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The Case for GMOs: Dealing with Clashes between Property Rights and Health and Safety Concerns

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The Case for GMOs: Dealing with Clashes between Property Rights and Health and Safety Concerns

ABSTRACT

A comparative analysis of international decisions concerning genetically modified organism (GMO) controversies reveals the judicial inconsistency that is often applied to the property rights of GMO producers and researchers. Courts often find that there are strong property right interests in GMOs, but when these rights clash with health and safety concerns, they are often minimized or completely forgotten; therefore, future growth in biotechnology is inhibited. This Note proposes a solution to this issue that better takes into account all stakeholders and allows for future investment and research into GMOs. The solution draws upon the lessons learned from current regulatory and enforcement regimes and international agreements governing GMOs. To arrive at this conclusion, this Note analyzes multiple cases concerning GMO controversies. These cases have been selected because their decisions have either gone against the national regulatory policy or public opinion. Further, this Note looks at the economic effects that these decisions have had on their respective countries.

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I. INTRODUCTION

The international market for genetically modified crops is in disarray. Genetically modified crop producers (e.g., farmers and seed developers) not only have to worry about the patchwork of regulatory schemes that have arisen but the inconsistent treatment of these systems in the courtroom as well. While, at some level, international agreements such as the Nagoya–Kuala Lumpur Protocol can be viewed as an attempt to provide a stabilized system of liability for genetically modified organism (GMO) producers, they do not address the underlying problem of inconsistent judicial treatment and cumbersome regulations, which can have the deleterious effect of inhibiting further research and development of GMOs.

One explanation for these inconsistencies can be found in the arguments surrounding the dichotomy between property rights and civil rights. The central feature of these arguments is whether property rights are a central right on par with civil rights or a lesser right that must yield to regulations and other civil rights.¹ As GMO cases can squarely fit into either category,² they provide the perfect means by which to analyze what happens when these interests collide and the subsequent economic effects of these decisions. This Note, divided into four parts, investigates this issue of judicial inconsistency and its economic impact on GMO producers and countries. Part I provides an overview of the history of GMOs. Part II reviews the general regulatory approaches that govern GMOs. Part III looks at court cases concerning the two major issues involving genetically modified crops: infringement and vandalism. Part III also analyzes the effect, if any, these decisions had on their respective country's economy. Part IV discusses a

1. Compare Miriam Galston, *Activism and Restraint: The Evolution of Harlan Fiske Stone's Judicial Philosophy*, 70 TUL. L. REV. 137, 139–42 (1995) (analyzing the origins of Chief Justice Stone's position that property rights can be regulated, but that civil rights cannot be regulated), with David Schultz, *Scalia, Property, and Dolan v. Tigar*: *The Emergence of a Post-Carolene Products Jurisprudence*, 29 AKRON L. REV. 1, 33–34 (1995) (The difficulties in deciding mixed cases "indicate[s] that the dichotomy between personal liberties and property rights is a false one. . . . That rights in property are basic civil rights has long been recognized.").

2. Producers and researchers have a property interest in GMOs because they have invested substantial amounts of effort and capital, but, on the other hand, opponents usually claim a risk to the collective's health and safety, a central civil liberty.

recommendation for a system that can sustain a proper balance between concerns for health and safety and the property rights of GMO producers and researchers.

A. *What are GMOs?*

GMOs are organisms that are engineered, usually in a laboratory by modern biotechnology processes, to exhibit desired physiological traits or produce specific biological products.³ GMOs are generally discussed in relation to the agriculture industry, but the genetic engineering methods used to create them are also applied to non-edible plants, animals, bacteria, and viruses, for example pigs modified to efficiently ingest phosphorus.⁴ Genetic engineering finds its roots in the research of Gregor Mendel, whose work in the 1860s shapes society's current understanding of how traits are passed down.⁵ The focus of his work was selective breeding, the process of breeding pairs over multiple generations to obtain desired characteristics.⁶ Modern biotechnology has extensively developed Mendel's work, allowing

3. Julia M. Diaz & Judith L. Fridovich-Keil, *Genetically modified organism (GMO)*, ENCYCLOPÆDIA BRITANNICA (Nov. 28, 2016), <http://www.britannica.com/science/genetically-modified-organism> [https://perma.cc/WBA6-9ABP] (archived Feb. 16, 2017); see also Cartagena Protocol on Biosafety to the Convention on Biological Diversity art. 3, Sept. 11, 2003, 2226 U.N.T.S. 208, <https://bch.cbd.int/protocol/text/> [https://perma.cc/8J5A-FD89] (archived Feb. 16, 2017) [hereinafter *Cartagena Protocol*] (“‘Living modified organism’ means any living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology[.]”); REECE WALTERS, *ECO CRIME AND GENETICALLY MODIFIED FOOD* 9 (2011) (describing the process as manipulating the genetic makeup of cells).

4. See *GM Crops List*, INT'L SERV. FOR THE ACQUISITION OF AGRI-BIOTECH APPLICATIONS, <http://www.isaaa.org/gmapprovaldatabase/cropslist/> (last visited Feb. 16, 2017) [https://perma.cc/L8XT-E6AE] (archived Feb. 16, 2017) (listing genetically modified crops in use); *Genetically Engineered Animals and Public Health*, BIOTECHNOLOGY INDUSTRY ORG., <https://www.bio.org/articles/genetically-engineered-animals-and-public-health> (last visited Feb. 16, 2017) [https://perma.cc/6VJS-KK4V] (archived Feb. 16, 2017) (discussing the benefit of genetically engineered animals for human health); AMY DOES ET AL., *Unit 13: Genetically Modified Organisms*, REDISCOVERING BIOLOGY (2016), http://www.learner.org/courses/biology/textbook/gmo/gmo_2.html [https://perma.cc/BJT6-GYKH] (archived Feb. 16, 2017) (looking at the genetic modification of bacteria).

5. Ilona Miko, *Gregor Mendel and the Principles of Inheritance*, 1 NAT. EDUC. 134, <http://www.nature.com/scitable/topicpage/gregor-mendel-and-the-principles-of-inheritance-593> [https://perma.cc/4WVR-E4ZN] (archived Feb. 16, 2017) (describing Mendel's work as “the cornerstone of modern genetics”).

6. Brian R. West, *Selective Breeding*, ENCYCLOPEDIA.COM (2002), http://www.encyclopedia.com/topic/Selective_breeding.aspx [https://perma.cc/7Z8S-2NPQ] (archived Feb. 17, 2017).

scientists to produce any three desired traits within three months, compared to twenty-five years using Mendel's traditional breeding.⁷

Despite the existence of genetic engineering techniques since the 1970s,⁸ the first GMO approved for human consumption was not released until 1994.⁹ Once approved, it did not take long for GMOs to become more prevalent in the market. Genetically modified crops currently make up more than 70 percent of the global production of soybeans and cotton.¹⁰ As of 2011, genetically modified crops made up "about 90% of the papaya grown in the United States, all in Hawaii," "95% of the nation's sugar beets, 94% of the soybeans, 90% of the cotton and 88% of the feed corn."¹¹ Given this significant representation in America's food supply chain, GMOs also represent a sizable portion of the United States' gross domestic product (GDP): 2.5 percent in 2012.¹²

The reason for the proliferation of genetically modified crops is threefold: efficiency, health, and sustainability. Genetically modified crop research began as a race to develop crops that produced more food while using fewer resources. From 1996 to 2012, the use of genetically modified crops saved 123 million hectares of land from being used for farming while still increasing crop yields.¹³ As these benefits were realized, aspirations grew from simply increasing production yields to also serving the nutritional needs of certain communities—an example of this is "golden rice."¹⁴ This rice, enriched genetically with beta-

7. Robert L. Paarlberg et al., *Regulation of GM Crops: Shaping an International Regime*, in *THE REGULATION OF AGRICULTURAL BIOTECHNOLOGY* 1, 3 (R.E. Evenson & V. Santaniello eds., 2004).

8. *Genetic Engineering*, ENCYCLOPÆDIA BRITANNICA (2016), <http://www.britannica.com/science/genetic-engineering> [<https://perma.cc/4VYQ-Z6F8>] (archived Feb. 17, 2017) (discussing the history and origin of genetic engineering).

9. WALTERS, *supra* note 3, at 9 (describing the first GMO approved for public consumption as the Flavr Savr, the long-life tomato).

10. INT'L SERV. FOR THE ACQUISITION OF AGRI-BIOTECH APPLICATIONS, 2013 GLOBAL BIOTECH CROP REPORT (2013), <http://www.isaaa.org/resources/publications/briefs/46/infographic/default.asp> [<https://perma.cc/8MAM-58DX>] (archived Feb. 17, 2017) [hereinafter 2013 GLOBAL BIOTECH CROP REPORT] (presenting as an infographic the findings of ISAAA Brief 46-2013).

11. Elizabeth Weise, *Genetically Engineered Foods Q&A*, USA TODAY (Oct. 28, 2012), <http://www.usatoday.com/story/news/nation/2012/10/28/gmo-questions/1658225/> [<https://perma.cc/H2MH-S2T9>] (archived Feb. 17, 2017) (discussing the issues surrounding California's proposed labeling law).

12. Rob Carlson, *The U.S. Bioeconomy in 2012 reached \$350 billion in revenues, or about 2.5% of GDP.*, SYNTHESIS (Jan. 1, 2014), http://www.synthesis.cc/synthesis/2014/01/the_us_bioeconomy_in_2012 [<https://perma.cc/4B8D-455Y>] (archived Feb. 17, 2017) (stating that this amount has been growing by 15 percent annually).

13. *ISAAA Brief 46-2013: Top Ten Facts*, INT'L SERV. FOR THE ACQUISITION OF AGRI-BIOTECH APPLICATIONS, <http://www.isaaa.org/resources/publications/briefs/46/topfacts/default.asp> (last visited Feb. 17, 2017) [<https://perma.cc/N62J-KY3Q>] (archived Feb. 17, 2017) (outlining the top ten findings from ISAA for 2013).

14. Dan Charles, *In A Grain Of Golden Rice, A World Of Controversy Over GMO Foods*, NPR (March 7, 2013, 2:59 AM) <http://www.npr.org/sections/thesalt/2013/03/07/173611461/in-a-grain-of-golden-rice-a-world-of-controversy-over-gmo-foods> [<https://>

carotene, was developed in response to the fact that “[m]illions of people in Asia and Africa don’t get enough of this vital nutrient.”¹⁵ In addition, some studies show that genetically modified crops can decrease the emissions of greenhouse gases emissions, as compared to traditional plantings.¹⁶ This is due to a reduction of fieldwork necessary to maintain some genetically modified crops, such as tillage. With a reduction of tillage, “more residue [will] remain in the ground, sequestering more [carbon dioxide] in the soil and reducing greenhouse gas emissions.”¹⁷ Achievement of these benefits, however, has not come without controversy.

B. Controversies Surrounding GMOs

Genetically modified crops are controversial in almost every country where they are planted, with the most vocal GMO protests usually found in developing countries.¹⁸ These protests range from peaceful boycotts to vandalism. The most cited reasons behind these protests are health and environmental concerns. The general argument is that GMOs are developed and deployed too rapidly to allow for proper testing and assessment of the risks associated with them.¹⁹

Globally there have been several examples of violent GMO protests. In the Philippines, activists broke down fences and destroyed a farmer’s crops because he was growing genetically modified crops in

perma.cc/WC76-LNPT] (archived Feb. 17, 2017) (discussing what golden rice is and the controversy surrounding it); see, e.g., Marc Gunther, *GMO 2.0: Genetically Modified Foods with Added Health Benefits*, GUARDIAN (June 10, 2014, 3:56 PM), <http://www.theguardian.com/sustainable-business/2014/jun/10/genetically-modified-foods-health-benefits-soybean-potatoes> [<https://perma.cc/6X46-PN7F>] (archived Feb. 17, 2017) (discussing “GMOs 2.0 - biotech foods designed not just for farmers but for consumers, too”).

15. Charles, *supra* note 14.

16. See, e.g., Graham Brookes & Peter Barfoot, *GM Crop Use Continues to Benefit the Environment and Farmers*, PG ECON. (May 6, 2014), <http://www.pgeconomics.co.uk/page/36/gm-crop-use-continues-to-benefit-the-environment-and-farmers> [<https://perma.cc/8L5B-W3CD>] (archived Feb. 17, 2017) (highlighting the findings from the report GM CROPS: GLOBAL SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACTS 1996-2012 (2016)); 2013 GLOBAL BIOTECH CROP REPORT, *supra* note 10 (stating that in 2012 biotech crops helped to mitigate climate change by “reduc[ing] CO2 emissions [at a volume] equivalent to taking 11.8 million cars off the road for 1 year”).

17. J.P., *Frankenfoods Reduce Global Warming*, ECONOMIST (Mar. 4, 2013, 3:30 PM), <http://www.economist.com/blogs/feastandfamine/2013/03/gm-crops-and-carbon-emissions> [<https://perma.cc/2D8P-NUXA>] (archived Feb. 17, 2017) (reiterating the findings of ISAAA and stating that most of ISAAA’s funding comes from governments and the United Nations).

18. Paarlberg et al., *supra* note 7, at 2.

19. *Id.* at 5.

his field.²⁰ In Australia, activists, “wearing Hazmat protective clothing,” “scaled the fence” at a test farm growing genetically modified wheat and, with weed eaters, destroyed all the crops.²¹ Likewise, in Brazil, a group of female activists “armed with sticks and knives” “destroyed millions of samples of genetically modified (GM) eucalyptus saplings.”²²

Similar protests also occur in the United States. The most innocuous of these events are those that are entirely confined to the political realm.²³ Activism in the United States, however, is not limited to just the public sphere. Sometimes activists have gone so far as to proclaim that “it is the moral right—and even the obligation—of human beings everywhere to actively plan and carry out the killing of those engaged in heinous crimes against humanity.”²⁴ The heinous crime that the activists are referring to is the production and distribution of GMOs. The protests also include vandalism. For example, in Oregon approximately sixty-five hundred genetically engineered sugar beet plants were destroyed over the course of three days by protesters.²⁵

20. See, e.g., Mark Lynas, *The True Story About Who Destroyed a Genetically Modified Rice Crop*, SLATE (Aug. 26, 2013, 12:10 PM), http://www.slate.com/blogs/future_tense/2013/08/26/golden_rice_attack_in_philippines_anti_gmo_activists_lie_about_protest_and.html [<https://perma.cc/NT2B-KZVD>] (archived Feb. 17, 2017) (describing the golden rice protests).

21. Jessica Nairn, *Greenpeace Destroys GM Wheat*, ABC NEWS AUSTRALIA (July 14, 2011, 12:56 AM), <http://www.abc.net.au/news/2011-07-14/20110714-greenpeace-gm-protest/2794272> [<https://perma.cc/P3ND-XN4T>] (archived Feb. 17, 2017) (describing an Australian protest).

22. Belén Marty, *“Landless” Women Workers Destroy GMO Lab in Brazil*, PANAM POST (Mar. 9, 2015, 11:45 AM), <http://panampost.com/belen-marty/2015/03/09/landless-women-workers-destroy-gmo-lab-in-brazil/> [<https://perma.cc/LF94-PKQ5>] (archived Feb. 17, 2017) (detailing a protest in Brazil).

23. Linda Marsa, *Sidebar: Anti-GMO Grass-Roots Effort Gains Ground in U.S.*, DISCOVER MAG. (Mar. 7, 2013), <http://discovermagazine.com/2013/april/16a-anti-gmo-efforts-us> [<https://perma.cc/T6V4-K26Y>] (archived Feb. 17, 2017); see *id.* (“Anti-GMO food activists in the U.S. don’t stage late-night guerrilla raids, vandalizing farms swathed in hazmat gear. Instead, they’re more likely to patrol the corridors of power in sport jackets, lobbying lawmakers for oversight or suing biotechs in court.”).

24. See Keith Kloor, *Mike Adams, Monsanto, Nazis, and a Very Disturbing Article*, DISCOVER MAG.: BLOGS, (July 22, 2014, 5:05 PM), <http://blogs.discovermagazine.com/collideascape/2014/07/22/mike-adams-monsanto-nazis-disturbing-article#.Vg8rDnpViko> [<https://perma.cc/SSU5-FHVK>] (archived Feb. 17, 2017) (quoting parts of the original article); see also Jon Entine, *FBI turns up heat on Mike Adams as ‘Health Ranger’ Fiasco Widens, Plus Adams’ Archive*, GENETIC LITERACY PROJECT (July 28, 2014), <http://www.geneticliteracyproject.org/2014/07/28/fbi-turns-up-heat-on-mike-adams-as-health-ranger-fiasco-widens-plus-adams-archive/> [<https://perma.cc/7TXV-S9FY>] (archived Feb. 17, 2017) (mentioning possible FBI action for inciting violence).

25. Karl Haro von Mogel, *GMO Crops Vandalized in Oregon*, BIOLOGY FORTIFIED (June 24, 2013), <http://www.biofortified.org/2013/06/gmo-crops-vandalized-in-oregon/> [<https://perma.cc/S3EX-PQ35>] (archived Feb. 17, 2017) (describing a GMO protest in Oregon).

Due to these controversies, various international actors developed a patchwork of regulations to govern GMO production and transportation.²⁶ While there are three mechanisms for the international regulation of GMOs, the most notable is the framework developed at the United Nations level, the Cartagena Protocol agreement.²⁷ The Cartagena Protocol entered into force on September 11, 2003, and currently has 170 signatories.²⁸ It concerns various issues of biosafety largely requiring only advanced notification of transportation of GMOs and subsequent safe handling and use.²⁹ A subpart of this agreement required that, within four years, the parties would agree on how to deal with issues of liability due to the nonconsensual “transboundary movements” of various GMOs.³⁰ Now, twelve years since the ratification of the Cartagena Protocol, the liability system, the Nagoya–Kuala Lumpur Supplementary Protocol, is still not ratified as it is lacking six signatures.³¹ While the reasons for this are numerous, one of the primary reasons is that local perceptions of GMOs have become so divisive that creating a standard regulatory structure is a political nightmare, but this is exactly what is required going forward.³²

C. Why Is This Important?

One of the major factors affecting the interpretation of international, and even national, legal and regulatory frameworks concerning GMOs is the perception of the local community. For instance:

While marketing and importing GMOs and food and feed produced with GMOs are regulated at the [European Union (EU)] level, the cultivation of GMOs is an area left to the EU members. EU members have the right to prohibit or restrict

26. Paarlberg et al., *supra* note 7, at 4, 6.

27. *Id.* at 13–16 (describing the three existing regulatory structures as the World Trade Organization, the Cartagena Protocol, and the Codex, which creates food safety rules on consensus).

28. *Cartagena Protocol*, *supra* note 3.

29. *Biosafety Clearing-House*, CONVENTION ON BIOLOGICAL DIVERSITY, <https://bch.cbd.int/protocol> (last visited Feb. 17, 2017) [<https://perma.cc/B83M-YZRV>] (archived Feb. 17, 2017) [hereinafter *Biosafety Clearing-House*] (detailing the provisions of the Cartagena Protocol).

30. *Cartagena Protocol*, *supra* note 3.

31. *Id.*

32. Philip Katz et al., *The Evolving GMO Food Trade Debate: Towards a Global Regulatory Regime?*, in *THE REGULATION OF AGRICULTURAL BIOTECHNOLOGY* 32 (R.E. Evenson & V. Santaniello eds., 2004) (describing the current regulatory regimes in the European Union and the United States and opining on how to achieve an international solution).

the sale or cultivation of approved GMOs based on adverse effects on health and the environment.³³

This discretion creates a patchwork of regulations and expectations across the EU member states.³⁴ These variances in expectations result in a multitude of externalities. In this day and age, it is dogma that economic success is dependent on a stable legal and regulatory system. This is because businesses like to know what their rights are beforehand, specifically what their property rights are, and how these rights will be enforced.³⁵ However, the current state of affairs—a hodgepodge of regulations and expectations—does not afford this benefit. Furthermore, this lack of consistency offers little to no incentive for continued investment or research into biotechnology.³⁶

This Note will analyze the regulatory structures for GMO regulations around the world and how the courts of different countries have interpreted these structures. To accomplish this, this Note will examine a variety of cases concerning genetically modified crop controversies and the stances the courts took when deciding them. Special attention will also be paid to the inconsistencies of court decisions in relation to the popular opinion of the surrounding community, with the courts sometimes even acting against the current regulatory structure. Finally, an analysis will be conducted of the economic incentives and disincentives created by these decisions.

II. OVERVIEW OF GENERAL TYPES OF REGULATORY STRUCTURES

There are generally two forms of regulatory schemes, divided along the lines of the two major positions taken during the negotiations of the Cartagena Protocol.³⁷ The Cartagena Protocol is an international

33. Thersesa Papademetriou, *European Union, in RESTRICTIONS ON GENETICALLY MODIFIED ORGANISMS* 64 (2014), <http://www.loc.gov/law/help/restrictions-on-gmos/restrictions-on-gmos.pdf> [<https://perma.cc/UYS3-HG34>] (archived Feb. 17, 2017).

34. Paarlberg et al., *supra* note 7, at 6–7.

35. Armen A. Alchian, *Property Rights*, LIBRARY OF ECONOMICS AND LIBERTY: THE CONCISE ENCYCLOPEDIA OF ECONOMICS (2008), <http://www.econlib.org/library/Enc/PropertyRights.html> [<https://perma.cc/NW2Z-ZRB8>] (archived Feb. 17, 2017) (“One of the most fundamental requirements of a capitalist economic system—and one of the most misunderstood concepts—is a strong system of property rights.”).

36. See Paarlberg et al., *supra* note 7, at 2; Katz et al., *supra* note 32, at 31 (“[A]n effective system of international trade in GMO foods has been stymied by a global impasse on key questions relating to market access for GMOs . . .”).

37. AARON COSBEY & STAS BURGIEL, *THE CARTAGENA PROTOCOL ON BIOSAFETY: AN ANALYSIS OF RESULTS* 4–7 (2000), <http://www.iisd.org/pdf/biosafety.pdf> [<https://perma.cc/V8JD-ALD7>] (archived Feb. 17, 2017) (listing the five major groups, but identifying the divisive questions was the inclusion of LMOs that are intended for direct use as feed, food, or for processing); Katz et al., *supra* note 32, at 31 (listing the United States and the European Union as the representatives for the opposing sides of the GMO debate).

agreement, currently signed by 170 parties,³⁸ “which aims to ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology that may have adverse effects on biological diversity, taking also into account risks to human health.”³⁹ Identifying as the Miami Group negotiation bloc, Argentina, Australia, Canada, Chile, the United States, and Uruguay’s ultimate goal was to exempt GMOs intended for direct use as feed, food, or for processing from the proposed agreement.⁴⁰ The Miami Group largely failed to achieve its ultimate goal,⁴¹ so it is perhaps unsurprising that none of the countries ratified the agreement at the completion of negotiations.⁴² The result is a stark contrast between countries that are pro-GMO, the Miami Group, and GMO resistant countries, most of whom are parties to the Cartagena Protocol.

The Miami Group countries have more in common than just their shared Cartagena Protocol goals. The countries also share similar domestic regulatory structures and economic features. For instance, these countries have comparatively weaker informed notice regimes.⁴³ In the United States, labeling a product that is derived in some part from GMOs is voluntary.⁴⁴ The same is true in Canada, Chile, and Argentina. However, Australia and Brazil, and to some extent Uruguay, have initiated mandatory labeling regimes, but these regimes are much less severe than those implemented by GMO resistant countries.⁴⁵ Similarly, these countries usually have a

38. *Cartagena Protocol*, *supra* note 3.

39. Biosafety Clearing-House, *supra* note 29.

40. COSBEY & BURGIEL, *supra* note 37, at 4 (“The Miami Group represents the major exporters of genetically modified (GM) seed and crops.”).

41. While failing to achieve its ultimate goal, the Miami Group was successful in achieving one of its minor goals. *Id.* at 8 (stating the Miami Group fought for and won a two-year window to decide on protocols dealing with mandatory shipping segregation).

42. *Cartagena Protocol*, *supra* note 3 (detailing that Brazil and Uruguay have since signed the agreement); Katz et al., *supra* note 32, at 32.

43. Informed notice regimes entail regulations that require advanced notice that the contents of item in question contains some specified amount of GMOs. These sometimes take the form of labeling laws.

44. Attempts to pass a mandatory labeling regime have failed at the federal level before advancing past the committee stage, see Luis Acosta, *United States, in RESTRICTIONS ON GENETICALLY MODIFIED ORGANISMS*, *supra* note 33, at 220, or during the proposed rulemaking procedure, see 66 C.F.R. § 4706 (2001) (proposing a labeling regime, although nothing further has been done since comments closed in 2001).

45. Uruguay has a voluntary labeling at the national level, but recently the municipality of Montevideo passed a mandatory labeling regime. See ANDREA YANKELEVICH, USDA FOREIGN AGRICULTURAL SERVICE, URUGUAY ANNUAL BIOTECHNOLOGY REPORT 2012 8 (2012), http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Agricultural%20Biotechnology%20Annual_Buenos%20Aires_Uruguay_7-2-2012.pdf [<https://perma.cc/76JH-5CK8>] (archived Feb. 17, 2017); *Alimentos Transgénicos*, INTENDENCIA DE MONTEVIDEO (May 5, 2015), <http://www.montevideo.>

pecuniary interest in the cultivation and production of GMOs. From 1996 to 2011, Argentina made about \$72.6 billion from the application of genetically modified technologies to agriculture.⁴⁶ Likewise, between 2007 and 2008 about 80 percent of Chile's revenues from exporting seeds came from exporting genetically modified seeds.⁴⁷ Finally, given the financial interests and the comparatively lax informed notice regimes, these countries, unsurprisingly, also have fairly permissive field testing requirements (i.e., approve more field tests than their counterparts discussed below).⁴⁸ These characteristics create a positive outlook through which GMO research and consumption is viewed, and it is through this viewpoint that the laws of these countries have been developed.

GMO resistant countries also share similar regulatory structures and economic underpinnings. The European Union is the leader in this arena, being the first to implement mandatory labeling laws,⁴⁹ but other major countries rightfully included in this list are Japan, South Africa, and New Zealand. One of the most defining features of this

gub.uy/empresas/regulacion-alimentariaempresas/regulacion-alimentaria/inocuidad-alimentaria-y-nutricion/alimentos-transgenicos [https://perma.cc/J6YT-TMC3] (archived Mar. 25, 2017) (detailing a press release regarding Montevideo's new labeling regime). Australia has a mandatory labeling regime, but the threshold requirement is less draconian than other mandatory labeling standards. See Guillaume P. Gruère & S.R. Rao, *A Review of International Labeling Policies of Genetically Modified Food to Evaluate India's Proposed Rule*, 10 J. AGROBIOTECHNOLOGY MGMT. & ECON. 51 (2007), <http://agbioforum.org/v10n1/v10n1a06-gruere.htm> [https://perma.cc/DJ5U-RL4B] (archived Feb. 17, 2017) (describing the labeling laws in various countries). Brazil, on the other hand, has passed a mandatory labeling regime, in 2003, on par with those implemented by anti-GMO countries, but has, as of 2006, failed to entirely implement these laws. *Id.*

46. Graciela Rodriguez-Ferrand, *Argentina*, in RESTRICTIONS ON GENETICALLY MODIFIED ORGANISMS, *supra* note 33, at 1 (describing the regulations of GMOs in Argentina).

47. Erika Salazar & Gloria Montenegro, *Genetically Modified Crops in Chile*, 36 CIENCIA E INVESTIGACION AGRARIA 353, 353 (2009), http://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0718-16202009000300003 [https://perma.cc/V3HT-PWXP] (archived Feb. 17, 2017).

48. *Compare Confined Research Field Trials for Plants With Novel Traits (PNTs)*, CANADIAN FOOD INSPECTION AGENCY, <http://www.inspection.gc.ca/plants/plants-with-novel-traits/general-public/field-trials/eng/1338138305622/1338138377239> (last visited Feb. 17, 2017) [https://perma.cc/WMH6-98NJ] (archived Feb. 17, 2017), with YELENA VASSILIEVA, RUSSIAN FEDERATION: AGRICULTURAL BIOTECHNOLOGY ANNUAL 2013 3 (2013), http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Agricultural%20Biotechnology%20Annual_Moscow_Russian%20Federation_7-15-2013.pdf [https://perma.cc/FP2G-RELF] (archived Feb. 17, 2017) (describing Russia's *de facto* ban of field trials).

49. See Colin A. Carter & Guillaume P. Gruère, *Mandatory Labeling of Genetically Modified Foods: Does it Really Provide Consumer Choice?*, 6 J. AGROBIOTECHNOLOGY MGMT. & ECON. (2003), <http://www.agbioforum.org/v6n12/v6n12a13-carter.htm> [https://perma.cc/95RM-88HN] (archived Feb. 17, 2017) (describing the current landscape of GMO labeling laws); see also Commission Regulation 258/97 of January 1997, Concerning Novel Foods and Novel Food Ingredients, 1997 O.J. (L 043), <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31997R0258> [https://perma.cc/4B2U-246S] (archived Feb. 17, 2017).

group is membership in the Cartagena Protocol and the subsequent Nagoya–Kuala Lumpur Supplementary Protocol on Liability and Redress.⁵⁰ The basic feature of these agreements is to provide for a uniform system through which advanced notice and request for acquiescence to the presence of GMOs is required before GMOs can be brought into a country, even if only passing through. The planned effect of this procedure was to provide countries with a mechanism to give voice to the public and craft a strong application of the precautionary principle, as it applies to human and ecological health; the dearth of GMOs in these countries shows that the aforementioned goals have been realized. Surprisingly, while GMOs are not greatly consumed in these countries,⁵¹ a substantial amount of GMO research is still conducted, evidenced by the 300 million euros in grants the European Union has issued for GMO research.⁵²

The aforementioned information highlights that while the regulatory regimes are different, an undercurrent exists that ties them together. Science is always pushing social and regulatory boundaries, and with these advances comes financial investment, whether from governments in the form of research grants or venture capitalists in the form of financing. To best maximize an investment there must be stable expectations, which cannot be obtained if there are inconsistencies in decisions concerning the property rights of GMO producers and researchers. Part III will analyze some instances of this inconsistency and its subsequent economic effect.

III. CASE ANALYSIS OF GMO CONTROVERSIES

Genetically modified crop controversies involving production can be divided into two types of cases: infringement and vandalism. Infringement cases, usually cross-contamination claims, are instances in which a farm growing genetically modified crops adversely—through action or inaction—violates another's rights or a regulation. Conversely, vandalism cases deal with a party infringing on the rights

50. *Parties to the Protocol and signature and ratification of the Supplementary Protocol*, CONVENTION ON BIOLOGICAL DIVERSITY, <https://bch.cbd.int/protocol/parties/> (last visited Feb. 17, 2017) [<https://perma.cc/L585-BY33>] (archived Feb. 17, 2017) (listing parties to both protocols).

51. Sybille de La Hamaide, et al., *France Bolsters Ban on Genetically Modified Crops*, REUTERS (Sep 17, 2015, 3:51 PM), <http://www.reuters.com/article/2015/09/17/us-france-gmo-idUSKCN0RH1BV20150917#mutJWQ6HmfgXKvwE.97> [<https://perma.cc/FS7M-QXVG>] (archived Feb. 17, 2017) (describing the opt-out provision initiated by France to keep out genetically modified corn).

52. DIRECTORATE-GENERAL FOR RESEARCH AND INNOVATION, A DECADE OF EU-FUNDED GMO RESEARCH: (2001-2010) 15 (2010), https://ec.europa.eu/research/biosociety/pdf/a_decade_of_eu_funded_gmo_research.pdf [<https://perma.cc/5GEK-ZG86>] (archived Mar. 25, 2017) (detailing GMO research funding in the European Union).

of the GMO producer or researcher. For the first type of cases, this Part will summarize the approach to GMOs in the respective country and then provide a case summary and an analysis of judicial action that appeared to shift this approach. For the second type of cases, there will be a case analysis and a comparison of the property rights of GMO producers *vis-à-vis* other tangible property holders in the country.

A. Infringement Cases

1. Argentina

Argentina, a part of the Miami Group discussed in Part II, is the third largest grower of genetically modified crops in the world.⁵³ Consequently, the Argentinean government's position on GMOs is fairly supportive, shown by the implementation of Ley de Promoción del Desarrollo y Producción de la Biotecnología Moderna (Law on the Promotion of the Development and Production of Modern Biotechnology, LB) in 2007. This law created tax incentives for research and production of modern biotechnology (e.g., GMOs).⁵⁴ Not all Argentines agreed with this approach, as evidenced by the protesting of the construction of a new GMO plant by citizens of the Córdoba Province.⁵⁵ They protested the alleged overspraying of herbicides and pesticides near water sources and residential areas. Protesters linked this to GMOs by claiming that companies producing GMO seeds, as well as herbicides and pesticides, were profiting from the overspraying and that this has always been their objective.⁵⁶ In regard to the use of agrochemicals on genetically modified crops, the regulatory scheme calls for each province to develop its own regulations and enforcement mechanisms.⁵⁷ This patchwork system came to a breaking point in 2012 with the first successful criminal prosecution of farmers for misuse of agrochemicals.

The case involved a mother accusing two genetically modified soybean farmers and a pilot for the death of her three-day-old infant

53. Rodríguez-Ferrand, *supra* note 46, at 1.

54. Law No. 26270, July 25, 2007, [31205] B.O. 1 (Arg.).

55. *Liberaron a Los Ambientalistas y Monsanto Suspende la Obra*, LA VOZ (Sep. 30, 2013), <http://www.lavoz.com.ar/politica/liberaron-las-ambientalistas-y-monsanto-suspende-la-obra> [<https://perma.cc/WSE7-3YQ5>] (archived Feb. 5, 2017).

56. See, e.g., Michael Warren & Natasha Pisarenko, *Argentina: The Country That Monsanto Poisoned? Photo Essay, Over Grow The System*, ANONHQ.COM (Sept. 23, 2015), <http://anonhq.com/argentina-the-country-that-monsanto-poisoned/> [<https://perma.cc/TM4Z-FD8Q>] (archived Feb. 5, 2017) (stating that the cause of birth defects is over pesticide spraying). But see Linda Pressly, *Are Pesticides Linked to Health Problems in Argentina?*, BBC NEWS (May 14, 2014), <http://www.bbc.com/news/magazine-27373134> [<https://perma.cc/ML6P-DMG6>] (archived Feb. 5, 2017) (finding the claim inconclusive).

57. See, e.g., OSVALDO DANIEL PÓRFIDO, DEPARTAMENTO DE SALUD AMBIENTAL, LOS PLAGUICIDAS EN LA REPÚBLICA ARGENTINA 55–57 (Eduardo Butler et al. eds., 2014).

due to the farmer's misuse of chemicals meant for the genetically modified soybean crop.⁵⁸ A criminal court of appeals in the Córdoba Province convicted one of the farmers and the pilot under Ley 24,051 Residuos Peligrosos Article 56, which criminalizes the act of poisoning or contaminating the environment in general.⁵⁹ This was heralded as a victory over the flawed "agriculture model" pursued by the Argentinean government (i.e., the reliance on Monsanto's genetically modified soybeans).⁶⁰

The verdict created turmoil in agricultural markets as farmers became concerned about potential liability for practices necessary to support their genetically modified crops.⁶¹ This discord originated from the apparent disconnect between the national government taking a pro-GMO stance and the judiciary giving voice to the rural populations and calling for an end to genetically modified agriculture in Argentina. The government tried to allay these concerns by issuing reassuring statements that "[t]he problem is not the model, but special cases that do not meet the limits of 1000 to 1500 meters for spraying,"⁶² as well as announcing another approved genetically modified crop the same day as the decision.⁶³ Since this verdict, provinces have begun passing legislation to protect farmers from liability. One such province, for example, implemented a permitting system for aerial spraying and insulates a farmer from liability if the fumigation is under the control of an agronomist.⁶⁴

58. See Lucia Graves, *Sofia Gatica, Argentine Activist, Faced Anonymous Death Threats For Fighting Monsanto Herbicide*, HUFFINGTON POST (May 3, 2012), http://www.huffingtonpost.com/2012/05/03/argentine-activist-sofia-gatica-monsanto_n_1475659.html [<https://perma.cc/7D7Q-RLQ7>] (archived Feb. 5, 2017) (detailing the case).

59. Law No. 24051, Dec. 17, 1991, [27307] B.O. 1 (Arg.).

60. See Dario Aranda, *Trial against use of agrochemicals in Ituzaingó (Argentina): Spraying is a crime*, JUICIO A LA FUMIGACIÓN (Sept. 6, 2012), <http://www.juicioalafumigacion.com.ar/trial-against-use-of-agrochemicals-in-ituzaingo-argentina-spraying-is-a-crime/> [<https://perma.cc/U5HB-RHCW>] (archived Feb. 5, 2017) (describing the criminal case) (describing a plaintiff's reaction to the decision).

61. See *id.* (quoting plaintiffs stating that their goal is stop the use of agrochemicals used to support genetically modified crops); see also Martin De Ambrosio, *Argentinean battle over agrichemical use*, CHEMISTRYWORLD (Sept. 19, 2012), <http://www.rsc.org/chemistryworld/2012/09/pesticide-agrochemical-spraying-towns-residential-argentina> [<https://perma.cc/67SC-KU72>] (archived Feb. 5, 2017) (mentioning that the agriculture industry and the government are working together after this judgment to develop new regulations).

62. Aranda, *supra* note 60.

63. Volker Gehrmann, *Argentina: Soya farmer and pilot convicted of poisoning the population with pesticide glyphosate*, SAVE OUR SEEDS (Aug. 23, 2012), <http://www.db.zs-intern.de/uploads/1345815813-Argentina%20PR%20English.pdf> [<https://perma.cc/C8WZ-B7RS>] (archived Mar. 25, 2017).

64. *New Agrochemicals Law is Approved in Argentinean province*, AGRONEWS (Oct. 29, 2015), <http://news.agropages.com/News/NewsDetail---16176-e.htm> [<https://perma.cc/>]

2. Brazil

Brazil is also a part of the Miami Group, although recently it has taken steps that suggest it might be backing away from its pro-GMO stance (e.g., by adopting a mandatory labeling law).⁶⁵ Regardless, one of the most interesting issues concerning GMOs in Brazil occurred in the mid-1990s. In 1995, Brazil issued Law No. 8,974 to provide biosafety measures for GMOs and their derivatives, thereby creating the Comissão Técnica Nacional de Biossegurança (National Biosecurity Technical Commission, CTNBio).⁶⁶ Initially, the CTNBio provided technical advice and support for safe handling and cultivation of GMOs by issuing standards for research and criteria for monitoring risk.⁶⁷ Then, after Decree No. 1,752 passed, the CTNBio's role escalated to also encompass the authority to demand an Environmental Impact Study (EIS) when deemed necessary.⁶⁸ This was the norm until 1998 when the CTNBio's statutory discretion was called into question.

On September 29, 1998, the CTNBio allowed for the commercialization of a herbicide-resistant soybean without requesting an EIS.⁶⁹ In lieu of the EIS, the CTNBio mandated regular monitoring.⁷⁰ The Institute for Consumer Defense, a non-governmental organization in Brazil, immediately challenged this and sought an injunction against the release of the soybean into the environment.⁷¹ The basis of the challenge was that pre-1995 constitutional and statutory provisions required an EIS anytime genetically modified crops were released, regardless of the 1995 federal decree granting discretion.⁷² This case found itself in front of a

W79Z-35LY] (archived Feb. 5, 2017); see also *Argentina Launches Juridical Agchem Database Fitoleg*, AGRONEWS (July 11, 2014), <http://news.agropages.com/News/NewsDetail---12635.htm> [<https://perma.cc/CWR7-9Z49>] (archived Feb. 5, 2017) (describing new database developed by the national government that details the laws and regulations for agrochemicals at every level of government for Argentina).

65. Eduardo Soares, *Brazil*, in RESTRICTIONS ON GENETICALLY MODIFIED ORGANISMS, *supra* note 33, at 17–20 (detailing GMO regulations in Brazil).

66. Tao Cardoso et al., *Memories of Biosafety in Brazil: Lessons to be Learned*, 10 APPLIED BIOSAFETY 160, 163 (2005).

67. Lei No. 8.974, de 5 de Janeiro de 1995, ch. III art. 10, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] de 6.01.1995 (Braz.).

68. Decreto No. 1.752, de 20 de Dezembro de 1995, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] de 21.12.1995 (Braz.).

69. Soares, *supra* note 65, at 29; see also Comunicado No. 54, (Sept. 29, 1998) DIÁRIO OFICIAL DA UNIÃO [D.O.U.] de 10.1.1998 (Braz.).

70. Eliana M.G. Fontes et al., *Monitoring the Environmental Effects of Genetically Modified Crops in Brazil*, in GENETICALLY MODIFIED ORGANISMS IN CROP PRODUCTION AND THEIR EFFECTS ON THE ENVIRONMENT: METHODOLOGIES FOR MONITORING AND THE WAY AHEAD 91 (Kakoli Ghosh & Paul C. Jepson eds., 2006).

71. ROBERT L. PAARLBERG, *THE POLITICS OF PRECAUTION: GENETICALLY MODIFIED CROPS IN DEVELOPING COUNTRIES* 75 (2001).

72. *Id.* at 75–77.

“sympathetic federal judge,” who granted an immediate temporary restraining order against the release of the soybeans.⁷³ The parties fought in court for almost a year before the federal judge ultimately turned a second restraining order into a final court decision.⁷⁴ This case highlights the tension between the precautionary approach, which in some instances results in an indefinite moratorium,⁷⁵ and a permissive approach calling for a monitoring system.⁷⁶

This decision caused a whirlwind of debate throughout Brazil.⁷⁷ The top leaders of Brazil’s government attacked the injunction through multiple avenues but failed: having a federal judge in Brasilia overturn part of the injunction; attempting to pass formal registration for GMOs under the Agriculture Ministry; and conducting a massive media campaign supported by scientists, the National Academy of Science and the Brazilian Genetics Society, and six Brazilian cabinet members.⁷⁸ The issue plainly stated was that the CTNBio’s jurisdiction was at the mercy of public opinion and as such there was a serious concern at the time that its authority would be usurped by the agency in charge of conducting the EIS, the Institute for the Environment and Renewable Natural Resources.⁷⁹ Ultimately, all of these actions culminated in the development of a complex regulatory system, which engendered little legal certainty.⁸⁰

3. Canada

Canada, another party to the Miami group, is the third largest producer of GMOs in the world, producing both genetically modified crops and animals.⁸¹ Initially, in 1993, the Canadian government adopted the Federal Regulatory Framework for Biotechnology, which extended the existing regulatory framework for agriculture production to encompass genetically modified crops.⁸² The framework originated

73. *Id.* at 75–76.

74. *Id.* at 77.

75. Sue Branford, *Brazil Poised to Break Global Moratorium on GM Terminator Seeds*, MONGABAY (Oct. 20, 2015), <http://news.mongabay.com/2015/10/brazil-poised-to-break-global-moratorium-on-gm-terminator-seeds/> [<https://perma.cc/9CNR-7GZJ>] (archived Feb. 5, 2017).

76. Fontes et al., *supra* note 70.

77. Soares, *supra* note 65, at 30.

78. PAARLBERG, *supra* note 71, at 77–78.

79. *Id.* at 76.

80. Soares, *supra* note 65, at 29–30.

81. Tariq Ahmad, *Canada, in RESTRICTIONS ON GENETICALLY MODIFIED ORGANISMS*, *supra* note 33, at 31–32.

82. CANADIAN FOOD INSPECTION AGENCY (CFIA), REGULATION OF AGRICULTURAL BIOTECHNOLOGY IN CANADA: A POST-SECONDARY EDUCATOR’S RESOURCE 13 (2007), http://publications.gc.ca/collections/collection_2007/cfia-acia/A104-24-2007E.pdf [<https://perma.cc/6W7K-9GE9>] (archived Feb. 5, 2017).

from two fundamental beliefs that epitomize Canada's approach to GMOs: the effective use of resources to avoid duplicative efforts and the maintenance of high regulatory standards.⁸³ First, the framework eliminated duplicative efforts by distributing responsibilities for regulating GMOs among existing agencies; for example, Health Canada regulates food that is produced through biotechnology.⁸⁴ Second, the framework continues to ensure high standards for health by requiring the review of the end products rather than the production process of GMOs—the same process by which traditional agriculture products are evaluated.⁸⁵ Canada is distinguishable from most other countries in this regard, and since the regulators rely on “the concept of novelty to trigger regulatory oversight,” more seeds and foods, produced either by traditional or biotechnological processes, are regulated.⁸⁶ Coincidentally, Canada is viewed as rather permissive of GMOs and follows a less precautionary judicial and regulatory approach than its European counterparts.⁸⁷ Surprisingly, even with this favorable stance, in 2002, the Supreme Court of Canada ruled that patents, a form of property rights, could not extend to “higher lifeforms” (e.g., plants or animals).⁸⁸ This precedent was short lived because in 2004, the Supreme Court of Canada unexpectedly held that genetically modified crops could be patented.⁸⁹

The Supreme Court of Canada's first foray into the property rights of GMO producers left much to be desired. The premier case, *Harvard College v. Canada*, concerned the patentability of the “Harvard mouse,” a popular genetically modified laboratory mouse with an increased susceptibility to cancer.⁹⁰ The issue squarely in front of the court was whether or not a product patent could be issued for a “higher lifeform” produced through a patented process.⁹¹ The Supreme Court of Canada determined that allowing a “higher lifeform” to be patentable would be against public policy and that such determinations are best made by the legislature.⁹² Bolstering this decision was an inference that due to the legislature's failure to expressly consider the patentability of

83. *Id.*

84. CANADIAN FOOD INSPECTION AGENCY, REGULATING AGRICULTURAL BIOTECHNOLOGY IN CANADA: AN OVERVIEW, <http://www.inspection.gc.ca/plants/plants-with-novel-traits/general-public/overview/eng/1338187581090/1338188593891> (July 19, 2016) [<https://perma.cc/3357-A66J>] (archived Feb. 5, 2017).

85. Ahmad, *supra* note 81, at 31–32.

86. *Id.* at 32.

87. *Id.*; Peter Andr e, *An Analysis of Efforts to Improve Genetically Modified Food Regulation in Canada*, 33 SCI. & PUB. POL'Y, 377, 377 (2006).

88. See generally *Harvard College v. Canada* (Commissioner of Patents), [2002] 4 S.C.R. 45 (Can.).

89. See generally *Monsanto Canada Inc. v. Schmeiser*, [2004] 1 S.C.R. 902 (Can.).

90. See generally *Harvard College*, 4 S.C.R. at 46.

91. *Id.*

92. *Id.* at 49.

“higher lifeforms” and make subsequent changes to patent law that the legislature did not consider such patents to be valid.⁹³ In contrast, there was a strong dissent that highlighted that the majority’s decision made Canada “stand apart” from Canada’s trading partners, such as the United States and the European Union.⁹⁴ Following this decision, scholars opined that this decision would result in a hindrance to biotechnology investment in Canada.⁹⁵

In 2004, the Supreme Court of Canada, in *Monsanto Canada Inc. v. Schmeiser*, overturned this conservative policy and extended the protection offered by patents. The case concerned the alleged cultivation of “Roundup Ready Canola”⁹⁶ by a farmer who had not paid for the seeds, but whose farm, in 1998, contained a 95–98 percent concentration of this particular plant.⁹⁷ Monsanto had filed for a patent on a glyphosate-resistant gene and the cell derived from the process of insertion of the gene.⁹⁸ The farmer’s defense consisted of two separate claims. First, the farmer claimed that the plant arrived on his land by “blow-by,” whereby seeds are cultivated through natural processes, such as birds, waterways, and wind.⁹⁹ The Supreme Court of Canada found this argument invalid due to the level of concentration of the plant in the 1998 crop.¹⁰⁰ However, the Supreme Court of Canada

93. *Id.* at 47.

94. *Id.* at 59, 72 (Binnie, J, dissenting); see also Tamara Winegust, *A Bite Out of Apple: Samsung Emerges Victorious as U.K. Court of Appeals Endorses Ruling that the Galaxy Tab Design is not “Cool” Enough to be Infringing*, AM. UNIV. INTELL. PROP. BRIEF (Oct. 23, 2012), <http://www.ipbrief.net/2012/10/23/a-bite-out-of-apple-samsung-emerges-victorious-as-u-k-court-of-appeals-endorses-ruling-that-the-galaxy-tab-design-is-not-cool-enough-to-be-infringing/> [<https://perma.cc/LMG3-VYTY>] (archived Feb. 5, 2017) (“[T]he problem of disparate patent decisions is inherent in the nature of our patent system.”).

95. Steven B. Garland et. al., *Harvard Mouse Decision and Its Future Implications*, 39 CAN. BUS. L. J. 162, 175–76 (2003); see KSHITIJ KUMAR SINGH, *BIOTECHNOLOGY AND INTELLECTUAL PROPERTY RIGHTS: LEGAL AND SOCIAL IMPLICATIONS* 91 (2015) (noting Canada’s attempts to “alleviate the fear among biotechnology groups that said the decision . . . would ruin the biotechnology industry”); Paul Ratanaseangsuang, *Trend and Development: Patent Pending: Are Higher Life Forms Patentable?*, 4 APPEAL 14, 21 (1998) (“The current practice of refusing to patent higher life forms merely encourages companies to conduct research of this type outside Canada.”); Matthias Kamber, Note, *Coming Out of the Maze: Canada Grants the Harvard Mouse Patent*, 35 GEO. WASH. INT’L L. REV. 761, 786 (2003); Lim Li Ching, *Canada Rejects Patents on Higher Life Forms*, INST. SCI. SOC’Y (Jan. 30, 2003), <http://www.i-sis.org.uk/crpohlf.php> [<https://perma.cc/B5WR-XSWE>] (archived Feb. 5, 2017).

96. This is a species of Canola that is glyphosphate tolerant and developed by Monsanto.

97. *Percy Schmeiser*, MONSANTO, <http://www.monsanto.com/newsviews/pages/percy-schmeiser.aspx> (last visited Jan. 14, 2016) [<https://perma.cc/E27A-VGFX>] (archived Feb. 5, 2017).

98. *Monsanto Canada Inc.*, 1 S.C.R. at 914.

99. *Id.* at 936–37.

100. *Id.* at 929.

highlighted the tension that would exist between patent protection and a truly innocent farmer whose farm became cultivated with “blow-by” protected plants.¹⁰¹ The second claim attacked the validity of the patent on the gene and cells of the “Roundup Ready Canola.” This claim was anchored in Supreme Court of Canada’s reasoning in the *Harvard College v. Canada* decision. As pointed out by the dissent, the effect of allowing the patent on the gene and cells of a plant that could be grown by “natural processes” would in effect create a patent on a “higher lifeform.”¹⁰² The majority, however, differentiated this case from *Harvard College v. Canada* by focusing on the specificity of the patent on a particular cell that required substantive technological intervention in order to be created, regardless of the fact that this particular cell might result in or be a part of a “higher lifeform.”¹⁰³

The legislative response to this series of decisions was jumbled. The initial decision, an apparent call to action from the judiciary to the legislative branch, stirred the members of Parliament into a strong public debate, spurred mostly by the media.¹⁰⁴ While some social advocates applauded the decision, the Canadian Biotechnology Advisory Committee called on Parliament to explicitly decide the extent of the protection of patents in order to satisfy biotechnology investors.¹⁰⁵ In response, Parliament attempted to pass some legislation but was continually criticized for perceived lack of transparency and independence from biotechnology companies.¹⁰⁶

Private parties responded quickly to the trial court’s decision in 1995 to *Harvard College v. Canada*. Companies moved towards contract law to provide them the protection that was not afforded to them by patent law.¹⁰⁷ For example, Monsanto, as specifically discussed in *Monsanto Canada, Inc. v. Schmeiser*, required that all farmers using its seeds must sign a Technology Use Agreement that

101. *Id.* at 911, 936–37.

102. *See id.* at 940–41 (Arbour, J., dissenting) (explaining that Monsanto’s patent only protected them against another biotech company using the same gene to create a similar product, but they had no claim on the plant that resulted from the process).

103. *See id.* at 916–17, 934–35; *see also* SINGH, *supra* note 95, at 92 (describing the *Monsanto* case).

104. *See generally* LAURA TELFORD, CANADIAN ORGANIC GROWERS, CANADIANS WAKE UP TO GMO ISSUES, http://www.cog.ca/documents/CanadianswakeuptoGMO_issues_002.pdf (last visited Mar. 25, 2017) [<https://perma.cc/SJ73-AFXQ>] (archived Feb. 5, 2017).

105. SINGH, *supra* note 95; CANADIAN BIOTECHNOLOGY ADVISORY COMMITTEE, ANNUAL REPORT: 1999-2000 9–10, 43–44 (2000), <http://publications.gc.ca/collections/Collection/C1-14-2000E.pdf> [<https://perma.cc/4HWT-GRDA>] (archived Feb. 5, 2017).

106. TELFORD, *supra* note 104; Ahmad, *supra* note 81, at 33.

107. *Context of ‘1996: Monsanto’s ‘Technology Use Agreement’ Requires Farmers to Purchase Seed Every Year’*, HISTORY COMMONS, <http://www.historycommons.org/context.jsp?item=gm-19> (last visited Jan. 14, 2016) [<https://perma.cc/GE4M-HAX7>] (archived Feb. 4, 2017).

heavily restricted the farmers use and cultivation of the plants.¹⁰⁸ After the *Schmeiser* decision, companies continued to use such agreements, but public opinion shifted against GMO producers due to concern that “blow-by” plants from nearby GMO farms would make innocent farmers liable for millions of dollars due to patent infringement.¹⁰⁹ As of now, the regulatory policy seems to be that protection is afforded by the patent office for the cells and genes that make up GMOs, but, as some observe, it is unclear how the Canadian courts would rule on these patents if they were explicitly challenged.¹¹⁰

B. Vandalism Cases

1. Germany

Germany is a major proponent of the anti-GMO movement. Given this, it is not surprising that Germany is host to multiple protests against GMOs, such as the instance when five separate attacks against GMO fields occurred in less than three weeks.¹¹¹ The level of anti-GMO activism in Germany has been noted by many due to how pervasive it is.¹¹² One reason that these actions might be unexceptional is because activists who destroy GMOs are usually acquitted, if charged at all. In 2010, the first anti-GMO activists were sentenced for the destruction of a university’s research field in 2006.¹¹³ However, a case involving

108. The agreement required that the farmer: (1) attend a Grower Enrollment Meeting at which Monsanto describes the technology and its licensing terms; (2) purchase seeds from an authorized seed agent; (3) must undertake to use the seed for planting a single crop and to sell that crop for consumption to a commercial purchaser authorized by Monsanto; (4) not sell or give the seed to any third party, or save seed for replanting or inventory. *Monsanto Canada Inc.*, 1 S.C.R. at 913.

109. *Percy Schmeiser vs Monsanto: The Story of a Canadian Farmer's Fight to Defend the Rights of Farmers and the Future of Seeds*, DEMOCRACY NOW! (Sept. 17, 2010), http://www.democracynow.org/2010/9/17/percy_schmeiser_vs_monsanto_the_story [https://perma.cc/35MJ-LN57] (archived Feb. 6, 2017).

110. SINGH, *supra* note 95, at 99.

111. *Germany: 5 GMO Fields Sabotaged in 3 Weeks Time*, ASEED (Oct. 21, 2008), <http://ASEED.net/germany-5-gmo-fields-sabotaged-in-3-weeks-time/> [https://perma.cc/S8ZF-TBW5] (archived Feb. 4, 2017).

112. See Alice Cooper, *Political Indigestion: Germany Confronts Genetically Modified Foods*, 18 GERMAN POL. 536 (2009); Mark Lynas, *With G.M.O. Policies, Europe Turns Against Science*, N.Y. TIMES (Oct. 24, 2015), https://www.nytimes.com/2015/10/25/opinion/sunday/with-gmo-policies-europe-turns-against-science.html?_r=0 (subscription required) [https://perma.cc/CS8U-F4FB] (archived Mar. 25, 2017).

113. Marcel Kuntz, *Destruction of public and governmental experiments of GMO in Europe*, 3 GM CROPS AND FOOD: BIOTECHNOLOGY IN AGRICULTURE AND THE FOOD CHAIN 258, 260 (2012).

the destruction of a GMO test field in 2008 sums up the more common incident.¹¹⁴

In 2013, the Higher Regional Court of Saxony-Anhalt reversed a ruling against GMO activists,¹¹⁵ who destroyed a GMO field in 2008, finding their actions were justified.¹¹⁶ The activists destroyed a field that had been approved by the Federal Office of Consumer Protection and Food Safety.¹¹⁷ In court, the activists argued that the presence of GMOs created an immediate threat to a nearby seed bank, the Gatersleben gene bank, holding 150,000 seed samples.¹¹⁸ The trial court held that no threat was present because if there were a possible risk then the permit would not have been issued.¹¹⁹ On appeal, the appellate court held that the trial court failed to make factual findings about the legitimacy of the permit issued, since the defense alleged failures by the researchers to act in accordance with the permit.¹²⁰ The appellate court sent the case back to a different chamber to make findings as to the content of the permit and the manner in which it was issued.¹²¹ The appellate court went on to say that it was not fatal that the defendants had no actual knowledge of a failure to abide by a permit—a general assumption that there would be a violation was sufficient.¹²²

While Germany is fairly lenient on prison sentences,¹²³ it would be pure fiction to say that there is equal treatment of genetically modified crops compared to other destroyed property. As of 2014, almost all genetically modified crops that have been planted in

114. Oberlandesgericht des Landes Sachsen-Anhalt [OLG] [Higher Regional Court of Saxony-Anhalt] Apr. 24, 2013, 2 SS 58/12, <http://www.landesrecht.sachsen-anhalt.de/jportal/portal/t/bug/page/bssahprod.psm1?doc.hl=1&doc.id=KORE721052013&showdoccase=1&doc.part=L¶mfromHL=true> [<https://perma.cc/L8CL-L4FQ>] (archived Feb. 6, 2017) (Ger.) [hereinafter *Zerstörung von Gen-Weizenpflanzen*].

115. See *Wheat field trial destruction: GM Opponents Must Pay*, GMO COMPASS (June 19, 2009), http://www.gmo-compass.org/eng/news/449.wheat_field_trial_destruction_gm_opponents_pay.html [<https://perma.cc/5KGG-DYG8>] (archived Feb. 18, 2017) [hereinafter *Wheat field trial destruction*] (reporting the regional court sentencing activists to compensation of damages caused when they destroyed of field trial of GM wheat).

116. *Zerstörung von Gen-Weizenpflanzen*, *supra* note 114.

117. *Id.*

118. *Wheat field trial destruction*, *supra* note 115.

119. *Zerstörung von Gen-Weizenpflanzen*, *supra* note 114; *Wheat field trial destruction*, *supra* note 115.

120. *Zerstörung von Gen-Weizenpflanzen*, *supra* note 114.

121. *Id.*

122. There was further discussion dealing with the differing *mens rea* requirements, but this is outside the scope of this Note. *Id.*

123. RAM SUBRAMANIAN & ALISON SHAMES, SENTENCING AND PRISON PRACTICES IN GERMANY AND THE NETHERLANDS 5 (2013), <http://www.vera.org/sites/default/files/resources/downloads/european-american-prison-report-v3.pdf> [<https://perma.cc/G3DF-YV77>] (archived Feb. 6, 2017) (79 people per 100,000 residents are in prison in Germany compared to 716 per 100,000 residents in the United States).

research fields since 2004 have been destroyed.¹²⁴ Some have noted that the lack of police intervention and political opposition to this destruction is typical of Europe's overall attitude toward GMOs.¹²⁵ Unique to Germany, however, are politicians who support and advocate the destruction of GMO research fields.¹²⁶ The effects of this policy in Germany have been clear: the utter lack of support from the government, specifically the agencies that initially approve of the release of GMOs, has caused most organizations to move out of Germany for testing.¹²⁷

2. Belgium

Belgium is peculiar because, compared to most other European countries, it has a very active biotechnology research agenda.¹²⁸ Tension, however, still exists between Belgium's pro-research regulations and the hostile public opinion of GMOs.¹²⁹ The first genetically modified crop destruction occurred in 2000, and since then these acts have become increasingly common.¹³⁰ The courts, at least initially, seemed to side with the public by either acquitting or giving extremely light sentences to activists.¹³¹

The tribunal correctionnel de Namur's decision to, while finding the defendants guilty, make the defendants pay one euro in compensation for the destruction of the field trial is an example of an exceptionally light sentence.¹³² In 2000, two hundred people were

124. Edith Palmer, *Germany*, in RESTRICTIONS ON GENETICALLY MODIFIED ORGANISMS, *supra* note 33, at 89, 94.

125. Kuntz, *supra* note 113, at 263.

126. *Id.* at 263.

127. After the above case IPK stopped all trials in Germany. *Wheat field trial destruction*, *supra* note 115. Further, many other public and private organizations have also stopped trials in Germany. See Kuntz, *supra* note 113, at 260.

128. Belgium is also noted by many as having created the first GM crop. Nicolas Boring, *Belgium*, in RESTRICTIONS ON GENETICALLY MODIFIED ORGANISMS, *supra* note 33, at 8; Frédéric Varone & Nathalie Schifano, *Regulating Red and Green Biotechnologies in Belgium: Diverging Designs of Biopolicies*, 64 ARCHIVES OF PUB. HEALTH 83, 85 (2004).

129. Belgium is only favorable to research, private development is still disfavored by both the public and the government. Varone & Schifano, *supra* note 128, at 86–87.

130. Boring, *supra* note 128, at 15; see NATHALIE SCHIFFINO & FRÉDÉRIC VARONE, LA RÉGULATION POLITIQUE DES OGM 21 (2005) (noting various instances of crop destruction between 2000-2005).

131. Kuntz, *supra* note 113, at 263; Boring, *supra* note 128, at 15.

132. Sabine Dorval & Christophe Schoune, *Justice - Le tribunal Correctionnel de Namur Suspend le Prononcé Pour Douze des Treize Militants Anti-OGM Tous « coupables » mais pas redevables « Notre action est par nature politique »*, LE SOIR (Jan. 27, 2004), http://archives.lesoir.be/justice-le-tribunal-correctionnel-de-namur-suspend-le_t-20040127-ZONZVH.html?queryor=Monsanto&firstHit=0&by=10&when=-2&begYear=2004&beg

allegedly involved in the destruction of a GMO field trial, but only thirteen were brought to trial, including a professor from the Université Libre de Bruxelles, Isabelle Stengers.¹³³ The activists were accused of destroying both genetically modified and non-genetically modified crops that had been planted under authorization given three weeks earlier.¹³⁴ In response, the defendants presented evidence that their actions should be justified and offered expert testimony on the risks that genetically modified crops pose to the environment.¹³⁵ The judge held that there was no evidence of the dangers that the defendants were trying to prevent, and, even if there were, that the defendants had other remedies besides destruction.¹³⁶ Even so, the court only awarded damages of one euro, despite alleged damages of 88,151 euros, and suspended the pronouncement of judgment against twelve of the thirteen defendants.¹³⁷

While the court ultimately found that a crime had been committed, the court's award of one euro in damages stemmed from a belief that the plaintiffs overstated the alleged damages.¹³⁸ This highlights the level of the crime's severity in the court's mind and supports the belief that the judiciary does not consider genetically modified crops as valuable.¹³⁹ The company celebrated the one euro compensation as a victory because there was a guilty verdict and a chance to collect more compensation later.¹⁴⁰

The court's actions in the above case were typical for many years, until a standoff occurred at a 2011 "demonstration."¹⁴¹ On May 29, 2011, 350 activists were met by 300 civilians and 86 police officers who

Month=01&begDay=27&endYear=2004&endMonth=01&endDay=27&sort=datedesc&ub=TOUT&pos=0&all=1&nav=1 [https://perma.cc/T544-7N4V] (archived Feb. 4, 2017).

133. *Isabelle Stengers*, UNIVERSITÉ LIBRE DE BRUXELLES, <https://www.ulb.ac.be/rech/inventaire/chercheurs/3/CH2533.html> (last visited Jan. 17, 2016) [https://perma.cc/49DJ-ZYRH] (archived Feb. 4, 2017); see also Christophe Schoune, *Justice Treize Militants Anti-OGM Sur les Bancs du Tribunal Correctionnel de Namur « Un devoir de désobéissance » « Les plants détruits n'étaient pas des OGM »*, LE SOIR (Mar. 11, 2003), http://archives.lesoir.be/justice-treize-militants-anti-ogm-sur-les-bancs-du-trib_t-20030311-Z0MX6H.html [https://perma.cc/EUW4-MZCW] (archived Feb. 2, 2017); *Belgium: the Revolt of the Guinea Pigs*, GENTECH (May 21, 2000, 3:24 AM), <http://www.gene.ch/gentech/2000/May/msg00060.html> [https://perma.cc/47U5-XZMC] (archived Feb. 4, 2017) [hereinafter *Belgium: the Revolt of the Guinea Pigs*].

134. *Belgium: the Revolt of the Guinea Pigs*, *supra* note 133.

135. Dorval & Schoune, *supra* note 132.

136. *Id.*

137. The defendant that was sentenced was given a suspended sentence of one month and a fine. *Id.*

138. *Id.*

139. The provision that the court found the activists guilty under has a maximum penalty of three year's imprisonment and a 500 euro fine. Code Pénal [C.Pén.] art. 535 (Belg.).

140. Dorval & Schoune, *supra* note 132.

141. Kuntz, *supra* note 113, at 262, 263.

gathered to protect a GMO field trial.¹⁴² The tension between the two groups grew until the activists broke through the barricade and injured numerous police officers.¹⁴³ This violence stirred politicians to begin condemning the destruction of genetically modified crops.¹⁴⁴ The trial court initially convicted the activists who broke through the barricade, but, ultimately, a higher court, while acquitting the activists on some of the charges, lessened the original sentences; this was seen as a victory as some sentences were upheld nonetheless.¹⁴⁵

C. Resulting Economic Impacts

Expectations of property rights are directly tied to levels of investments.¹⁴⁶ Property rights are “at their best” when they are predictable, unmalleable, and allow for concerned parties to deal directly with the owner of the right.¹⁴⁷ When property rights contain these features, economic growth is promoted.¹⁴⁸ The fundamental building block, however, is stable expectations, whether at the level of enforcement or the scope of protection. The following subsections will analyze a few of the aforementioned cases and examine how unstable expectations impacted national GMO investment.

1. Germany

Germany’s hostile approach toward GMOs has almost wiped out all national genetically modified crop investment and research. In Germany, companies have given up hope that even after an intensive authorization process their research will be given full legal protection and enforcement. This is evidenced by a drastic decrease in field trials. In 2007, there were eighty field trials but by 2010 this number

142. *Id.* at 262.

143. *Id.* at 262.

144. *Id.* at 263.

145. *GMO Potato Protesters Win Lighter Sentences on Appeal*, GMWATCH (Dec. 24, 2014), <http://gmwatch.org/news/archive/2014/15829-gmo-potato-protesters-win-lighter-sentences-on-appeal> [<https://perma.cc/BZL6-K7AN>] (archived Feb. 4, 2017); *Wetteren Court Case: Acquittal of the Potato Activists*, ASEED (Dec. 24, 2014), <http://ASEED.net/en/wetteren-court-case-acquittal-of-the-potato-activists/> [<https://perma.cc/8C9B-9RZM>] (archived Feb. 6, 2017).

146. See generally GERALD P. O'DRISCOLL JR. & LEE HOSKINS, PROPERTY RIGHTS: THE KEY TO ECONOMIC DEVELOPMENT (Aug. 7, 2003) <http://object.cato.org/sites/cato.org/files/pubs/pdf/pa482.pdf> [<https://perma.cc/6ZYE-QVQ4>] (archived Feb. 6, 2017).

147. Stephen H. Haber, F. Scott Kieff, & Troy A. Paredes, *On the Importance to Economic Success of Property Rights in Finance and Innovation*, 26 WASH. U. J.L. & POL'Y 215, 216 (2008).

148. *Id.*

decreased to twenty-five and by 2011 it dropped further to fifteen.¹⁴⁹ In 2013, there were no new plantings explicitly due to the persistent threat of activists.¹⁵⁰

Multiple sources note that agricultural GMO research is shrinking in Germany specifically due to legal uncertainty.¹⁵¹ But, while investment in agricultural GMOs has been declining, medical GMO research, which does not face strong controversies, has been growing, with a 7 percent growth from 2014 to 2015.¹⁵² An economic study conducted on the effect that these destructions have had on GMO investment in Switzerland, a neighboring country also known for being hostile to GMOs,¹⁵³ concluded that for every euro spent on GMO research 1.26 euros more are needed for security and regulatory compliance.¹⁵⁴ Specifically, the study found that seventy-eight cents were needed for security against activists, thirty-one cents for biosafety precautions, and seventeen cents for regulatory compliance.¹⁵⁵ Since the cost of protection alone almost doubles the cost of a proposed GMO project, the study concluded that future projects are unlikely to occur unless these costs are reduced.¹⁵⁶ One way costs could be reduced is by dissuading activists from destroying these projects by enforcing property rights, thereby giving value to genetically modified crops.

149. Kuntz, *supra* note 113, at 260; *see also* INFORMATION SYSTEMS FOR BIOTECHNOLOGY, PLANT RESEARCH IN EUROPE: FEW NEW GM PLANTS (2012), <http://www.isb.vt.edu/news/2012/Jul/GMOSafety.pdf> [https://perma.cc/G7EM-C6GQ] (archived Mar. 25, 2017)

150. Palmer, *supra* note 124, at 90.

151. KWS, GREEN BIOTECHNOLOGY: WHY MODERN PLANT BREEDING CANNOT DO WITHOUT IT 27, http://www.kws.com/global/show_document.asp?id=aaaaaaaaahuwpi&download=1 (last visited Feb. 28, 2017) [https://perma.cc/7LNZ-3ZAC] (archived Jan. 7, 2017); *Industry Opinion: The German Biotech Sector is Still in Good Spirits but Doubts Remain about Foreseeable Improvements of Political Frameworks*, SCANBALT BIOREGION, <http://www.scanbalt.org/press/news+archive/view?id=2921> (last visited Jan. 17, 2016) [https://perma.cc/D85B-VFC3] (archived Feb. 5, 2017); Kuntz, *supra* note 113, at 260.

152. Nicole Sagener, *Biopharmaceuticals Booming in Germany Despite GMO Controversy*, EURACTIV (June 26, 2015), <http://www.euractiv.com/sections/innovation-industry/biopharmaceuticals-booming-germany-despite-gmo-controversy-315770> [https://perma.cc/3YTM-7A6S] (archived Feb. 7, 2017).

153. In 2005, there was a five-year ban instituted to prohibit the use of GMOs. When the ban was about to expire the Scientific Commission of the Swiss National Assembly. *Switzerland: Three More Years of GM Ban*, GMO COMPASS (Feb. 8, 2010), http://www.gmo-compass.org/eng/news/488.switzerland_three_more_years_gm_ban.html [https://perma.cc/NFN7-T2EP] (archived Feb. 7, 2017).

154. Kuntz, *supra* note 113, at 263; Thomas Bernauer et. al, *Government Regulation and Public Opposition Create High Additional Costs for Field Trials with GM crops in Switzerland*, 20 TRANSGENIC RES. 1227 (2010).

155. Bernauer et al., *supra* note 154, at 3.

156. *Id.* at 1.

2. Belgium

As stated earlier, Belgium is characterized as having an active biotechnology agenda.¹⁵⁷ Despite this, it is likely that the findings of the Switzerland study hold true for GMO research conducted in Belgium. Regardless, the way that Belgium has responded to these destructions has placed it on a trajectory quite unlike Switzerland and Germany's.

There appears to be evidence that legislative and judicial support, through the criminalization and enforcement of penalties for the destruction of GMOs, has a direct correlation with the number of GMO field trials conducted in Belgium. In 2000, when the law changed to criminalize the destruction of crops, GMO field trial notifications doubled.¹⁵⁸ Conversely, for five out of the six years following the court's decision to impose one euro as compensation there were zero notifications; in 2007, there was just a single notification.¹⁵⁹ The recent turn-around in policy has shifted this otherwise bleak outlook as there has now been a mostly consistent number of field trial notifications.¹⁶⁰ And as of 2011, GMO investments make up 5 percent of Belgium's total national activity.¹⁶¹

3. Canada

The effects of the decision in *Harvard College v. Canada* were subject to great debate and examination.¹⁶² Immediately following the decision, one company, TGN Biotech, disclosed that it was having difficulty finding funds because investors were "puzzled by the

157. *Belgian Economy at a Glance*, EMBASSY AND CONSULATES OF BELG. IN THE UNITED STATES (2015), <http://unitedstates.diplomatie.belgium.be/en/economic-information/belgian-economy-at-a-glance> [https://perma.cc/N8EP-NAYN] (archived Feb. 4, 2017).

158. See *Environmental releases of transgenic plants in Belgium*, BELGIAN BIOSAFETY SERVER, <http://www.biosafety.be/DTB/deliberate-releases-of-transgenic-plants> (last visited Jan. 17, 2016) [https://perma.cc/4ZFH-KE2Q] (archived Feb. 4, 2017) [hereinafter *Environmental releases of transgenic plants in Belgium*] (containing an interactive database of notifications of deliberate releases in Belgium).

159. *Id.*

160. *Id.*

161. FRANÇOIS BRIES & SOFIE ALBERT, BELGIAN FOREIGN TRADE AGENCY, BELGIAN BIOTECHNOLOGY 6 (F. L'Hoost ed., 2011), http://www.abh-ace.be/sites/default/files/downloads/BIOTECH_WEB.pdf (last visited Feb. 6, 2017) [https://perma.cc/JBW3-DMMD] (archived Feb. 6, 2017) (stating that green biotechnology accounts for 5 percent of Belgium's national activity).

162. See, e.g., Garland et al., *supra* note 95; Ratanaseangsuang, *supra* note 95; Kamber, *supra* note 95.

ruling.”¹⁶³ The dissent stated perfectly the reason for investor concern as the majority’s decision put Canada on “a very different trajectory” than Canada’s trading partners.¹⁶⁴

The decisions in *Harvard Mouse* and *Schmeiser* directly affected both trade and GMO cultivations in Canada. Around the time that the appellate court, disagreeing with the trial court, held that “higher lifeforms” could be patented, the number of genetically modified crop plantings climbed from 2.8 million hectares to 4 million hectares.¹⁶⁵ After notice of appeal of the decision to Canada’s Supreme Court, genetically modified crop plantings dropped by a million hectares.¹⁶⁶ Although, after the court’s final decision in *Schmeiser*, genetically modified crop plantings increased by a million hectares.¹⁶⁷ A secondary issue was the lack of harmonization of Canada’s regulatory regimes with its trading partners, since harmonization is correlated to higher levels of trade, which directly impact GDP.¹⁶⁸

4. Argentina

Argentina relies heavily on agriculture. Even before its reliance on GMOs, Argentina was beginning to dominate the world market as a net exporter of produce.¹⁶⁹ This economic posturing makes Argentina’s early and vigorous adoption of GMOs understandable. Furthermore, it explains why both the government and private parties would take special note of anything that could jeopardize GMO production.

163. *Harvard Mouse Patent Denied in Canada - Biotech Industry Hard Hit*, ORGANIC CONSUMERS ASS’N (Apr. 19, 2003), https://www.organicconsumers.org/old_articles/Patent/041903_mouse_patent.php [<https://perma.cc/Z97E-URS5>] (archived Feb. 6, 2017).

164. *Harvard College v. Canada (Commissioner of Patents)*, [2002] 4 S.C.R. 45, 59, 72 (Binnie, J, dissenting) (Can.).

165. *GM Crop Production: Countries Growing GMOs*, GMO COMPASS (Jan. 19, 2007), http://www.gmo-compass.org/eng/agri_biotechnology/gmo_planting/142.countries_growing_gmos.html [<https://perma.cc/6E6L-GMD8>] (archived Feb. 6, 2017) [hereinafter *GM Crop Production: Countries Growing GMOs*] (presenting data compiled from Clive James at the ISAAA about planted acres of GMOs).

166. *Id.*

167. *Id.*

168. See MAURO VIGANI, VALENTINA RAIMONDI & ALESSANDRO OLPER, *GMO REGULATIONS, INTERNATIONAL TRADE AND THE IMPERIALISM OF STANDARDS* 22 (2009) (concluding that a process of harmonized international standardization could have a positive trade effect).

169. See RANDALL D. SCHNEFF ET. AL, U.S. DEP’T OF AGRIC., *AGRICULTURE IN BRAZIL AND ARGENTINA: DEVELOPMENTS AND PROSPECTS FOR MAJOR FIELD CROPS* 2 (2001), https://www.ers.usda.gov/webdocs/publications/wrs013/15081_wrs013_1_.pdf?v=41057 [<https://perma.cc/U8WY-ATAN>] (archived Feb. 7, 2017) (“Since 1990, Argentina’s average shares of global corn and wheat trade have nearly doubled, to 13 and 10 percent.”).

GMO producers appeared to be very responsive to not only consummated court cases but threats as well. Leading up to the 2012 conviction, in 2008, there were hundreds of accusations filed against farmers cultivating GMOs for poisoning their neighbors.¹⁷⁰ During this same time period, including 2012, agricultural investment in Argentina dropped on average 3 percent a year, and only recently has agricultural investment surpassed 2007 amounts.¹⁷¹ Correspondingly, the number of crops planted in Argentina during this time period was drastically less than both the subsequent and preceding years. The annual percentage growth of genetically modified crop plantings between 2004 and 2008 was 7 percent; whereas, between 2008 and 2013 the average dropped to only 3 percent.¹⁷² There was no increase in plantings between 2013 and 2014, likely due to the now complete

170. Marie Trigona, *Study Released in Argentina Puts Glyphosate Under Fire*, TRUTHOUT (July 28, 2009), <http://www.truth-out.org/archive/item/85365-gmos-questionable-global-conquest> [https://perma.cc/2WPK-V79K] (archived Feb. 7, 2017) (reporting that the Campesino Movement of Santiago del Estero took over one hundred accusations of agrochemical poisoning to court in Santiago del Estero).

171. *World Development Indicators: Argentina*, WORLD BANK, <http://databank.worldbank.org/data/reports.aspx?source=2&country=ARG&series=&period> (last visited Jan. 17, 2016) [https://perma.cc/99Q6-8KXB] (archived Feb. 7, 2017) [hereinafter *World Development Indicators: Argentina*] (showing the annual growth of agriculture in Argentina while accounting for inflation).

172. CLIVE JAMES, INTERNATIONAL SERVICE FOR THE ACQUISITION OF AGRIBIOTECH APPLICATIONS (ISAAA), BRIEF 34: GLOBAL STATUS OF COMMERCIALIZED BIOTECH/GM CROPS: 2005 9 (2005), <https://www.isaaa.org/resources/publications/briefs/34/download/isaaa-brief-34-2005.pdf> [https://perma.cc/UR3H-HH8T] (archived Feb. 7, 2017) (showing 2005 and 2004 planting data); *ISAAA Brief 35-2006: Executive Summary*, ISAAA, <https://www.isaaa.org/resources/publications/briefs/35/executivesummary/default.html> (last visited Jan. 17, 2016) [https://perma.cc/436L-ZHAT] (archived Feb. 7, 2017) (showing 2006 planting data); *ISAAA Brief 37-2007: Executive Summary*, (ISAAA), <https://www.isaaa.org/resources/publications/briefs/37/executivesummary/default.html> (last visited Jan. 17, 2016) [https://perma.cc/L834-TYDH] (archived Feb. 7, 2017) (showing 2007 planting data); *ISAAA Brief 39-2008: Executive Summary*, ISAAA, <https://www.isaaa.org/resources/publications/briefs/39/executivesummary/default.html> (last visited Jan. 17, 2016) [https://perma.cc/P2UM-PH8L] (archived Feb. 7, 2017) (showing 2008 planting data); *ISAAA Brief 41-2009: Executive Summary*, ISAAA, <http://www.isaaa.org/resources/publications/briefs/41/executivesummary/default.asp> (last visited Jan. 17, 2016) [https://perma.cc/WF54-GTVP] (archived Feb. 7, 2017) (showing 2009 planting data); *ISAAA Brief 42-2010: Executive Summary*, ISAAA, <http://isaaa.org/resources/publications/briefs/42/executivesummary/default.asp> (last visited Jan. 17, 2016) [https://perma.cc/2P7D-CYMV] (archived Feb. 7, 2017) (showing 2010 planting data); *ISAAA Brief 43-2011: Executive Summary*, ISAAA, <http://www.isaaa.org/resources/publications/briefs/43/executivesummary/> (last visited Jan. 17, 2016) [https://perma.cc/GHT3-Q2RR] (archived Feb. 7, 2017) (showing 2011 planting data); *ISAAA Brief 44-2012: Executive Summary*, ISAAA, <http://www.isaaa.org/resources/publications/briefs/44/executivesummary/> (last visited Jan. 17, 2016) [https://perma.cc/L5BN-MMJB] (archived Feb. 17, 2017) (showing 2012 planting data); *ISAAA Brief 46-2013: Executive Summary*, ISAAA, <http://www.isaaa.org/resources/publications/briefs/46/executivesummary/> (last visited Jan. 17, 2016) [https://perma.cc/P2DR-QTVK] (archived Feb. 7, 2017) (showing 2013 planting data).

adoption of genetically modified crops for the production of corn and soybeans.¹⁷³ While there were definitely concerns from producers about liability, Argentina seems to have found a successful compromise as its legislature balances its favorable treatment of GMOs with its belief that activists and unlawful GMO producers must be held accountable for their actions. Argentina's framework is now characterized as sound, due to the science-based risk assessments and early involvement of scientists in the regulatory process.¹⁷⁴

5. Brazil

Like Argentina, Brazil is also heavily involved in agriculture. Brazil has abundant land suitable for agriculture and a favorable climate, both of which make it a natural low-cost producer of crops.¹⁷⁵ Further, Brazilian farmers are known for being more price sensitive because of the lack of support in the form of subsidies; this price sensitivity makes them particularly interested in the higher yield-to-cost ratios offered by genetically modified crops.¹⁷⁶

The 1998 decision, which led to a ban on the sale of GMO seeds, had an interesting effect on the Brazilian economy. Given Brazilian farmers' interest in the economic benefit of genetically modified crops, it was predictable that even with the ban there would be some use of these crops.¹⁷⁷ Estimates of illegal plantings show that plantings did not occur until at least a few months after the 1998 ban.¹⁷⁸ This suggests that at first Brazilian farmers were willing to wait and plant crops legally based on the CTNBio's authorization for commercialization. In 1999, illegal genetically modified crop plantings were estimated to be about 1.4 million hectares.¹⁷⁹ Illegal plantings from 1999 on increased at an average annual rate of 36 percent.¹⁸⁰

173. See *supra* note 172 and accompanying text; see also ISAAA, BIOTECH COUNTRY FACTS & TRENDS: ARGENTINA 1 (2015), https://www.isaaa.org/resources/publications/biotech_country_facts_and_trends/download/Facts%20and%20Trends%20-%20Argentina.pdf [<https://perma.cc/NA6R-TSQ6>] (archived Feb. 7, 2017).

174. Moises Burachik, *Regulation of GM Crops in Argentina*, 3 GM CROPS AND FOOD: BIOTECH. IN AGRIC. AND THE FOOD CHAIN 48, 48 (2012) (noting how Argentina developed a sound regulatory framework and decision-making process).

175. SCHNEPF ET AL., *supra* note 169, at vi.

176. Drake Bennett, *Brazil Says 'Yes' to Genetically Modified Foods. Mexico Says 'No'*, BLOOMBERG (Oct. 30, 2013, 12:49 PM), <http://www.bloomberg.com/bw/articles/2013-10-30/brazil-says-yes-to-genetically-modified-foods-dot-mexico-says-no> [<https://perma.cc/CBR5-2PQE>] (archived Feb. 7, 2017).

177. John Vidal & Gareth Chetwynd, *Brazil Agrees to Grow GM Crops*, GUARDIAN (Sept. 26, 2003, 6:14 AM), <http://www.theguardian.com/science/2003/sep/26/gm.food> [<https://perma.cc/GW79-KV3R>] (archived Feb. 7, 2017).

178. *GM Crop Production: Countries Growing GMOs*, *supra* note 166 (presenting data compiled from Clive James at the ISAAA about planted acres of GMOs).

179. *Id.*

180. See *id.*

Interestingly, illegal plantings stopped when an executive order was passed in 2003 to enable companies to collect the royalties on the genetically modified crops planted, with subsequent legal plantings amounting to only 50 percent of the former illegal plantings.¹⁸¹ Altogether, this pattern of behavior seems to suggest that GMO producers considered price and legality before investing in genetically modified crops. After genetically modified crops became legal, Brazil appears to “ha[ve] embraced GMOs with a vengeance,”¹⁸² as Brazil has been the second leading producer of GMOs since 2009.¹⁸³

IV. SOLUTION

GMOs and other facets of modern biotechnology have become inextricably linked with the global economy and potentially offer other non-economic benefits. In spite of the potential benefits, the approaches taken by the countries comprising the Miami Group and those opposed to GMOs during the Cartagena Protocol negotiations are inherently flawed because they each fail to truly consider opposing viewpoints. These flaws have led to inconsistent judicial decisions and unstable expectations when courts are faced with decisions concerning property rights versus concerns for health and safety. The faults of the Miami Group can be attributed to the perception that they are running roughshod over the health and safety concerns of individuals, leading to a general mistrust of the regulatory structure.¹⁸⁴ Likewise, the judicial and regulatory systems of countries opposed to GMOs fail to value the research conducted in these countries.¹⁸⁵

181. *Id.*; Jim Suhr, *Brazilian court suspends royalties to Monsanto*, NEV. DAILY MAIL, January 14, 2005, at 2 (describing executive order that allowed Monsanto to collect royalties on its seeds)

182. See Bennett, *supra* note 176.

183. See ISAAA Brief 41-2009, *supra* note 172 (showing 2009 planning data); ISAAA Brief 42-2010, *supra* note 172 (showing 2010 planning data); ISAAA Brief 43-2011, *supra* note 172 (2011 planting data); ISAAA Brief 44-2012, *supra* note 172 (2012 planting data); ISAAA Brief 46-2013, *supra* note 172 (2013 planting data); ISAAA Brief 49-2014: *Executive Summary*, ISAAA, <http://www.isaaa.org/resources/publications/briefs/49/executivesummary/default.asp> (last visited Jan. 17, 2016) [<https://perma.cc/B7RP-5FTY>] (archived Feb. 7, 2017) (2014 planting data).

184. Elisabeth Abergel, *The Canadian Biotechnology Advisory Committee, in HEALTH AND SUSTAINABILITY IN THE CANADIAN FOOD SYSTEM: ADVOCACY AND OPPORTUNITY FOR CIVIL SOCIETY* 114–16 (Rod MacRae and Elisabeth Abergel eds., 2012) (detailing that the fear of capture was a major concern and led to the events that ultimately caused the Canadian Biotechnology Advisory Committee to be shut down).

185. See *supra* Part III (describing how vandalism cases are under-prosecuted and how researchers are under-compensated).

Since GMO research is concentrated in many areas opposed to GMOs¹⁸⁶ while GMO production is typically carried out in Miami Group countries,¹⁸⁷ the tension created between these incoherent systems is palpable. Without clear and stable expectations, available to both researchers and investors, it is inevitable that GMO research projects will be left unfunded and incomplete.¹⁸⁸ If these experiments, due to lack of approval or funding, are never conducted, then results about the risks surrounding GMOs will not be clarified and GMO producers and researchers will be trapped in a never-ending cycle, thus impeding the advancement of biotechnology. This problem highlights the need to develop a comprehensive system to govern the property rights of GMO producers and researchers in order to provide stable expectations and ease the tension that currently exists. This Note proposes that the ideal system could be created by borrowing aspects from the government in Brazil, the judiciary in Belgium, and modifying current international treaties governing GMOs, thereby ultimately providing stable expectations by taking into account not only the interests of GMO producers and researchers but also the interests of individuals opposed to GMO propagation.

A stable system is needed to give decisional structure to cases where health and safety rights collide with property rights because when activist courts make inconsistent decisions, they create chaos regarding GMO producers' expectations of their own rights. In Brazil, the courts halted the legal adoption of GMOs for nearly ten years by dismantling the regulatory and approval process that had been previously established.¹⁸⁹ In Canada, the courts hindered the application of protection afforded by patents.¹⁹⁰ In Argentina, the courts imposed criminal liability for yet unproven causations, while in Germany and Belgium, the courts gave no value to the research efforts or the cost of cultivation of GMOs that were destroyed by activists.¹⁹¹

186. See generally XioZhi Lim, *GLP Infographic: All GMO Research is Industry Funded? Biofortified Analysis Sets Record Straight*, GENETIC LITERACY PROJECT (Nov. 26, 2014), <https://www.geneticliteracyproject.org/2014/11/26/glp-infographic-all-gmo-research-is-industry-funded-biofortified-analysis-sets-record-straight/> [<https://perma.cc/G3YK-TRN4>] (archived Feb. 7, 2017) (detailing GMO research funding around the world).

187. See *ISAAA Brief 49-2014*, *supra* note 172 (showing 2014 planting data).

188. DEREK BYERLEE & GARY E. ALEX, STRENGTHENING NATIONAL AGRICULTURAL RESEARCH SYSTEMS: POLICY ISSUES AND GOOD PRACTICE 20–21 (1998).

189. Joana Ferreira, *GMOs, A Global Debate: Brazil, Second Largest GMO Producer in World*, EPOCH TIMES (July 8, 2013), <http://www.theepochtimes.com/n3/162906-gmos-a-global-debate-brazil-second-largest-gmo-producer-in-world/> [<https://perma.cc/3M6T-4FFB>] (archived Apr. 9, 2017).

190. *Compare* Harvard College v. Canada (Commissioner of Patents), [2002] 4 S.C.R. 45 (Can.), *with* Monsanto Canada Inc. v. Schmeiser, [2004] 1 S.C.R. 902 (Can.).

191. See Pressly, *supra* note 56; Aranda, *supra* note 60; *Zerstörung von Gen-Weizenpflanzen*, *supra* note 114; Dorval & Schoune, *supra* note 132.

An analysis of the effect that these decisions had on the expectations of rights of GMO producers in their respective countries, as well as the economic impact on the countries, show the importance of the need for a solution. Generally, the economic indicators moved in accordance with the judicial and legislative decisions. When there was a move that strengthened the rights or the expectations of GMO producers, economic indicators showed positive growth in GMO activity.¹⁹² Conversely, when the rights or expectations of GMO producers were weakened, economic indicators showed a reduction in GMO activity.¹⁹³

However, the extent of these effects was not the same in each instance. The differences appear correlated to each country's existing political viewpoint on GMOs and its respective legal considerations, such as protection offered either under patents or contracts for damages or infringement and the likelihood of punishment for violating the regulations. For example, in Belgium, the effect of the court's decision to go against the national GMO research agenda was relatively minor, with notifications going from zero to at least one notification a year.¹⁹⁴ Conversely, in countries where the national government appeared to support GMOs, at least initially, negative court decisions had a major impact. In Argentina, the threat of liability and the court's imposition of such appeared to significantly affect GMO activity.¹⁹⁵ There also seems to be an underlying connection, although not explored in depth in this Note, between cost savings and the cost of liability or violations of law. Brazil provides an excellent example of this. In Brazil, price appeared to be at least as important as legality for the adoption of GMOs, but the fact that farmers waited to adopt GMOs until after the national government approved of them suggests that legal considerations played a significant role in the farmers' decision.¹⁹⁶ Ultimately, the above discussion suggests that even decisions that temporarily enlarge the rights of GMO producers and researchers would not be as beneficial in the long run as those that continue the norm.¹⁹⁷

192. See generally Section III.C and accompanying text.

193. See generally *id.*

194. See generally *Environmental releases of transgenic plants in Belgium*, *supra* note 158 (containing an interactive database of notifications of deliberate releases in Belgium).

195. *World Development Indicators: Argentina*, *supra* note 171.

196. *GM Crop Production: Countries Growing GMOs*, *supra* note 165.

197. Max Everest-Phillips, *The myth of 'secure property rights': Good economics as bad history and its impact on international development* 20 (Strategic Policy Impact and Research Unit, Working Paper 23, 2008), <http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/4251.pdf> [<https://perma.cc/8HJ8-5U7H>] (archived Feb. 7, 2017) ("Few doubt that property rights, not as absolutely secure but adequately stable, are essential for economic productivity.").

One cause of the inconsistencies studied by this Note appears to be that courts take into consideration the parties bringing the action, giving substantial weight to individuals as opposed to other stakeholders such as corporations.¹⁹⁸ In most instances, simply being an individual claiming a risk to your civil rights seemed to be determinative of the case.¹⁹⁹ The Argentina case models this well. Given that there were hundreds of suits being filed, it seems that the definitive feature that made this suit different was a judge who was sympathetic to the individuals claiming poisoning at the hands of GMO farmers.²⁰⁰ Similarly, in the vandalism cases, the interests the courts seem concerned with protecting were not those of GMO producers but those of individuals concerned about potential risks that had not been exhaustively explored.²⁰¹ The German court, in discussing whether the justification defense applied to the case, mentioned that an emergency situation could exist because it was unclear that the “competent authorities” would respond adequately to the threat posed by GMOs; the court sent the case back to a new trial to explicitly find whether the activists’ destruction of the field was a milder approach than alerting officials.²⁰² These cases suggest that when weighing the property rights of GMO producers against claims of safety, the courts almost unilaterally side with individuals claiming risks to health and safety.

Conversely, the courts rule in favor of individuals claiming property right interests in GMOs in cases not directly implicating health and safety concerns. For instance, the Canadian court, in upholding Monsanto’s property right infringement claim, confronted the issue head-on as to whether or not GMO producers had enforceable property rights against individuals not bound by contract.²⁰³ Interestingly, the dissent, in discussing the majority’s interpretation of “use,” touched upon a key issue often brought up by GMO opponents: that genetically modified crops are difficult to contain.²⁰⁴ The majority, however, did not appear to give any credence to this argument.²⁰⁵ The reluctance of courts to engage in this issue of containment when not posited as a health and safety concern suggests that courts, when ruling for individuals concerned for their health and safety, are merely

198. See generally *supra* Part III (outlining cases that support this proposition).

199. *Id.* (looking specifically at the Germany and Argentina cases where the court found a risk to human health and safety).

200. See PAARLBERG, *supra* note 71, at 75; Trigona, *supra* note 170.

201. Compare *Zerstörung von Gen-Weizenpflanzen*, *supra* note 114, with Dorval & Schoune, *supra* note 132 (showing similar circumstances but differing views on extent of risk, but ultimately deciding damage was negligible).

202. *Zerstörung von Gen-Weizenpflanzen*, *supra* note 114.

203. See generally *Monsanto Canada Inc. v. Schmeiser*, [2004] 1 S.C.R. 902 (Can.).

204. *Monsanto Canada Inc.*, 1 S.C.R. at 954.

205. *Id.*

deciding based on the framing of the issue and not the merits of the issue.

The aforementioned examples suggest that in some instances the courts are willing to recognize significant property right interests of GMO producers and researchers, but when the context changes, these rights are quickly forgotten. This situation closely parallels the dichotomy espoused by former U.S. Supreme Court Chief Justice Stone that property rights are subservient to other personal rights: that in response to rapid social change property rights must be fungible and open to government regulation, not enshrined as a constitutional right.²⁰⁶ This position has been adopted, at least implicitly, by courts and proponents practicing the precautionary principle.²⁰⁷ Defendants of the precautionary principle have framed it as a choice between an unsure economic loss of future gains and an immediate environmental loss.²⁰⁸ One example cited by proponents of this choice is that the restrictions placed on GMOs in Europe should be framed as foregoing future gains, claiming that the policies adopted in Europe do not result in losses; but, as shown above, this is not the case.²⁰⁹ GMO researchers realize considerable losses in the present through the destruction of their research and facilities. The precautionary principle and the idea that property rights are a lesser right than other civil rights have recently come under substantial criticisms. While Chief Justice Stone's approach gained popularity in the early-nineteenth century,²¹⁰ more recently there has been a push to redeem property rights as on par with other civil rights.²¹¹ The argument is that property rights intimately implicate other civil rights because they are inextricably entwined with "the defense of individual autonomy, constitutionalism, the protection of minority rights, and the articulation of a sense of personhood and identity."²¹² Even so, simply elevating property rights to the same level as other civil rights does not, in and of itself, solve the issue of how to

206. See Galston, *supra* note 1.

207. See John S. Applegate, *The Taming of the Precautionary Principle*, 27 WM. & MARY ENVTL. L. & POL'Y REV. 13, 13 (2002) ("[The precautionary principle] reflects the implicit judgment that, in the absence of some degree of ex ante regulatory review, new technologies will create novel, severe, and irreversible—but avoidable—harms to human health and the environment." It also reflects the policy that these harms "should be avoided or minimized through anticipatory, preventative regulatory controls.").

208. David A. Dana, *A Behavioral Economic Defense of the Precautionary Principle*, 97 NW. U. L. REV. 1315, 1341 (2003).

209. *Id.*

210. See generally, e.g., Schultz, *supra* note 1 (citing to cases such as *United States v. Carolene Products*, 304 U.S. 144 (1938)).

211. See *id.* at 33 (quoting *Lynch v. Household Finance Corporation*, 405 U.S. 538, 551–52 (1973)) ("[T]he dichotomy between personal liberties and property rights is a false one.").

212. *Id.* at 34.

deal with conflicts between property rights and health and safety concerns. There is significant concern that by not developing a system to deal with these conflicts that the market would, in effect, define and distribute rights solely based on economic considerations.²¹³

Given these concerns, the system that would engender more stable rights would be one that puts property rights on equal footing with health and safety concerns, and provides a strong framework for handling conflicts between the two of them. A system that gives the appearance of running roughshod over the concerns of activists will only result in acts of protest and, in extreme cases, vandalism; notwithstanding the fact that most acts of vandalism that occur in countries already hostile to GMOs are more attributable to a political atmosphere that condones and, in some instances, compels the behavior,²¹⁴ unlike legitimate actions of activists who believe that the government will not respond to their concerns.²¹⁵ To account for this, countries should adopt an approach that takes into consideration these concerns as well as provides ample protection for property rights.

This is where neutrality comes into play, as GMO opponents claim neutrality is lacking in many countries throughout the world. In Brazil, the perceived lack of fairness caused countless protests by opponents of GMOs who believed GMO producers had bought out the government.²¹⁶ Brazil offered a solution to this by creating a bipartisan board to determine the release of GMOs.²¹⁷ To this end, a framework already exists in the treaties previously attempting to regulate GMOs. Both the Cartagena Protocol, and moreover the Convention on Biodiversity, include the concept of shared scientific research between the members of results that further the conservation of biodiversity, focusing especially on the effects on developing countries.²¹⁸ If this goal was broadened to entail the safe use and cultivation of GMOs, then these agreements would be more effective, creating a neutral, joint-research initiative.

213. *Id.*

214. See Kuntz, *supra* note 113, at 260, 263 (detailing acts of vandalism targeted at GMO research in Europe).

215. *Zerstörung von Gen-Weizenpflanzen*, *supra* note 114.

216. Warren & Pisarenko, *supra* note 56.

217. Burachik, *supra* note 174; see CONABIA, MINISTERIO DE AGROINDUSTRIA PRESIDENCIA DE LA NACIÓN, <http://www.agroindustria.gov.ar/sitio/areas/biotecnologia/conabia/> (last visited Mar. 25, 2017) [<https://perma.cc/ZHP2-ZMWQ>] (archived Mar. 25, 2017).

218. Convention on Biological Diversity art. 12, June 5, 1992, 1760 U.N.T.S. 79 (stating that “Contracting Parties” shall “promote and encourage research which contributes to the conservation and sustainable use of biological diversity, particularly in developing countries.”); *Cartagena Protocol*, *supra* note 3, at art. 26 (“The Parties are encouraged to cooperate on research and information exchange on any socio-economic impacts of living modified organisms, especially on indigenous and local communities.”).

Certain concerns, however, will need to be overcome for this to be successful. Developing countries in early negotiations were fearful that their “genetic resources” would be exploited for the profit of more developed countries, explaining the explicit reference to their concerns in the treaties.²¹⁹ Also, issues of environmental concern have traditionally been subject to state sovereignty, as announced in UN Resolution 1803 in 1962. This history of sovereignty makes it difficult for countries to accept the findings of another country regarding safety of a practice, if the findings have any potential to harm them.

Despite this, the countries have more to gain by working together in this initiative instead of proceeding as sovereigns. First, currently each country solely bears the cost of enforcement and regulation attributed to crafting and enforcing individual regulatory structures.²²⁰ If the countries agreed to participate in a joint research initiative, then the results of studies could be used to set streamlined standards, thereby reducing the cost currently incurred by countries as they continue to individually craft these standards. Second, each country is already funding duplicitous studies regarding the safety of GMOs through grants. While collaboration is hardest in situations where a few countries are perceived to bear all the risks for the benefit of other countries,²²¹ this concern can also be dealt with by conducting research in countries with a positive GMO outlook, allowing the researchers in anti-GMO countries the chance to perform their research to completion. The ultimate benefit for skeptical countries is that through this collaborative effort, one country could be prevented from allowing a certain GMO to be cultivated to the detriment of the environment without sufficient research and testing.²²²

This research initiative will also assuage the fears of anti-GMO proponents. The reasoning for this lies in the framing of the issue; for instance, GMOs used for medicine, known as “red biotechnology” or “biopharmaceuticals,” are relatively non-controversial,²²³ but GMOs used for food are seen as more dangerous, yet both can be derived from field testing and subject the environment to the same risks. Cultural

219. See generally COSBEY & BURGIEL, *supra* note 37.

220. See *supra* Part II (describing each state’s regulatory structure); see also FRANZ XAVER PERREZ, COOPERATIVE SOVEREIGNTY 185–87 (2000) (discussing the significance of each country having to adopt a regulatory structure).

221. PERREZ, *supra* note 220, at 187.

222. See *id.*

223. See Sagener, *supra* note 152 (noting that “consumer fears have apparently been dispelled through the achievements of so-called ‘red’ medical biotechnology.”). But see *Genetically Modified Biopharmaceutical Crops Grown in Open Fields Threatening Genetic Pollution of Food Crops*, ALKALIZEFORHEALTH, <http://www.alkalizeforhealth.net/Library/gmpharming.htm> (last visited Jan. 1, 2017) [<https://perma.cc/BF77-5V8E>] (archived Feb. 7, 2017) (protesting use of pharmaceutical GMOs due to similar risks as other genetically modified crops).

cognition theory posits the idea that all “individuals select certain risks for attention and disregard others in a way that reflects and reinforces the particular worldviews to which they adhere.”²²⁴ Accordingly, simply pushing more information without framing it in a way that conforms with the opposing side’s “cultural worldview” will be ineffective. The proponents of the anti-GMO movement are likely to be more “egalitarian and solidaristic individuals,”²²⁵ meaning that they value community well-being *writ large* at the expense of individual gains.²²⁶ Therefore, the framing of the creation of a multi-state sponsored research initiative as one focused on the safe use of GMOs to benefit local needs would appeal to these individuals and put us one step closer to mending the cultural rift.

V. CONCLUSION

In conclusion, this Note makes clear that at least some of the inconsistencies that parties claiming property rights face in GMO disputes stem from issues arising over the clash of property rights versus health and safety concerns. One solution to this problem is to modify the current treaties to create a joint research initiative focused on the safe and beneficial use of GMOs and use this information to implement a balanced, yet rigid, regulatory and judicial framework; this solution, thereby, accounts for the interests of all stakeholders and producing consistent judicial decisions in cases similar to the GMO cases analyzed above. This solution avoids the pitfall often associated with the earnest adoption of the precautionary principle, an indefinite moratorium on the activity, while also avoiding the implications of a sole permitting process, which would raise similar concerns as the Germany defendants raised and result in vigilante justice. This solution will only work, however, if both GMO proponents and opponents are willing to work together and believe that all interested parties will be treated fairly under the law. For without such protection, there appears to be no end to the jumbled system of GMO regulations, which has severely limited scientific research in the agricultural and biotechnology arenas.

*Kline C. Moore

224. Dan M. Kahan & Donald Braman, *Cultural Cognition and Public Policy*, 24 *YALE L. & POL'Y REV.* 147, 152 (2006).

225. *Id.* at 156.

226. *Id.* at 152 (describing that these individuals are “naturally sensitive to environmental risk, the reduction of which justifies regulating commercial activities that are productive of social inequality and that legitimize unconstrained self-interest”).

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