as a common and often dangerous problem.[15]

To distinguish their goods from inferior ones, producers increasingly turned to branding and trademarks.[16] Unscrupulous sellers responded by misbranding their products or resorting to other forms of fraud, prompting calls for government oversight over the production and sale of food products.[17] In 1906, Congress passed both the Pure Food and

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12. Mira Wilkins, *When and Why Brand Names in Food and Drink?*, *in* ADDING VALUE: BRANDS AND MARKETING IN FOOD AND DRINK 15, 18 (Geoffrey Jones & Nicholas J. Morgan eds., 1994).

13. *Id.* at 26.

14. *See, e.g.*, Spencer Henson & Bruce Traill, *The Demand for Food Safety: Market Imperfections and the Role of Government*, FOOD POLICY, Apr. 1993, at 158 (discussing the effects of "informational asymmetries" in commercial markets).

15. FOOD LABELING: TOWARD NATIONAL UNIFORMITY 41 (Donna V. Porter & Robert O. Earl eds., 1992).

16. 2 THE ADVERTISING AGE ENCYCLOPEDIA OF ADVERTISING 755 (John McDonough & Karen Egolf eds., 2003).

17. Ilyse D. Barkan, *Industry Invites Regulation: The Passage of the Pure Food and Drug Act of 1906*, 75 AM. J. PUB. HEALTH 18, 20–21 (1985).

Drug Act,[18] the first federal law prohibiting the misbranding of food items, and the Meat Inspection Act,[19] which required that manufacturers identify themselves and substantiate any claims regarding quality.[20] The Food, Drug, and Cosmetic Act of 1938 declared any food "misbranded . . . [i]f its labeling is false or misleading in any particular"[21] and imposed civil and criminal penalties for violations.[22]

Scientific advances in the latter half of the twentieth century triggered a second wave of food labeling laws. Unlike earlier laws that restricted what producers and manufacturers could say, these new regulations required producers and manufacturers to convey information deemed important for consumers to know.[23] An improved understanding of human nutritional needs and the relationships between food and human health gave the Food and Drug Administration (FDA) a basis to promulgate its initial regulations on nutrition labeling in 1973.[24] In 1990, Congress passed the Nutrition Labeling and Education Act (NLEA), requiring the disclosure of nutritional profiles.[25] In the years since, other affirmative labeling requirements have been imposed, including country-of-origin labeling for meat products[26] and mandatory disclosure of common food allergens.[27] These and other food labeling requirements first imposed in the United States have been widely adopted around the

18. Pure Food and Drug Act, ch. 3915, 34 Stat. 768 (1906) (codified at 21 U.S.C. §§ 1–15 (repealed 1938)).

19. Meat Inspection Act, ch. 3913, 34 Stat. 674 (1906), *substantially amended by* Wholesome Meat Act, Pub. L. 90-201, 81 Stat. 584 (1967).

20. Peter Barton Hutt, *Regulating the Misbranding of Food*, 43 FOOD TECH. 288, (Sept. 1989), *in* FOOD AND DRUG LAW: CASES AND MATERIALS 37 (Peter Barton Hutt & Richard A. Merrill eds., 2d ed. 1991).

21. Federal Food, Drug, and Cosmetic Act (FDCA), Pub. L. No. 75-717, § 403(a), 52 Stat. 1040, 1047 (1938) (codified at 21 U.S.C. § 343(a) (2012)).

22. *Id.* § 303, 52 Stat. at 1043 (codified as amended at 21 U.S.C. § 333 (2012)).

23. Fred R. Shank, *The Nutrition Labeling and Education Act of 1990*, 47 FOOD & DRUG L.J. 247, 248 (1992).

24. Regulations for the Enforcement of the Federal Food, Drug, and Cosmetic Act and the Fair Packaging and Labeling Act: Nutrition Labeling, 38 Fed. Reg. 2125 (Jan. 19, 1973).

25. Nutrition Labeling and Education Act of 1990, Pub. L. No. 101-535, sec. 2, 104 Stat. 2353. Congress's express intent in passing the NLEA was to educate the public and provide people the information necessary to make informed decisions. As a concession to producers, the NLEA authorized producers to make certain health claims. *See* Mara A. Michaels, Comment, *FDA Regulation of Health Claims under the Nutrition Labeling and Education Act of 1990: A Proposal for a Less Restrictive Scientific Standard*, 44 EMORY L.J. 319, 322–23 (1995).

26. *See* Farm Security and Rural Investment Act of 2002, Pub. L. No. 107-171, sec. 10816, 116 Stat. 134, 533–35 (codified as amended at 7 U.S.C. § 1638 (2012)).

27. *See* Food Allergen Labeling and Consumer Protection Act of 2004, Pub. L. No. 108-282, 118 Stat. 905.

world.

There is, however, one trend in food product labeling that the United States neither pioneered nor, despite widespread adoption overseas and broad public support at home, has thus far followed. While sixty-four nations around the world, including China, India, Japan, South Korea, Australia, Brazil, South Africa, and all of the nations of the European Union, now require that foods produced through genetic engineering be labeled,[28] attempts in the United States to enact federal legislation that requires labeling have failed, and only Vermont has passed a state law compelling disclosure that is not conditioned on the enactment of similar laws in other states.

B. Genetically Engineered Foods

Genes are discrete segments of an organism's chromosomes that code for certain proteins, which in turn determine the physical traits of that organism. An organism's genetic code, also known as its genome, is in essence the biochemical blueprint that defines that organism as a unique physical and biological being. Traditional plant breeding and animal husbandry manipulate this process through the selective breeding of individual organisms with desirable characteristics to create new organisms with these favored traits. Natural reproductive mechanisms limit how much any individual organism can differ genetically from its parents or, for that matter, from other members of its species. These mechanisms also limit the pace at which any new line of organisms with selected traits can be developed.

Because every organism has a genetic composition that is different from either of its parents, traditional plant and animal breeding is, in the most literal sense, a form of genetic modification. Today, however, the phrase "genetically modified" refers primarily to the insertion through biotechnology of a gene from one organism into the genome of a different organism.[29] While there are numerous biotechnological techniques by which a "transgene" can be inserted,[30] the result is always

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28. *See International Labeling Laws*, *supra* note 4.

29. The phrases "genetically modified," "genetically modified organism," and "GMO" are susceptible to misinterpretation, specifically, to claims that they describe organisms that include those bred through traditional breeding techniques. The phrase "genetically engineered" is therefore considered a more accurate description of organisms created through biotechnology.

30. Initial genetic engineering efforts involved the use of recombinant DNA and biological vectors such as plasmids and viruses to carry foreign genes into cells. Methods now used include microinjection; electro- and chemical poration, by which electric current or chemicals facilitate the entry of the foreign gene through the cell membranes of the host organism; and bioballistics, by

an organism with a genome that does not occur in nature and is infinitely unlikely ever to occur through natural means.

In the 1940s, scientists discovered that a gene could be spliced from one organism and inserted into the genome of another, even that of a different species, phylum, or kingdom.[31] Efforts were soon underway to transfer foreign genes—and thereby introduce novel physical characteristics—into useful organisms, including food crops. In the early 1990s, geneticists successfully developed a GE tomato that ripened more slowly after picking.[32] In 1994, following a two-year review, the FDA approved the Flavr Savr tomato for retail sale in the United States.[33]

The Flavr Savr proved a commercial failure, with production ceasing by 1997, but its introduction ushered in a new era of industrial agriculture featuring GE commodity crops. Today, approximately eighty-five percent of corn, ninety-one percent of soybeans, and eighty-eight percent of cotton produced in the United States are genetically engineered.[34] While most early efforts to develop GE crops focused, as in the case of the Flavr Savr, on the possible benefits to consumers through such characteristics as prolonged shelf life or improved flavor or nutrition, the dominant emphasis today is on the introduction of traits intended to simplify farming, primarily through crop varieties that withstand the application of broad spectrum chemical herbicides and those that generate their own insecticides.[35] Concerns about the known and potential adverse impacts of such crops and the food made from them have spurred calls for mandatory labeling of GE foods, a requirement that producers of GE crops and foods contend would infringe on their First Amendment rights.

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which the foreign gene is attached to metal slivers and propelled into a cell. *See* Sophia Kolehmainen, *Precaution Before Profits: An Overview of Issues in Genetically Engineered Food and Crops*, 20 VA. ENVTL. L. J. 267, 270–72 (2001).

31. *See* Joshua Lederberg & E.L. Tatum, *Gene Recombination in* Escherichia Coli, 158 NATURE 558 (1946).

32. CLIVE JAMES & ANATOLE F. KRATTIGER, THE INT'L SERV. FOR THE ACQUISITION OF AGRI-BIOTECH APPLICATIONS, GLOBAL REVIEW OF THE FIELD TESTING AND COMMERCIALIZATION OF TRANSGENIC PLANTS, 1986 TO 1995: THE FIRST DECADE OF CROP BIOTECHNOLOGY 23 (1996), *available at* http://www.isaaa.org/resources/publications/briefs/01/download/isaaa-brief-01-1996.pdf.

33. KEITH REDENBAUGH ET AL., SAFETY ASSESSMENT OF GENETICALLY ENGINEERED FRUITS AND VEGETABLES: A CASE STUDY OF THE FLAVR SAVR™ TOMATO 288 (1992), *available at* http://www.crcpress.com/product/isbn/9780849348037.

34. *About Genetically Engineered Foods*, CTR. FOR FOOD SAFETY, http://www.centerforfoodsafety.org/issues/311/ge-foods/about-ge-foods#showJoin (last visited Apr. 27, 2014).

35. *See infra* Part III.

II. THE FIRST AMENDMENT, COMPELLED COMMERCIAL SPEECH, AND LABELING OF GE FOODS

A. Restrictions on Speech

The First Amendment's declaration that "Congress shall make no law . . . abridging the freedom of speech"[36] manifests our "profound national commitment to the free exchange of ideas."[37] The unfettered exchange of ideas[38] buttresses political and social discourse by allowing competition within the "marketplace of ideas" to test the truth and the wisdom of competing beliefs.[39] The values served by the First Amendment differ, however, depending on the content, purpose, and type of speech. Protection of traditional speech derives primarily from respect for the speaker's autonomy.[40] Political speech earns additional protection because it fosters the "uninhibited, robust, and wide-open" debate considered essential to democratic self-governance[41] and helps ensure that government remains responsive to the views of those it serves.[42] Protection of commercial speech—defined as speech made in conjunction with a proposed commercial transaction[43]—serves a different and more specific interest: the open availability of commercial information benefits consumers by empowering them with knowledge to aid their decision-making,[44] and thereby promotes an efficient and healthy free enterprise system.[45]

Because it serves a more narrow set of interests, commercial speech

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36. U.S. CONST. amend. I.

37. Harte-Hanks Commc'ns, Inc. v. Connaughton, 491 U.S. 657, 686 (1989).

38. Buckley v. Valeo, 424 U.S. 1, 14 (1976) (quoting Roth v. United States, 354 U.S. 476, 484 (1957)).

39. *See* Abrams v. United States, 250 U.S. 616, 630 (1919) (Holmes, J., dissenting) ("[T]he ultimate good desired is better reached by free trade in ideas—that the best test of truth is the power of the thought to get itself accepted in the competition of the market . . . .").

40. *See* Jennifer L. Pomeranz, *Compelled Speech Under the Commercial Speech Doctrine: The Case of Menu Label Laws*, 12 J. HEALTH CARE L. & POL'Y 159, 166 (2009).

41. New York Times Co. v. Sullivan, 376 U.S. 254, 270 (1964).

42. Robert Post, *The Constitutional Status of Commercial Speech*, 48 UCLA L. REV. 1, 4 (2000).

43. City of Cincinnati v. Discovery Network, Inc., 507 U.S. 410, 423 (1993); Zauderer v. Office of Disciplinary Counsel, 471 U.S. 626, 637 (1985).

44. Cent. Hudson Gas & Elec. Corp. v. Pub. Serv. Comm'n, 447 U.S. 557, 561–62 (1980) ("Commercial expression not only serves the economic interest of the speaker, but also assists consumers and furthers the societal interest in the fullest possible dissemination of information."); *see also* Pomeranz, *supra* note 40, at 167.

45. Va. Pharmacy Bd. v. Va. Citizens Consumer Council, 425 U.S. 748, 763–66 (1976).

occupies a "subordinate position" in First Amendment jurisprudence.[46] Courts subject regulations restricting commercial speech to an intermediate level of scrutiny, evaluating them under the four-step analysis set forth in *Central Hudson Gas & Electric Corp. v. Public Service Commission of New York*.[47] Under this approach, courts must evaluate four factors: (1) whether the expression is protected by the First Amendment, meaning that it concerns lawful activity that is not false, misleading, or deceptive; (2) whether the asserted government interest being promoted by the restriction is substantial; (3) whether the regulation directly advances the asserted government interest; and (4) whether the restriction is more extensive than necessary to serve that interest.[48]

B. Compelled Speech

The First Amendment safeguards not only the freedom to speak, but also the freedom not to speak.[49] The rights to speak and not to speak have been deemed "complementary components of the broader concept of 'individual freedom of mind.'"[50] A regulation requiring an individual to espouse state-sponsored orthodoxy that conflicts with his own religious, political, or ideological beliefs violates this principle no less than one prohibiting that person from expressing those personal beliefs.[51]

As discussed above, laws restricting commercial speech are subject to a lower level of scrutiny than those restricting traditional or political speech. In similar fashion, a regulation compelling commercial speech must meet a lower level of scrutiny than one that compels other types of speech. In *Zauderer v. Office of Disciplinary Counsel*,[52] the Supreme

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46. *See* Bd. of Trustees of State Univ. of N.Y. v. Fox, 492 U.S. 469, 477 (1989) (quoting Ohralik v. Ohio State Bar Ass'n, 436 U.S. 447, 456 (1978)) ("Our jurisprudence has emphasized that 'commercial speech [enjoys] a limited measure of protection, commensurate with its subordinate position in the scale of First Amendment values,' and is subject to 'modes of regulation that might be impermissible in the realm of noncommercial expression.'"). In fact, it was not until 1976 that the Supreme Court recognized the First Amendment's applicability to commercial speech. *See Va. Pharmacy Bd.*, 425 U.S. at 763–66.

47. 447 U.S. 557 (1980).

48. *Id.* at 566.

49. Wooley v. Maynard, 430 U.S. 705, 714 (1977).

50. *Id.* (quoting W. Va. State Bd. of Educ. v. Barnette, 319 U.S. 624, 637 (1943)).

51. *See Barnette*, 319 U.S. at 642 ("If there is any fixed star in our constitutional constellation, it is that no official, high or petty, can prescribe what shall be orthodox in politics, nationalism, religion, or other matters of opinion or force citizens to confess by word or act their faith therein.").

52. 471 U.S. 626 (1985).

Court held that a law compelling commercial speech is constitutional if the disclosure requirement bears a reasonable relationship to the government's interest in enacting that regulation.[53] In that case, the Court upheld the constitutionality of an Ohio law requiring advertisements for legal services done on a contingency fee basis to also disclose whether clients were liable for costs regardless of the outcome of their cases.[54] It determined that the state had a legitimate interest in preventing consumer deception, and that the subject lawyer's advertisement was sufficiently vague and potentially deceptive to warrant discipline by the state bar association.[55]

The more lenient standard established by the Court in *Zauderer* recognizes that the commercial market cannot be relied upon to ensure dissemination of material information that may dissuade a potential consumer from making a purchase.[56] It also reflects the principle that commercial speech deserves protection not primarily for the sake of advertisers, but for the value it provides to consumers.[57] In this sense, the mandatory disclosure of commercial information that is both factual and accurate serves to promote rather than inhibit the interests the First Amendment is intended to serve.[58]

C. Zauderer *Should Apply to Mandatory Labeling of GE Foods*

Any regulation requiring that GE foods be labeled should be subject to analysis under *Zauderer*'s rational-relationship test. Those challenging such a regulation will contend that *Zauderer* applies only to law compelling factual disclosures that serve a single government interest: preventing consumer deception. They will likely base their argument on the Court's statement in *Zauderer* that disclosure requirements pertaining to lawyer advertising are constitutional if they are "reasonably related to the State's interest in *preventing deception of consumers*."[59] With that statement the Court rejected Zauderer's contention that mandatory disclosure requirements must "serve[] some

53. *Id.* at 651.

54. *Id.* at 651–53.

55. *Id.* at 652–53.

56. ARCHON FUNG, MARY GRAHAM & DAVID WEIL, FULL DISCLOSURE: THE PERILS AND PROMISE OF TRANSPARENCY 6 (2007).

57. *See* Cent. Hudson Gas & Elec. Corp. v. Pub. Serv. Comm'n, 447 U.S. 557 (1980); Va. Pharmacy Bd. v. Va. Citizens Consumer Council, 425 U.S. 748 (1976).

58. *See* Jennifer M. Keighley, *Can You Handle the Truth? Compelled Commercial Speech and the First Amendment*, 15 U. PA. J. CONST. L. 539, 551–53 (2012).

59. *Zauderer*, 471 U.S. at 651 (emphasis added).

substantial governmental interest other than preventing deception."[60]

However, nothing in the Court's opinion suggests that it intended its holding be limited to regulations that compel speech *and* are designed to prevent consumer deception. The Court rooted its decision in what it characterized as the "material differences between disclosure requirements and outright prohibitions on speech."[61] The regulation at issue did not prevent attorneys from conveying information to the public; it merely required them to provide "purely factual and uncontroversial information" that they otherwise might choose not to disclose.[62] While an interest in preventing consumer deception motivated Ohio to compel commercial speech in *Zauderer*, the Court's reasoning would apply equally to commercial speech compelled in service of other state interests.

Concerns over possible consumer deception play a central role in case law addressing compelled commercial speech. Many disputes over the constitutionality of compelled commercial disclosures have arisen from regulations that place limits on advertisements for certain professional services. This results in large part from concerns that, due to the sophisticated nature of professions such as law and medicine, advertisements for professional services create heightened risks of consumer deception.[63] However, the prominent role that consumer deception plays in the case law simply reflects the fact that mandatory disclosures are often used to address that particular concern.[64]

Indeed, courts have applied *Zauderer* in their evaluations of mandatory disclosure laws intended to serve interests other than the prevention of consumer deception. In *National Electrical Manufacturers Ass'n v. Sorrell*,[65] the Court of Appeals for the Second Circuit examined a Vermont law requiring manufacturers of certain products containing mercury to disclose that fact and describe methods for proper disposal.[66] Recognizing the state's significant interest in protecting human health

60. *Id.* at 650.

61. *Id.*

62. *Id.* at 651.

63. *See In re* R.M.J., 455 U.S. 191, 200 (1982) (quoting Bates v. State Bar of Ariz., 433 U.S. 350, 383 (1977)).

64. *See* Pomeranz, *supra* note 40, at 176–77 (explaining that *Zauderer* should not be read to apply solely to disclosure requirements that address consumer confusion); Dayna B. Royal, *The Skinny of the Federal Menu-Labeling Law & Why It Should Survive a First Amendment Challenge*, 10 FIRST AMEND. L. REV. 140, 161–71 (2011) (analyzing precedent and concluding that consumer deception is not a prerequisite for *Zauderer* to apply).

65. 272 F.3d 104 (2d Cir. 2001).

66. *Id.* at 107.

and the environment from mercury contamination, the court reasoned that the labeling requirement was rationally related to the state's goal of reducing pollution because it would promote changes in consumer behavior that would reduce mercury contamination.[67] The court upheld the requirement, ruling that the First Amendment right not to speak is not infringed upon when there is a "rational connection between the purpose of a commercial disclosure requirement and the means employed to realize that purpose."[68]

The First Circuit has also rejected the argument that *Zauderer* applies only to mandatory disclosures intended to prevent consumer deception.[69] Maine's Unfair Prescription Drug Practices Act required pharmacy benefit managers to disclose information regarding conflicts of interest and financial arrangements with third parties. In *Pharmaceutical Care Management Ass'n v. Rowe*,[70] the court found that the disclosure requirements were "reasonably related" to several state interests and therefore did not violate the First Amendment.[71] Although the prevention of consumer deception was one such interest, the court expressly rejected the argument that *Zauderer* applied only to disclosure requirements intended to curb consumer deception.[72] Similarly, the Court of Appeals for the D.C. Circuit concluded in *SEC v. Wall Street Publishing Institute, Inc.*,[73] that "disclosure requirements have been upheld in regulation of commercial speech even when the government has not shown that 'absent the required disclosure, [the speech would be false or deceptive] or that the disclosure requirement serves some substantial government interest other than preventing deception.'"[74]

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67. *Id.* at 115.

68. *Id.*; *see also* N.Y. State Restaurant Ass'n v. N.Y.C. Bd. of Health, 556 F.3d 114, 133 (2d Cir. 2009) (rejecting the argument that *Sorrell* was incorrectly decided and reaffirming that *Zauderer*'s rational basis review applies to compelled commercial disclosure cases regardless of whether consumer deception or confusion is implicated).

69. Pharm. Care Mgmt. Ass'n v. Rowe, 429 F.3d 294 (1st Cir. 2005).

70. *Id.*

71. *Id.* at 310.

72. *Id.* at 310 n.8 ("[Petitioner] states that the holding in *Zauderer* is 'limited to potentially deceptive advertising directed at consumers.' None of the cases it cites, however, support this proposition, and we have found no cases limiting *Zauderer* in such a way." (internal citations omitted)).

73. 851 F.2d 365 (D.C. Cir. 1988).

74. *Id.* at 373–74 (quoting Zauderer v. Office of Disciplinary Counsel, 471 U.S. 626, 650 (1985)). Not all federal courts of appeals agree. *See, e.g.*, United States v. Philip Morris USA Inc., 566 F.3d 1095, 1144–45 (D.C. Cir. 2009) (suggesting that for a disclosure requirement to be found constitutional under *Zauderer*, it must be designed to thwart efforts to mislead consumers).

D. Mandatory Labeling of GE Foods Would Be Constitutional Even Under Central Hudson

Although courts should apply the standard established by the Supreme Court in *Zauderer* to mandatory labeling requirements for GE foods, some courts could decide to apply the *Central Hudson* test instead.[75] Even under that analysis, however, a law requiring labeling of GE foods should survive a First Amendment challenge. The disclosure that a product contains ingredients produced through genetic engineering would be "purely factual,"[76] thus satisfying the requirement that the expression concerns lawful activity that is not "false, deceptive, [or] misleading"[77] Mandatory disclosure would also satisfy the requirement[78] that the regulation "directly advanc[e] a substantial government interest."[79] As discussed in Part III, *infra*, there are substantial government interests related to GE crops and GE foods, including concerns about their environmental, economic, social, and cultural impacts. Finally, a GE food labeling law would, as required by *Central Hudson*, require action no more extensive than necessary to serve the government interest. It is hard to imagine a more restrained mechanism to promote the government's interest in alerting consumers to the impacts of GE foods than merely requiring producers to identify such foods. A mandatory labeling law would neither prohibit the cultivation of GE crops nor prevent food manufacturers from using ingredients produced through genetic engineering. It would merely require that a single factual, truthful, and unbiased statement be made on food packaging to allow consumers to make better-informed decisions.

III. PUBLIC AND GOVERNMENT INTERESTS SERVED BY MANDATORY LABELING OF GE FOODS

The debate over whether the mandatory labeling of GE foods would

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75. In *Zauderer*, the Court defined the scope of constitutional compelled commercial speech; in *Central Hudson*, it addressed the scope of permissible restrictions on commercial speech (specifically, a prohibition on promotional advertising by an electrical utility). The Court recognized the significance of this distinction. *See Zauderer*, 471 U.S. at 650 (recognizing "material differences between disclosure requirements and outright prohibitions on speech").

76. *Id.* at 651.

77. Cent. Hudson Gas & Elec. Corp. v. Pub. Serv. Comm'n, 447 U.S. 557, 576 (1980).

78. This formulation combines *Central Hudson* elements (2) and (3). *See supra* Part II.A.

79. Milavetz, Gallop & Milavetz, P.A. v. United States, 559 U.S. 229, 249 (2010) (alteration in original) (quoting *Cent. Hudson Gas & Elec. Corp.*, 447 U.S. at 566) (internal quotation marks omitted).

advance a substantial government interest has thus far revolved around a single issue: whether GE foods pose any risk to human health. The weight of the evidence now available supports the conclusion that no GE crop that has been approved for commercial sale nor any food made from such crops has caused any adverse human health impacts.[80] However, the safety or potential toxicity of any particular GE crop variety can be established only through testing of that strain.[81] In other words, even if GE foods now commercially available pose no health risk, no claim can be made that genetic engineering of food crops will always result in a product that is safe for human consumption.[82]

This potential risk helps explain, at least in part, the American public's overwhelming support for mandatory labeling of GE foods. Yet consumer interest is, at least according to one federal appeals court, insufficient of itself to warrant the mandatory labeling of food products. In *International Dairy Foods Ass'n v. Amestoy*,[83] a divided panel of the Second Circuit struck down a Vermont statute that required the labeling of milk and milk products from cows injected with the synthetic hormone rBST.[84] In passing the labeling law, the Vermont legislature relied solely on the fact that there was strong consumer interest in this information.[85] It offered no additional or alternative bases for the labeling requirement. But the court held that consumer curiosity is, standing alone, inadequate to justify compelled speech, even if the information subject to mandatory disclosure is both factual in nature and objectively true.[86] Central to the court's ruling was the failure of the law's proponents to offer any evidence that milk from cows injected with rBST had any adverse impacts on human health or, for that matter, on anything else.[87]

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80. Michael White, *The Scientific Debate About GM Foods Is Over: They're Safe*, PACIFIC STANDARD (Sept. 23, 2013), http://www.psmag.com/navigation/health-and-behavior/scientific-debate-gm-foods-theyre-safe-66711/.

81. Society of Toxicology, *The Safety of Genetically Modified Foods Produced Through Biotechnology*, 71 TOXICOLOGICAL SCIENCES 2 (2003).

82. Notably, the FDA neither conducts nor requires independent safety assessments of GE foods, so approval of any new GE food crop is based only on testing conducted and funded by developers and manufacturers of that new strain. The agency's position is outlined in a 1992 draft policy statement, which recommends that producers of new GE strains adopt certain non-mandatory testing protocols and encourages consultation with FDA should harmful effects be found. Statement of Policy: Foods Derived from New Plant Varieties, 57 Fed. Reg. 22,984 (May 29, 1992).

83. 92 F.3d 67 (2d Cir. 1996).

84. *Id.* at 73–74.

85. *See id.* at 73.

86. *Id.*

87. The ruling did, however, draw a strong dissenting opinion in which it was argued that strong

The singular focus on whether GE foods pose any risk to human health has hobbled the debate over whether GE foods should be labeled. Opponents of labeling point to a history of safety,[88] while proponents cite concerns based on sound science about potential health impacts.[89] On these terms, the dispute over whether labeling provides any value to consumers is unresolvable. Genetically engineered crops and GE foods do, however, have significant and known impacts of which the public is largely unaware. It is these impacts for which a strong government interest exists that consumers be informed.

A. Environmental Impacts

The advent of GE crops in the mid-1990s spurred hope that technology could mitigate or even reverse many of the adverse environmental impacts caused by modern agriculture. Genetic engineering would, it was hoped, confer drought or salt tolerance, allowing crops to be grown in conditions not hospitable to traditional varieties and reducing the need for irrigation. It would improve yields and per-acre productivity and thereby slow the pace at which natural landscapes worldwide are being converted to agricultural use. It would reduce reliance on chemical pesticides, herbicides, and fertilizers.[90]

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consumer interest and the public's right to know should be strongly considered in determining whether a compulsory disclosure meets First Amendment requirements. *Id.* at 75 (Leval, J., dissenting). The dissenting judge analogized the possible unknown health impacts of rBST milk to the many instances in which risks posed by prescription drugs were revealed only after they received FDA approval and were made available to consumers. *Id.* at 76–77 (An "agency's conclusion regarding a product's safety, reached after limited study, is not a guarantee and does not invalidate public concern for unknown side effects.").

88. *See, e.g.*, Alessandro Nicolia et al., *An Overview of the Last 10 Years of Genetically Engineered Crop Safety Research*, 34 CRITICAL REVS. BIOTECHNOLOGY 77 (2014).

89. In October 2013, for example, scientists in the European Union challenged the assertion that a scientific consensus exists that GE foods are safe, citing "widespread recognition of risks" posed by GE foods and crops. *See Scientists State: There Is No Consensus on GMO Safety*, BIOSCIENCE RESOURCE PROJECT (Oct. 21, 2013), http://www.bioscienceresource.org/2013/10/scientists-state-there-is-no-scientific-consensus-on-gmo-safety/. The Union of Concerned Scientists has identified a range of potential risks that include increased herbicide and pesticide resistance, the inadvertent creation of new allergens and toxins, and the enhancement of the environment for toxic fungi. *Risks of Genetic Engineering*, UNION OF CONCERNED SCIENTISTS, http://www.eng.uerj.br/~fariasol/disciplinas/Monitoramento%20Ambiental/GMOs/books/Risks%20of%20Genetic%20Engineering%20_%20Union%20of%20Concerned%20Scientists.pdf (last updated Oct. 30, 2002).

90. The Food and Agriculture Organization of the United Nations has, for example, identified improved productivity—meaning drought, salt tolerance, and other hardiness characteristics—and reduction of chemical inputs as "[p]otential benefits for the environment." *Weighing the GMO Arguments: For*, FOOD AND AGRIC. ORG. OF THE U.N. (Mar. 2003), http://www.fao.org/english/newsroom/focus/2003/gmo7.htm.

Serious, well-intentioned, and well-funded research and development efforts to achieve these goals continue, but the performance of GE crops on these measures has thus far been poor. No GE strain of any food crop now available offers better drought tolerance than traditional hybrid varieties.[91] In 2002, the U.S. Department of Agriculture (USDA) published a study concluding that genetic engineering had failed to increase the yield potential of any crop variety.[92] A more recent comprehensive study confirmed this conclusion, finding that traditional breeding should be "solely credited with the intrinsic-yield increases in the United States and other parts of the world that characterized the agriculture of the twentieth century."[93]

While GE crops have merely failed to meet expectations of improved drought tolerance or yield, they have actually intensified farmers' reliance on and use of chemical herbicides. Among the most popular GE crops on the market today are strains of commodity crops that have been developed to withstand the application of glyphosate, a broad-spectrum systemic herbicide sold as Roundup.[94] The rapid adoption of so-called "Roundup Ready" crops has caused massive increases in the use of

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91. A maize variety developed by Monsanto, MON87460, was hailed as the first GE crop designed to tolerate drought conditions. Charles Abbott, *U.S. Approves Monsanto Drought-Tolerant GM Corn*, REUTERS (Dec. 22, 2011), http://reut.rs/KyB8pX. However, the USDA's assessment of this strain led it to conclude that many corn varieties produced through conventional breeding techniques and already on the market were at least as effective in managing water use. USDA, MONSANTO COMPANY PETITION (07-CR-191U) FOR DETERMINATION OF NON-REGULATED STATUS OF EVENT MON 87460: FINAL ENVIRONMENTAL ASSESSMENT 33 (2011), *available at* http://www.aphis.usda.gov/brs/aphisdocs/09_05501p_fea.pdf ("[T]he reduced yield-loss [trait] does not exceed the natural variation observed in regionally-adapted varieties of conventional corn . . . . Thus, equally drought resistant corn varieties produced through conventional breeding techniques are readily available and may be cultivated in lieu of MON87460 . . . ."); *see also* Paul Voosen, *USDA Looks to Approve Monsanto's Drought-Tolerant Corn*, N.Y. TIMES (May 11, 2011), http://nyti.ms/mQtCnq.

92. JORGE FERNANDEZ-CORNEJO & WILLIAM D. MCBRIDE, ECON. RESEARCH SERV., U.S. DEP'T OF AGRIC., AER-810, ADOPTION OF BIOENGINEERED CROPS 21 (2002), *available at* http://ers.usda.gov/publications/aer-agricultural-economic-report/aer810.aspx.

93. DOUG GURIAN-SHERMAN, UNION OF CONCERNED SCIENTISTS, FAILURE TO YIELD: EVALUATING THE PERFORMANCE OF GENETICALLY ENGINEERED CROPS 13 (2009), *available at* http://www.ucsusa.org/assets/documents/food_and_agriculture/failure-to-yield.pdf. The disappointing performance of GE crops came despite industry efforts to develop high-yield GE varieties. *See, e.g.*, Jack Kaskey, *Monsanto Facing 'Distrust' as It Seeks to Stop DuPont (Update 3)*, BLOOMBERG (Nov. 10, 2009), http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aii_24MDZ8SU.

94. Charles M. Benbrook, *Impacts of Genetically Engineered Crops on Pesticide Use in the U.S.—The First Sixteen Years*, 24 ENVTL. SCI. EUR., no. 24, 2012, at 2, *available at* http://www.enveurope.com/content/pdf/2190-4715-24-24.pdf [hereinafter Benbrook, *The First Sixteen Years*].

glyphosate.[95] According to a 2012 study, the use of herbicide-resistant crop technology in the United States between 1996 and 2011 resulted in an additional 527 million pounds of herbicides used.[96] The indiscriminate use of glyphosate has in turn caused certain weed species to evolve resistance,[97] rendering it less effective and forcing farmers to resort to the very chemical inputs it was intended to replace.[98] Resistant weeds have also been shown to develop when GE crops cross-pollinate with wild or cultivated non-GE relatives. Genetically engineered canola (*Brassica napus*) has been found to pass on its glyphosate tolerance to related plants such as wild mustard (*Brassica rapa*),[99] and the adventitious presence of herbicide-resistant transgenes has been found in wild canola plants growing far from areas of agricultural production.[100]

Glyphosate has become a ubiquitous presence in the natural environment, raising concerns regarding impacts on wildlands, natural aquatic ecosystems, and biodiversity.[101] It has been detected in streams[102] and in air and rain samples taken in the American Midwest during the crop-growing season.[103] Beyond its direct toxicity to such organisms as earthworms[104] and amphibians,[105] glyphosate has been

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95. *Id.* at 7–8; CHARLES BENBROOK, THE ORGANIC CENTER, IMPACTS OF GENETICALLY ENGINEERED CROPS ON PESTICIDE USE IN THE UNITED STATES: THE FIRST THIRTEEN YEARS 3 (2009), *available at* http://organic-center.org/reportfiles/GE13YearsReport.pdf [hereinafter BENBROOK, THE FIRST THIRTEEN YEARS].

96. Benbrook, *The First Sixteen Years*, *supra* note 94, at 3.

97. Vijay K. Nandula et al., *Glyphosate-Resistant Weeds: Current Status and Future Outlook*, 16 OUTLOOKS ON PEST MGMT. 183, 183–87 (2005).

98. Recognizing that farmers have increasingly had to rely on herbicides other than glyphosate to deter resistant weeds, Monsanto commenced a program offering subsidies to farmers to purchase supplemental herbicides. Philip Brasher, *Monsanto Paying Farmers to Increase Herbicide Use*, DES MOINES REGISTER (Oct. 19, 2010), http://blogs.desmoinesregister.com/dmr/index.php/2010/10/19/monsanto-paying-farmers-to-increase-herbicide-use.

99. S. Warwick et al., *Do Escaped Transgenes Persist in Nature? The Case of an Herbicide Resistance Transgene in a Weedy* Brassica rapa *Population*, 17 MOLECULAR ECOLOGY 1387, 1387 (2008); *see also*, Brassica rapa L.*: Field Mustard*, NATURAL RES. CONSERVATION SERV., U.S. DEP'T OF AGRIC., http://www.plants.usda.gov/core/profile?symbol=BRRA (click "Legal Status") (last visited Apr. 17, 2014) ("wild mustard" is one common name for *Brassica rapa*).

100. Natasha Gilbert, *GM Crop Escapes into the American Wild*, NATURE (Aug. 6, 2010), http://www.nature.com/news/2010/100806/full/news.2010.393.html.

101. Guy R. Knudsen, *Impacts of Agricultural GMOs on Wildlands: A New Frontier of Biotech Litigation*, 26 NAT. RESOURCES & ENV'T 13 (2011).

102. Richard H. Coupe et al., *Fate and Transport of Glyphosate and Aminomethylphosphonic Acid in Surface Waters of Agricultural Basins*, 68 PEST MGMT. SCI. 16, 17 (2011).

103. Feng-chih Chang et al., *Occurrence and Fate of the Herbicide Glyphosate and Its Degradate Aminomethylphosphonic Acid in the Atmosphere*, 30 ENVTL. TOXICOLOGY & CHEMISTRY 548, 548–49 (2011).

104. J.A. Springett & R.A.J. Gray, *Effect of Repeated Low Doses of Biocides on the Earthworm*

found to disrupt beneficial bacterial and mycorrhizal communities in soils[106] and, through its profound effects on vegetation and habitat, to cause reductions in bird populations.[107] Although not intended to impact insect populations, transgenic herbicide-resistant crops have been linked directly to the decline of monarch butterfly populations in North America due to the degradation of habitat and impacts on milkweed, the species' sole source of food.[108]

Manufacturers of GE seed point out that one particular agricultural application of genetic engineering has had a beneficial impact on the environment. The dominant method of agricultural pest control has long been the use of broad-spectrum insecticides, which kill not only target insects but also many species that prey on them. In 1996, the agricultural biotechnology company Monsanto developed a GE corn that produces proteins from a bacterium known as Bt.[109] These proteins are lethal to certain pest insects that ingest them but spare most non-target species.[110] Data confirm that Bt and other transgenic insect-resistant crops have helped curb the use of pesticides, at least in certain areas and as to certain crops. However, several studies have exposed Bt's toxic effects on non-target insect populations, including butterflies and predators of pest insect species,[111] as well as aquatic organisms[112] and beneficial

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Aporrectodea caliginosa *in Laboratory Culture*, 24 SOIL BIOLOGY & BIOCHEMISTRY 1739, 1744 (1992).

105. Rick A. Relyea, *The Impact of Insecticides and Herbicides on the Biodiversity and Productivity of Aquatic Communities*, 15 ECOLOGICAL APPLICATIONS 618, 623 (2005).

106. M. Castaldini et al., *Impact of Bt Corn on Rhizospheric and Soil Eubacterial Communities and on Beneficial Mycorrhizal Symbiosis in Experimental Microcosms*, 71 APPLIED & ENVTL. MICROBIOLOGY 6719, 6719 (2005).

107. David J. Santillo et al., *Response of Songbirds to Glyphosate-Induced Habitat Changes on Clearcuts*, 53 J. WILDLIFE MGMT. 64, 69–70 (1989); *see also* C. Hawes et al., *Responses of Plants and Invertebrate Trophic Groups to Contrasting Herbicide Regimes in the Farm Scale Evaluations of Genetically Modified Herbicide-Tolerant Crops*, 358 PHIL. TRANSACTIONS ROYAL SOC'Y LONDON B BIOLOGICAL SCI. 1899, 1908–12 (2003) (finding significant adverse impacts on wildlife populations and farmland biodiversity).

108. Lincoln P. Brower et al., *Decline of Monarch Butterflies Overwintering in Mexico: Is the Migratory Phenomenon at Risk?*, 5 INSECT CONSERVATION & DIVERSITY 95, 96–97 (2012).

109. Bt's scientific name is *Bacillus thuringiensis*. Michelle Marvier et al., *A Meta-Analysis of Effects of Bt Cotton and Maize on Nontarget Invertebrates*, 316 SCI. 1475, 1475 (2007).

110. Richard L. Hellmich & Kristina Allyse Hellmich, *Use and Impact of Bt Maize*, THE NATURE EDUC. KNOWLEDGE PROJECT (2012), http://www.nature.com/scitable/knowledge/library/use-and-impact-of-bt-maize-46975413.

111. Marvier et al., *supra* note 109, at 1475–77.

112. E.J. Rosi-Marshall et al., *Toxins in Transgenic Crop Byproducts May Affect Headwater Stream Ecosystems*, 104 PROC. NAT'L ACAD. SCI. U.S. 16,204, 16,206 (2007).

microbial communities in soil.[113] Evidence of insect resistance to Bt crops has also emerged.[114] The fact that Bt seeds are commonly treated with systemic chemical insecticides known as neonicotinoids further compromises any environmental benefits they confer. Neonicotinoids spread throughout plant tissues and are even present in pollen and nectar. The rise in the use of neonicotinoid seed treatments has been implicated in regional bee die-offs,[115] and recent research suggests that exposure to neonicotinoids may make honey bees more susceptible to parasites and pathogens, including *Nosema*, a parasite believed to be a cause of the syndrome known as colony collapse disorder.[116]

In sum, GE crops and the industrial farming methods they both exemplify and promote have created significant adverse environmental impacts and have solved few if any environmental problems. Because of these detrimental effects, several countries and certain agricultural communities in the United States have banned the cultivation of GE crops.[117] Numerous federal and state statutes expressly proclaim the government's strong interest in identifying and minimizing adverse environmental impacts.[118] The mandatory disclosure of food products

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113. *See generally* Castaldini et al., *supra* note 106.

114. Bruce E. Tabashnik et al., *Insect Resistance to Bt Crops: Evidence Versus Theory*, 26 NATURE BIOTECHNOLOGY 199, 201–02 (2008); Shenghui Wang et al., *Bt-Cotton and Secondary Pests*, 10 INT'L J. BIOTECHNOLOGY 113 (2008); Helen Pearson, *Transgenic Cotton Drives Insect Boom*, NATURE (July 25, 2006), http://www.nature.com/news/2006/060724/full/news060724-5.html.

115. Christian H. Krupke et al., *Multiple Routes of Pesticide Exposure for Honey Bees Living near Agricultural Fields*, PLOS ONE, Jan. 2012, at e29268, at 1, http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0029268.

116. JENNIFER HOPWOOD ET AL., THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION, ARE NEONICOTINOIDS KILLING BEES? vi (2012), http://www.xerces.org/wp-content/uploads/2012/03/Are-Neonicotinoids-Killing-Bees_Xerces-Society1.pdf.

117. For example, Mexico imposed a moratorium on the cultivation of GE corn in 1998. When the Mexican government signaled in 2013 that it would consider applications for permits allowing field trials of GE crops, a federal judge ordered it not to proceed because of concerns regarding imminent harm to environment. Daniel Looker, *No Export Effect Likely from Mexican GMO Ban*, AGRICULTURE.COM (Oct. 15, 2013, 11:00 PM), http://www.agriculture.com/news/business/no-expt-effect-likely-from-mexic-gmo-b_5-ar34604. In 2004, Mendocino County, California, became the first jurisdiction in the United States to ban the cultivation or production of GE crops. *See* MENDOCINO CNTY., CAL., CODE OF ORDINANCES §§ 10A.15.010–10A.15.040 (2013) (Prohibition on the Propagation, Cultivation, Raising and Growing of Genetically Modified Organisms in Mendocino County); *Mendocino Goes GMO Free*, MULTINATIONAL MONITOR (Mar. 2004), http://www.multinationalmonitor.org/mm2004/032004/lines.html.

118. *See, e.g.*, the Federal Water Pollution Control Act, 33 U.S.C. § 1251(a)(3) (2006) (declaring it "the national policy that the discharge of toxic pollutants in toxic amounts be prohibited"); the Toxic Substances Control Act, 15 U.S.C. § 2601(b)(3) (declaring it "the policy of the United States that . . . authority over chemical substances and mixtures should be exercised . . . to assure that such innovation and commerce in such chemical substances and mixtures do not present an unreasonable

containing ingredients produced through genetic engineering would serve this interest by allowing consumers to make better-informed decisions about their food purchases.

B. Economic Impacts

In the spring of 2013, an Oregon wheat farmer who sprayed glyphosate on his fields to prepare them for planting was surprised to find that some wheat plants survived. Tests confirmed the presence of a transgene that conveys resistance to glyphosate in the surviving plants.[119] What made this discovery so alarming was that no genetically engineered wheat has ever been approved for commercial planting or sale. An experimental GE wheat had been developed and field-tested in several states in the late 1990s, but no authorized testing had been conducted in Oregon since 2001,[120] and efforts to seek approval to sell the strain had been abandoned by 2004.[121]

Export markets reacted swiftly. Japan and Korea suspended imports of wheat grown in the Pacific Northwest.[122] The European Union imposed testing requirements on all imports of wheat from the U.S.[123]

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risk of injury to health or the environment"); and Washington's Model Toxics Control Act, WASH. REV. CODE § 70.105D.010(1) (declaring it to be state policy that the "beneficial stewardship of land, air, and waters of the state is a solemn obligation of the present generation for the benefit of future generations").

119. Eric Mortenson, *Genetically Engineered Wheat Found in Oregon Field, Federal Investigation Underway*, THE OREGONIAN (May 29, 2013), http://www.oregonlive.com/business/index.ssf/2013/05/genetically_engineered_wheat_f.html. In May 2013, the USDA confirmed the finding and issued a formal announcement. U.S. DEP'T OF AGRIC., RELEASE NO. 0127.13, STATEMENT ON THE DETECTION OF GENETICALLY ENGINEERED WHEAT IN OREGON (June 14, 2013), *available at* http://www.usda.gov/wps/portal/usda/usdahome?contentidonly=true&contentid=2013/06/0127.xml.

120. Andrew Pollack, *Modified Wheat Is Discovered in Oregon*, N.Y. TIMES (May 29, 2013), http://www.nytimes.com/2013/05/30/business/energy-environment/genetically-engineered-wheat-found-in-oregon-field.html.

121. Michael Wines, *Genetically Altered Wheat in Oregon Comes as No Surprise*, N.Y. TIMES (June 5, 2013; corrected June 11, 2013), http://www.nytimes.com/2013/06/06/us/genetically-altered-crop-in-oregon-no-surprise.html.

122. *Japan Suspends Some Imports of U.S. Wheat*, N.Y. TIMES (May 31, 2013), http://www.nytimes.com/2013/05/31/business/global/japan-suspends-some-imports-of-us-wheat.html; Victoria Shannon, *Japan and South Korea Bar Imports of US Wheat*, N.Y. TIMES (May 31, 2013), http://www.nytimes.com/2013/06/01/business/global/japan-and-south-korea-bar-us-wheat-imports.html; *see also* Eric Mortenson, *Genetically Modified Wheat: Still No Answer, Records Show Concern over Export Markets*, THE OREGONIAN (Aug. 28, 2013), http://www.oregonlive.com/business/index.ssf/2013/08/genetically_modified_wheat_sti.html.

123. Anna Edwards, *America Facing Wheat Export Crisis as Europe and Japan Lead the Way in Rejecting Genetically Modified Crops*, DAILY MAIL (May 30, 2013), http://www.dailymail.co.uk/news/article-2333381/GM-wheat-crops-America-facing-wheat-export-

Damage and continuing threats to an export market valued at $8.1 billion annually[124] have spurred numerous lawsuits.[125]

The response of these export markets was predictable. The vast majority of this country's export markets now require that GE crops and foods be labeled.[126] Moreover, there had been several previous incidents in which grains and seed stocks had been found to be contaminated by GE strains. In 1998, the Swiss company Aventis CropScience (now Bayer CropScience) obtained approval to market StarLink corn, a strain genetically engineered to produce a protein lethal to insect larvae that ingest it.[127] After studies raised concerns that StarLink could trigger allergic reactions in certain people, the FDA approved the strain for use only as animal feed or as raw material for biofuel.[128] In September 2000, however, testing revealed the presence of the StarLink corn in commercially produced taco shells. That discovery led to testing of more than four billion bushels of corn, the revocation of StarLink's federal registration,[129] a class action lawsuit filed by farmers asserting product liability claims[130] that was settled for $112.2 million,[131] and a recall of food products that cost the food industry an estimated $1 billion.[132]

Incidents of contamination by GE strains have continued to occur since the StarLink episode. In 2006, rice exported from the U.S. was found to contain a GE strain, raising concerns among international

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crisis-Europe-Japan-lead-way-rejecting-genetically-modified-crops.html.

124. Pollack, *supra* note 120. The threat is particularly significant in the Pacific Northwest. While the U.S. exports about half of its annual wheat crop, Oregon and Washington export approximately ninety percent of their annual production. AGRI-BUS. COUNCIL OF OR., *Oregon Wheat Industry*, OREGON AGRIC., http://oregonfresh.net/education/oregon-agriculture-production/oregon-wheat-industry/ (last visited Apr. 18, 2014) ("more than 85% of Oregon-grown wheat is exported"); WASH. GRAIN COMM'N, *Washington Wheat Facts*, WAWG.ORG 4 (2011–2012), http://www.wawg.org/core/files/wawg/uploads/files/2011WF4Web.pdf (85–90% of Washington-grown wheat is exported).

125. Twelve underlying cases are now pending disposition before the U.S. District Court in Kansas. *See In re* Monsanto Company Genetically-Engineered Wheat Litigation, MDL No. 2473, 2013 WL 5703210 (J.P.M.L. Oct. 16, 2013) (issuing initial transfer order consolidating five pending cases).

126. *See supra* Part I.A.

127. Wines, *supra* note 121.

128. *Id.*

129. *Id.*

130. *In re* StarLink Corn Prod. Liab. Litig., 212 F. Supp. 2d 828, 833–34 (N.D. Ill. 2002).

131. *U.S. Farmers to Get $112 Million for GE StarLink Corn Contamination*, ORGANIC CONSUMERS ASS'N, http://www.organicconsumers.org/Corn/starlink.cfm (last visited Apr. 18, 2014).

132. Colin Macilwain, *U.S. Launches Probe into Sales of Unapproved Transgenic Corn*, 434 NATURE 423 (2005).

consumers that led to a twenty percent decline in U.S. rice exports that year.[133] Bayer CropScience, which developed the GE rice, eventually agreed to pay $750 million to settle claims asserted by 11,000 American farmers.[134] In 2009, evidence that an unauthorized strain of GE flax had contaminated Canadian flax seed supplies caused the collapse of that country's flax export market.[135] In recent years, contamination of certain seed crops has become so common that export markets routinely test shipments and reject those containing GE strains. In the first eleven months of 2013, China turned away approximately thirty percent of corn imported from the United States due to the presence of unapproved GE strains.[136]

The contamination of crops and seeds also poses a serious threat to producers of organic crops. Genetically engineered foods may not be certified under the U.S. National Organic Program.[137] As a result, the inadvertent blending of organic crops with GE varieties or the adventitious presence of a transgenic strain on an organic farm could jeopardize a farm's certification.[138] In a survey published in 2004, only eight percent of organic crop producers in the United States claimed to have incurred direct costs or suffered losses attributable to contamination by GE crops.[139] But as the National Academy of Sciences

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133. Lisa Haarlander & Adriana Barrera, PlanetArk, *Mexico Halts US Rice Over GMO Certification*, WORLD ENV'T NEWS (Mar. 16, 2007), http://www.planetark.com/dailynewsstory.cfm/newsid/40898/story.htm.

134. Andrew Harris & David Beasley, *Bayer Agrees to Pay $750 Million to End Lawsuits Over Gene-Modified Rice*, BLOOMBERG (July 1, 2011), http://www.bloomberg.com/news/2011-07-01/bayer-to-pay-750-million-to-end-lawsuits-over-genetically-modified-rice.html. Potential liability is a concern not only for private entities, but public agencies as well. On federal wildlands, for example, a failure to fully consider the effects of herbicide application programs may open agencies to citizen suits under federal law. *See, e.g.*, League of Wilderness Defenders/Blue Mountains Biodiversity Project v. U.S. Forest Serv., 883 F. Supp. 2d 979, 1008–11 (D. Or. 2012).

135. Allan Dawson, *CdC Triffid Flax Scare Threatens Access to No. 1 EU Market*, MANITOBA CO-OPERATOR (Sept. 17, 2009), http://www.manitobacooperator.ca/2009/09/17/cdc-triffid-flax-scare-threatens-access-to-no-1-eu-market/.

136. Dominique Patton & Niu Shuping, *Update 1-China Rejects 30 Pct of Corn Shipped in from U.S. This Year*, REUTERS (Dec. 18, 2013), http://www.reuters.com/article/2013/12/18/china-us-corn-idUSL3N0JX1R120131218.

137. *See* 7 C.F.R. § 105.105 (2013) (banning use of excluded methods from products labeled organic); *id.* § 205.2 (defining excluded methods as those relying on genetic engineering).

138. DAVID R. GEALY ET AL., COUNCIL FOR AGRIC. SCI. & TECH., ISSUE PAPER NO. 37, IMPLICATIONS OF GENE FLOW IN THE SCALE-UP AND COMMERCIAL USE OF BIOTECHNOLOGY-DERIVED CROPS: ECONOMIC AND POLICY CONSIDERATIONS 8–9 (2007), *available at* http://www.cast-science.org/download.cfm?PublicationID=2935&File=f0302e5ababb28796e4fb142e23314824867.

139. GRAHAM BROOKES & PETER BARFOOT, CO-EXISTENCE IN NORTH AMERICAN AGRICULTURE: CAN GM CROPS BE GROWN WITH CONVENTIONAL AND ORGANIC CROPS? 17

noted in 2010, the rate of adoption of GE crops has accelerated since that survey, as has the production of organic crops and consumer demand for non-GE products.[140] Because "[a] zero tolerance for the presence of GE traits in non-GE crops is generally impossible to manage and is not technically or economically feasible,"[141] some degree of contamination can be expected for any organic crop species for which a GE strain exists.

Perhaps the most troubling economic consequence of the rapid and widespread adoption of GE crops has been the consolidation of the seed industry. Until the mid-1990s, the industry was composed primarily of small, family-owned businesses and had long been a competitive sector of the agricultural economy.[142] Since then, through acquisitions and market pressure, the industry has become dominated by fewer than a dozen transnational corporations and increasingly integrated into the pharmaceutical and chemical industries.[143] In 1996, the three largest American seed companies controlled twenty-two percent of the domestic market.[144] By 2009, three companies—Monsanto, DuPont, and Syngenta—had gained control of over half of the global market.[145] In just the five-year period between 2008 and 2013, more than seventy seed companies were acquired by the eight largest seed companies in the industry.[146]

The shrinking number of suppliers has, predictably, reduced the diversity of available seed varieties[147] and increased the cost of those varieties.[148] In the first fourteen years after GE crops were first made commercially available in 1996, increases in the cost of seed exceeded

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(2004), *available at* http://www.pgeconomics.co.uk/pdf/CoexistencereportNAmericafinalJune2004.pdf.

140. COMM. ON THE IMPACT OF BIOTECH. ON FARM-LEVEL ECON. & SUSTAINABILITY, BD. ON AGRIC. & NATURAL RES., DIV. ON EARTH & LIFE STUDIES, NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., THE IMPACT OF GENETICALLY ENGINEERED CROPS ON FARM SUSTAINABILITY IN THE UNITED STATES 170 (2010) [hereinafter IMPACT OF GE CROPS].

141. *Id.* at 171.

142. Jorge Fernandez-Cornejo & Richard E. Just, *Researchability of Modern Agricultural Input Markets and Growing Concentration*, 89 AM. J. AGRIC. ECON. 1269, 1269 (2007).

143. IMPACT OF GE CROPS, *supra* note 140, at 216; Fernandez-Cornejo & Just, *supra* note 142, at 1269–70.

144. Philip H. Howard, *Visualizing Consolidation in the Global Seed Industry: 1996–2008*, 1 SUSTAINABILITY 1266 (2009).

145. *Seed Industry Structure-Dr. Phil Howard*, CORNUCOPIA INST. (Sept. 26, 2013), http://www.cornucopia.org/2013/09/seed-industry-structure-dr-phil-howard-2/.

146. *Id.*

147. Howard, *supra* note 144, at 1266–67.

148. IMPACT OF GE CROPS, *supra* note 140, at 146.

the rise in other costs paid by American farmers by nearly thirty percent,[149] and the cost of GE seed increased far more than that of conventional or organic seed.[150] Consolidation in the industry has also narrowed the field of companies engaged in seed research and development and created potential barriers to entry for competitors.[151] Dramatic increases in seed prices have drawn scrutiny from federal authorities. In 2010, Monsanto raised the cost of certain strains of its GE soybeans and seed corn so steeply that the Department of Justice launched an investigation into possible anti-competitive pricing and monopolistic practices.[152]

C. Social and Cultural Impacts

It is often assumed that farmers choose to use GE seed because it allows them to operate more profitably. That assumption is questionable. In 2002, the USDA concluded that the farm-level economic impacts of GE agriculture were "mixed or even negative."[153] A subsequent study determined that the primary reason for farmers' rapid adoption of GE crops was not improved profitability, but rather simpler weed and pest control.[154] Efforts to ease one of the burdens of a burdensome profession and way of life are certainly understandable. If, however, such efforts are driving the transformation towards an agricultural system increasingly dependent on GE seed and dominated by the handful of companies that develop and produce it, the likely social and socioeconomic impacts should first be identified, understood, and considered.

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149. *Id.*

150. CHARLES BENBROOK, THE ORGANIC CENTER, THE MAGNITUDE AND IMPACTS OF THE BIOTECH AND ORGANIC SEED PRICE PREMIUM 11–12 (2009), *available at* http://www.organic-center.org/reportfiles/SeedsFinal11-30-09.pdf.

151. IMPACT OF GE CROPS, *supra* note 140, at 196.

152. Stephanie Kirchgaessner, *DoJ Urged to Complete Monsanto Case*, FIN. TIMES (Aug. 10, 2010), http://www.ft.com/cms/s/0/6327dfda-a3ef-11df-9e3a-00144feabdc0.html; William Neuman, *Rapid Rise in Seed Prices Draws U.S. Scrutiny*, N.Y. TIMES (Mar. 11, 2010), http://www.nytimes.com/2010/03/12/business/12seed.html. Citing "marketplace developments," the Department closed its investigation in 2012. Georgina Gustin, *Justice Department Ends Monsanto Antitrust Probe*, ST. LOUIS POST-DISPATCH (Nov. 19, 2012), http://www.stltoday.com/business/local/justice-department-ends-monsanto-antitrust-probe/article_667ceab6-e568-57c8-a110-3d99efc31c4c.html.

153. FERNANDEZ-CORNEJO & MCBRIDE, *supra* note 92, at 24.

154. MANUEL GÓMEZ-BARBERO & EMILIO RODRÍGUEZ-CEREZO, EUROPEAN COMM'N JOINT RESEARCH CTR., INST. FOR PROSPECTIVE TECHNOLOGICAL STUDIES, EUR 22547 EN, ECONOMIC IMPACT OF DOMINANT GM CROPS WORLDWIDE: A REVIEW 17 (2006), *available at* http://ftp.jrc.es/EURdoc/eur22547en.pdf.

Certain such impacts arise from the simple fact that GE seed is subject to intellectual property rights. Throughout most of human history, seed was understood to be a public resource,[155] and the open system in which hybrid crop varieties were developed, tested, and shared brought about numerous profound benefits. This system facilitated the creation and dissemination of semi-dwarf strains of rice and wheat, varieties that formed the basis for the Green Revolution that helped boost global agricultural production in the 1960s.[156] The collaborative effort and focus on public benefit required for such a development would be exceedingly unlikely in an agricultural system based on proprietary seed and controlled by a small number of private companies.

An agricultural and food system dominated by GE crops is also likely to have negative consequences for farmers and farming communities. Subsistence farmers and farmers in developing countries are likely to be most affected,[157] but even successful commercial growers in the United States will suffer adverse impacts. Decisions regarding which varieties of seed to plant have traditionally been made locally, by farmers with knowledge of and experience with regional and local growing conditions. However,

> the developmental trajectory of GE-seed technology is leading to concern that access to seeds without GE traits or to seeds that have only the specific GE traits of particular interest to farmers may become increasingly limited. Additional concerns are being raised about the lack of farmer input and knowledge regarding which seed traits might be developed.[158]

In short, the availability of seed varieties will be determined less by those who plant them and more by the handful of multinational chemical companies that sell GE seed. The threatened loss of local control has been a factor in the decisions of certain nations and agricultural communities to ban the cultivation of GE crops.[159]

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155. Stephen B. Brush, *Bioprospecting the Public Domain*, 14 CULTURAL ANTHROPOLOGY 535, 541–42 (1999).

156. DANA G. DALRYMPLE, OFFICE OF INT'L COOPERATION & DEV. & U.S. AGENCY FOR INT'L DEV., U.S. DEP'T OF AGRIC., AGRIC. ECON. REP. NO. 455, DEVELOPMENT AND SPREAD OF SEMI-DWARF VARIETIES OF WHEAT AND RICE IN THE UNITED STATES, at ix (1980).

157. *See, e.g.*, Hope Shand, *There Is a Conflict Between Intellectual Property Rights and the Rights of Farmers in Developing Countries*, 4 J. AGRIC. & ENVTL. ETHICS 131, 139 (1992).

158. IMPACT OF GE CROPS, *supra* note 140, at 202.

159. For example, the National Farmers Union of Canada issued a report in 2005 recommending that GE crops not be grown on Prince Edward Island. *See* NATIONAL FARMERS UNION, GM CROPS: NOT NEEDED ON THE ISLAND: RECOMMENDATIONS OF THE NATIONAL FARMERS UNION TO THE PRINCE EDWARD ISLAND LEGISLATURE'S STANDING COMMITTEE ON AGRICULTURE, FORESTRY,

The diminishing availability and use of different seed varieties also increases the risk that an important food crop will suffer a widespread and devastating disease outbreak. Crop varieties throughout history have been developed locally to match regional conditions and to resist native pests. This traditional practice fostered broad genetic diversity in food crops. For example, while only 187 species of wild potato have been identified,[160] farmers in the Andean highlands regions of Peru, Bolivia, and Ecuador have developed and now cultivate an estimated 4000 potato varieties.[161] Because varietals often differ in their susceptibility to any particular malady, agricultural systems in which growers cultivate numerous varietals are less prone to catastrophic outbreaks of disease. Today, however, "[m]any crops are especially vulnerable to diseases due to their narrow genetic base—in part a product of their history as introductions from distant areas of crop diversity; in part a result of plant breeding methods and farming practices."[162]

The use of GE seeds and the industrial agricultural practices required to grow them have accelerated this trend. By definition, large-scale monocultures—which use a single-crop varietal on a large swath of land[163]—replace diversity with homogeneity. This method of farming can make crops more vulnerable to disease and render entire food systems more susceptible to failure. The most notorious such failure occurred between 1845 and 1852, when a blight infected potato crops throughout Ireland.[164] The Irish Potato Famine, in which over one million people starved to death[165] and which triggered massive social and cultural shifts on two continents, was caused by overreliance on a single variety of potato: the Irish Lumper.[166] While a catastrophic loss of the potato crop is unlikely ever to occur in the Andean highlands,

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AND THE ENVIRONMENT 15–16 (2005), *available at* http://www.nfu.ca/sites/www.nfu.ca/files/PEI%20GMO%20BRIEF%20TWENTY%20SEVEN%20FINAL.pdf.

160. *Wild Potato Species*, INT'L POTATO CENTER, http://cipotato.org/potato/wild-species/ (last visited May 9, 2014).

161. *Native Potato Varieties*, INT'L POTATO CENTER, http://cipotato.org/potato/native-varieties (last visited Apr. 28, 2014).

162. CALVIN O. QUALSET & HENRY L. SHANDS, GENETIC RESOURCES CONSERVATION PROGRAM, UNIV. OF CAL., SAFEGUARDING THE FUTURE OF U.S. AGRICULTURE 8 (2005), *available at* http://www.croptrust.org/documents/WebPDF/TrustReportfinal.pdf.

163. DANIEL CHIRAS, ENVIRONMENTAL SCIENCE 176 (8th ed. 2010).

164. *Id.*

165. ENCYCLOPEDIA OF PEST MANAGEMENT 366 (David Pimentel ed., 2002).

166. *Great Famine Potato Makes a Comeback After 170 Years*, IRISHCENTRAL (Mar. 3, 2013), http://www.irishcentral.com/news/great-famine-potato-makes-a-comeback-after-170-years-194635321-237569191.html.

devastating crop failures continue to occur where crops are grown in monoculture.[167]

Finally, certain GE crops pose a threat to native species that have particular cultural significance. In 2013, the National Congress of American Indians, concerned that GE crops threaten plant species that have been cultivated by native peoples for thousands of years, passed a resolution opposing the use of GE crops.[168] The resolution called upon Congress, the USDA, and other federal agencies:

> [T]o preserve, protect, and maintain the integrity of traditional native foods, seeds, and agricultural systems; . . . support the labeling of seeds or products containing GE technology and ingredients; ensure the sustainability of traditional native foods and seeds by providing funding for the construction of seed banks; gather data and provide testing on GE presence and cross-pollination of native seeds; create GE and transgenic crop-free zones; and oppose the use and cultivation of GE seeds in the United States.[169]

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167. In the 1970s, for example, southern corn leaf blight caused $1 billion of damage in the United States. In 1979 and 1980, rust wiped out forty percent of Cuba's sugarcane crop, causing estimated losses of $500 million. D.I. Jarvis et al., *Managing Crop Disease in Traditional Agroecosystems: Benefits and Hazards of Genetic Diversity*, *in* MANAGING BIODIVERSITY IN AGRICULTURAL ECOSYSTEMS 294 (D.I. Jarvis et al. eds., 2007).

168. NATIONAL CONGRESS OF AMERICAN INDIANS, RESOLUTION #REN-13-014: OPPOSITION TO THE USE OF GENETICALLY ENGINEERED OR TRANSGENIC CROPS (2013), *available at* http://www.ncai.org/attachments/Resolution_yzqNDGkFdWJiPhLJoZsgKqldtWcBApbQAqtEBZYhadapwZqzdhH_REN-13-014%20final.pdf.

169. *Id.* Concerns felt by Native American tribes extend beyond transgenic plant species. The AquAdvantage® Fish is a transgenic salmon developed to grow to market size in half the time required by "conventional" salmon. *See Products*, AQUABOUNTY TECHNOLOGIES, http://aquabounty.com/about-us/products/ (last visited Apr. 18, 2014). The Columbia River Inter-Tribal Fish Commission, which represents tribes with native fishing rights along the Columbia and Snake Rivers, has issued a statement opposing its use. *Genetically Modified Salmon*, COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION, http://www.critfc.org/advocacy/genetically-modified-salmon/ (last visited Jan. 13, 2014). The AquAdvantage® Fish remains under review by the FDA. If approved, it would be the first transgenic animal species approved for human consumption. CENTER FOR VETERINARY MEDICINE, U.S. FOOD & DRUG ADMIN., *The Animal Biotechnology Interdisciplinary Group's Achievements in FY 2011*, *in* ANNUAL REPORT – FY 2011, at 58, 58 (2011), *available at* http://www.fda.gov/downloads/AboutFDA/CentersOffices/OfficeofFoods/CVM/UCM311167.pdf.

IV. CONCLUSION

> *"The main facts in human life are five: birth, food, sleep, love and death. One could increase the number—add breathing for instance—but these five are the most obvious."*
>
> —E.M. Forster[170]

In 1989, five years before the first GE food crop was even approved for retail sale, researchers studied the likely consequences of an agricultural and food system based on GE crops.[171] Their conclusion: such a system would be "clearly capable of causing major ecological, economic, and social changes."[172] That this prediction has been proven accurate should come as no surprise. Our decisions about the foods we purchase and consume are among the most consequential we make. Collectively, these decisions have always had significant effects on the health of the environment, our use of natural resources, the health and trajectory of our national economy, the vitality of our agricultural communities, and even our culture.

In the case of GE foods, these impacts have been overwhelmingly negative. However, the debate over GE foods has thus far revolved around a different issue: whether these foods have any detrimental effects on human health. Because genetic engineering is not inherently dangerous, and because no credible evidence has emerged to date that any GE food available on the commercial market has caused harmful health effects in humans, opponents of mandatory labeling argue that concerns raised about GE foods are much ado about nothing. But the impacts of GE agriculture and GE foods, aside from the potential health risks they pose, are wide-ranging and significant. Mandatory labeling of GE foods would allow consumers to decide whether to accept these consequences or to "vote with their forks" to support agricultural and food production practices that cause less harm. Correctly applied, the First Amendment poses no obstacle to this compelled disclosure.

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170. E.M. FORSTER, ASPECTS OF THE NOVEL 75 (1927, 1954 prtg.).

171. D. Pimentel et al., *Benefits and Risks of Genetic Engineering in Agriculture*, 39 BIOSCIENCE 606 (1989).

172. *Id.* at 611.