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LEGAL LIABILITY, INTELLECTUAL PROPERTY AND GENETICALLY MODIFIED CROPS: THEIR IMPACT ON WORLD AGRICULTURE

Kanchana Kariyawasam[†]

Abstract: The use of genetic engineering and biotechnology in agriculture has attracted worldwide attention over the past decade. This technology has raised highly controversial issues and considerable international debate over the liabilities associated with crops containing genetically modified organisms (“GMOs”). In particular, the extension of intellectual property protection to GMOs, especially genetically modified crops, has produced one of the most controversial and strenuous debates of recent times.

After looking briefly at some of the key features, advantages and disadvantages of GM crops, this paper outlines the debate over the associated legal liability issues. This article also examines the major elements of the debate over liability for GM contamination and assesses whether common law remedies provide adequate protection against it. The paper then details the Australian Gene Technology Act 2000 (Cth) and its essential principles and shortcomings. In its examination of all these issues, this article identifies the challenges that must be faced to ensure justice for all those affected by GM cropping.

I. INTRODUCTION

Genetically modified (“GM”)¹ crops created by modern agricultural bio-technology have attracted worldwide attention over the past decade.² Genetic modification involves the alteration of an organism’s genetic

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¹ There are four major GM crops in commercial production today, including soybeans, maize, cotton and canola, though trials are under way for many other products. See Keith E. Maskus, *Intellectual Property Rights in Agriculture and the Interests of Asian-Pacific Economies*, 29 *WORLD ECON.* 715, 719 (2006). The US grows around fifty percent of the world’s GM crops; combined with Argentina the two countries make up seventy percent of GM production. Other countries which grow GM crops include Brazil, Canada, India, China, Paraguay, South Africa, Uruguay, Philippines, Australia, Spain, Mexico, Colombia, Chile, France, Honduras, Czech Republic, Portugal, Germany, Slovakia, Romania and Poland. The most notable expansion has been in the emerging economies of Argentina, Brazil, India and China. See INT’L SERVICE FOR THE ACQUISITION OF AGRI-BIOTECH APPLICATIONS, *GLOBAL STATUS OF COMMERCIALIZED BIOTECH/GM CROPS: 2007* (2007), <http://www.isaaa.org/resources/publications/briefs/37/executivesummary/default.html> (last visited Apr. 21, 2010); see also KATARINA NOSSAL ET AL., *GM CROPS IN EMERGING ECONOMIES: IMPACTS ON AUSTRALIAN AGRICULTURE* (2008) http://www.abareconomics.com/publications_html/crops/crops_08/gmcrops.pdf (last visited Apr. 21, 2010).

² FELICIA WU & WILLIAM P. BUTZ, *THE FUTURE OF GENETICALLY MODIFIED CROPS: LESSONS FROM THE GREEN REVOLUTION* (2004), http://www.rand.org/pubs/monographs/2004/RAND_MG161.pdf (last visited May 14, 2010).

material by manipulation of its DNA.³ A set of genes is removed from the DNA of one organism and inserted into the DNA of another, resulting in the production of genetically modified seeds.⁴ Such a transfer of genetic information across natural species barriers may not occur naturally through conventional breeding or hybridization.⁵ Principally, “GM crops are plants engineered by scientists who have inserted pieces or strands of foreign genetic material in an effort to change or supplement one or more of the plant’s traits.”⁶ In 2007, 114,000,000 hectares (281,000,000 million acres) of GM crops were cultivated in twenty-three countries, according to the International Service for the Acquisition of Agri-biotech Applications (ISAAA).⁷ The GM varieties of soy and cotton have become widely accepted and account for approximately ninety percent of production in this sector.⁸

Nobel-laureate agricultural scientist Norman Borlaug⁹ has detailed the true value of genetic engineering:

With the technology that we now have available, and with the research information that’s in the pipeline and in the process of being finalized to move to production, we have the know-how

³ ENGINEERING GENESIS: THE ETHICS OF GENETIC ENGINEERING IN NONHUMAN SPECIES 2 (Donald Bruce & Ann Bruce eds., 1998); see also Mark Tester, *Seeking Clarity in the Debate Over the Safety of GM Foods*, 402 NATURE 575, 575 (1999).

⁴ *Monsanto Co. v. Trantham*, 156 F. Supp. 2d 855, 858 (W.D. Tenn. 2001) (involving the insertion of genes into cottonseed and soybeans to make the plants resistant to herbicide).

⁵ Andrew Cockburn, *Assuring the Safety of Genetically Modified (GM) Foods: the Importance of an Holistic, Integrative Approach*, 98 J. BIOTECH. 79, 80 (2002).

⁶ Carie-Megan Flood, *Pollen Drift and Potential Causes of Action*, 28 J. CORP. L. 472, 477 (2003) (quoting Sophia Kolehmainen, *Precaution Before Profits: An Overview of Issues in Genetically Engineered Food and Crops*, 20 VA. ENVTL. L.J. 267, 269 (2001)). GM food is defined by the Joint FAO/WTO Expert Consultation on Biotechnology and Food Safety as follows: “Genetically engineered foodstuffs are food organisms that have been genetically engineered, foodstuffs that contain an ingredient of a genetically engineered organism or foodstuffs that have been produced using a processing aid made with the use of genetic engineering.” DOMINIQUE LAUTERBURG, *FOOD LAW POLICY & ETHICS* 160 (2001) (citing FOOD AND AGRIC. ORG. U.N. & W.H.O., *EXPERT CONSULTATION ON BIOTECHNOLOGY AND FOOD SAFETY* (1996)).

⁷ Stacy Lawrence, *Brazil Surpasses U.S. in New Transgenic Crop Plants*, 26 NATURE BIOTECH. 260, 260 (2008).

⁸ GMO Compass website, *GM Crops: Growing Around the World*, http://www.gmo-compass.org/eng/agri_biotechnology/gmo_planting/ (last visited May 14, 2010).

⁹ The U.S. agricultural scientist, Norman Borlaug, received the 1970 Nobel Peace Prize for developing high-yield crops to prevent famine in the developing world. See Norman Borlaug — Biography, http://nobelprize.org/nobel_prizes/peace/laureates/1970/borlaug-bio.html (last visited May 14, 2010).

to produce the food that will be needed to feed the population of 8.3 billion people that will exist in the world in 2025.¹⁰

Dr. Jacques Diouf, Director-General of the United Nations Food and Agriculture Organization (“FAO”), has said that “[GMOs] can help to increase the supply, diversity and quality of food products and reduce costs of production and environmental degradation, as the world still grapples with the scourge of hunger and malnutrition”¹¹ Finding the means to feed a growing global population, which is predicted to reach more than nine billion by 2050,¹² is a challenge that must be faced in coming decades.¹³ The United Nations estimates that agricultural output will have to rise fifty percent by 2030 to meet this increased demand.¹⁴ GM technology has the potential to revolutionize world agriculture, particularly in developing countries, in ways that would substantially reduce malnutrition, improve food security, increase rural income, and possibly even reduce environmental pollutants.¹⁵

However, GM products have also generated enormous public concern¹⁶ regarding the health, environmental, legal, social and ethical issues

¹⁰ Ronald Baily, *Billions Served: Norman Borlaugh Interviewed by Ronald Bailey*, REASON, Apr. 2000, available at <http://reason.com/archives/2000/04/01/billions-served-norman-borlaug>. Norman Borlaug was of the view that, unlike conventional farming, organic farming could not help feed the hungry in the developing world since organic food was too expensive and well beyond their reach. According to him, “[w]hile the affluent nations can certainly afford to pay more for food produced by so-called ‘organic’ methods, the one billion chronically undernourished people of the low-income, food-deficit nations cannot.” Norman E. Borlaug, *Feeding a World of 10 Billion People: The Miracle Ahead*, 38 IN VITRO CELL. DEV. BIOL.—PLANT 221, 227 (2002) (lecture presented at De Montfort University, on the occasion of the formal designation of the De Montfort University Norman Borlaug Institute for Plant Science Research).

¹¹ Press Release, FAO Director-General Stresses Benefits of Biotechnology in Fighting Hunger and Malnutrition and Calls for Open Debate on Potential Risks (May 14, 2001), http://www.fao.org/WAICENT/OIS/PRESS_NE/PRESSENG/2001/pren0131.htm (last visited May 19, 2010). Dr. Jacques Diouf was of the view that “we can no longer depend on bringing significant new areas of virgin lands into the food production chain and further expansion of food production must come from increased yields on the lands already farmed by the poorest of small farmers and the larger farms alike. This raises the twin challenges of raising productivity on the more fertile lands farmed by the better-off farmers together with an improvement in the output and range of food crops that can be grown on the less well-endowed fragile marginal lands”

¹² Matt Kallman, *Genetically Modified Crops and the Future of World Agriculture*, EARTHTRENDS: ENVTL. INFO., June 17, 2008, <http://earthtrends.wri.org/updates/node/313> (last visited May 18, 2010).

¹³ *Id.*

¹⁴ *Id.*

¹⁵ WU ET AL., *supra* note 2, at XV; see also, Nigel G. Halford & Peter R. Shewry, *Genetically Modified Crops: Methodology, Benefits, Regulation and Public Concerns*, 56 BRIT. MED. BULL. 62, 73 (2000) (arguing that “GM crops are already playing a part in increased yields, improving nutritional quality, increasing the profitability of agriculture and reducing its dependence on high chemical inputs.”).

¹⁶ As entomologist Chris Geiger noted, “[T]ransgenic crops hold a great deal of promise. But let’s remember that we are tinkering with one very complex system (the genome) and introducing it into another very complex system (the ecosystem). I believe that the precautionary principle should be followed with

raised by gene technology. While the debates over the advantages and disadvantages will continue, genetic engineering is already changing the face of agriculture.¹⁷ This article explains the arguments at the center of the debate and discusses the potential benefits and risks of GMOs. The legal issues surrounding GM crops have received less attention than the more popular social and environmental issues. In an effort to address this imbalance, this article presents a complex and critical focus on the legal liability issues associated with GM crops and the approach currently applied in Australia. In doing so, this article reviews the existing responsibilities under the Australian Gene Technology Act 2000 (Cth), identifies its limitations and offers possible solutions.

II. POTENTIAL BENEFITS AND RISKS OF GMOs

Many of the attitudes towards the use of GMOs in agriculture involve concerns about trust and perceived risk.¹⁸ Public perception of the use of genetic modification in food production is very emotionally charged, and it is therefore essential that the risks and benefits are considered carefully. This section examines the benefits and the risks—both perceived and actual—of GM food. The negative perceptions and fears about genetically modified foods worldwide are considerable.¹⁹ It has been suggested that some consumers reject GM food and agriculture because consumers believe

all transgenic introductions, that is, err on the side of caution . . . I have not yet seen a transgenic crop product for which there is a truly compelling need, a need that outweighs the unknown risks." Samantha Madell, *The Social Implications of Genetically Modified Food* (2000) (unpublished M.A. dissertation, Macquarie University, Sydney, Austl.). http://members.ozemail.com.au/~gamgee/writing_genetic_engineering.html (last visited May 18, 2010).

¹⁷ The Director-General of the U.N. Food and Agric. Org., Dr. Jacques Diouf said that to feed the forthcoming nine billion world population "we will have to use the scientific tools of molecular biology." By 2050, the world population is predicted to rise from the current six billion people to nine billion, requiring a 60% increase in food production. "Such a situation will require intensified cultivation, higher yields and greater productivity. With this in mind, we will have to use the scientific tools of molecular biology, in particular the identification of molecular markers, genetic mapping and gene transfer for more effective plant enhancement, going beyond the phenotype-based methods." The U.N. Food and Agric. Org. indicated in their *Agricultural Outlook* that the world needs to reconsider the use of genetically-modified organisms to boost agricultural production, as well as embark on a "serious review" of biofuel policies. See Director-General Jacques Diouf, *Biotechnology: FAO Response to Open Letter From NGOs* (2004), <http://www.fao.org/newsroom/en/news/2004/46429/index.html> (last visited May 19, 2010).

¹⁸ "The most recent Eurobarometer on Biotechnology, based on a survey of 25,000 participants in 2005, shows a growing confidence in biotechnology, but nevertheless a persistent rejection of GM food." Johanna Gibson, *Markets in Tradition—Traditional Agricultural Communities in Italy and the Impact of GMOs*, 3 *SCRIPT-ED* 243, 243 (2006) (citing George Gaskell et al., *Europeans and Biotechnology in 2005: Patterns and Trends*, *EUROBAROMETER* 64.3 (2006), http://ec.europa.eu/research/biosociety/public_understanding/eurobarometer_en.htm (last visited May 19, 2010)).

¹⁹ See Joan Costa-Font & Elias Mossialos, *Are Perceptions of 'Risks' and 'Benefits' of Genetically Modified Food (In)Dependent?*, 18 *FOOD QUALITY & PREFERENCE* 173, 173-82 (2007).

they could be health hazards.²⁰ The effects of GM crops on human health have been of major concern in public debates, even though the crops are subjected to far greater levels of scrutiny than foods produced by more traditional plant-breeding techniques.²¹ In genetic modification, the intended gene is incorporated into the genome of a crop-using vector containing several other genes, including those of non-plant organisms.²² Genetically engineered foods may also carry an antibiotic-resistant gene,²³ and one commentator has argued that, “some of the antibiotics used for this purpose are still used to treat human illnesses, and there is concern that resistance to the antibiotics could be transferred to humans and animals through food and feed products.”²⁴ Foreign genes introduced into food plants may therefore carry potentially harmful substances that may have negative impacts on human health.²⁵

The negative impact of GM crops on the environment and ecosystems is another significant issue in the GM debate.²⁶ For example, introducing new genes into an existing crop could, in turn, affect the surrounding environment, including other varieties of the same species.²⁷ The danger is that the “genes of the genetically modified crop [could] transfer to other wild or domesticated varieties of the species.”²⁸ There are fears that such transfers could facilitate the development of resistant “super-weeds,” loss of genetic diversity within crop species, or even the destabilisation of entire ecosystems.²⁹ Farmland wildlife would also decline because the use of GM crops would initiate the removal of weeds from all crops in the normal arable rotation.³⁰ This, in turn, would reduce the food supply for insects and

²⁰ Marianne McGarry Wolf et al., *A Comparison of Consumer Attitudes Towards GM Food in Italy and the USA*, in CONSUMER ACCEPTANCE OF GENETICALLY MODIFIED FOODS 131 (Robert E. Evenson & Vittorio Santaniello eds., 2004).

²¹ Trish Malarkey, *Human Health Concerns with GM Crops*, 544 MUTATION RES. 217, 217 (2003).

²² Arpad Pusztai et al., *Genetically Modified Foods: Potential Human Health Effects*, in FOOD SAFETY: CONTAMINANTS & TOXINS 347, 347 (J.P.F. D’Mello ed., 2003).

²³ Beever, D.E., and Kemp, C.F., *Safety Issues Associated with the DNA in Animal Feed Derived From Genetically Modified Crops: A Review of The Scientific and Regulatory Procedures*, 70 NUTR. ABSTR. REV. SER. A, 197 (2000).

²⁴ N. Clark et al., *Biotechnology and Development: Threats and Promises for the 21st Century*, 34 FUTURES 785, 793 (2002).

²⁵ DEBORAH WHITMAN, GENETICALLY MODIFIED FOODS: HARMFUL OR HELPFUL? (2000), <http://www.csa.com/discoveryguides/gmfood/review.pdf> (last visited May 18, 2010).

²⁶ Richard Bennett et al., *Environmental and Health Impacts of Growing Genetically Modified Herbicide-Tolerant Sugar Beet: A Life-Cycle Assessment*, 2 PLANT BIOTECH. J. 273 (2004).

²⁷ Jeroen Van Den Bergh & Justin M. Holley, *An Environmental—Economic Assessment of Genetic Modification of Agricultural Crops*, 34 FUTURES 807, 809 (2002).

²⁸ *Id.* at 813.

²⁹ Clark, *supra* note 24, at 792.

³⁰ FRIENDS OF THE EARTH, GENETICALLY MODIFIED CROPS AND FOOD 4 (2003), http://www.foe.co.uk/resource/briefings/gm_crops_food.pdf (last visited May 19, 2010).

birds.³¹ Thus, GM crops bring unknown effects to the natural environmental gene flow by creating unstoppable super-weeds, which threaten wildlife and biodiversity, all of which negatively impact organic farming initiatives.

Cross-pollination is another major concern.³² An irreversible or uncontrollable “escape” of genes from a GM crop to neighbouring plants of the same species, wild or domestic, could occur by pollen transfer.³³ It is believed that GM pollen can travel hundreds of meters downwind under normal weather conditions; in exceptional conditions, much longer dispersion of tens to hundreds of kilometers may occur.³⁴ In the case of rapeseed oil, researchers have found that its pollen can travel up to 4 kilometers and can escape from fields even when they are surrounded by barrier crops as a preventative measure.³⁵ This would present a serious problem for adjacent farmers, who would find it increasingly difficult to produce purely non-GM varieties in the presence of gene transfer.³⁶ It is argued that, “[n]eighbors may suffer damages, for example, by being unable to market their non-GM crop as they wish if the non-GM crops test positive for GMOs that came from a neighboring farmer’s field.”³⁷ The possible negative effects of GM contamination are numerous:

This contamination would have serious implications for small-scale farmers. For instance, it would endanger the indigenous seeds that these farmers have developed over centuries and that they trust and know. Farmers with contaminated fields could also end up being forced to pay royalties to the companies that

³¹ *Id.*

³² Philippe Cullet, *Farmer Liability and GM Contamination: Schmeiser Judgment*, 39 *ECON. & POL. WKLY.* 2551, 2551-54 (2004).

³³ THE WORLD CONSERVATION UNION, *CURRENT KNOWLEDGE OF THE IMPACTS OF GENETICALLY MODIFIED ORGANISMS ON BIODIVERSITY & HUMAN HEALTH* (2007), http://cmsdata.iucn.org/downloads/ip_gmo_09_2007_1_.pdf (last visited May 19, 2010); *see also* NUFFIELD COUNCIL ON BIOETHICS, *THE USE OF GENETICALLY MODIFIED CROPS IN DEVELOPING COUNTRIES*, http://www.nuffieldbioethics.org/fileLibrary/pdf/GM_Crops_short_version_FINAL.pdf (last visited Apr. 16, 2010).

³⁴ THE PARLIAMENTARY OFFICE OF SCI. AND TECH., *GM FARM TRIALS* (2000), <http://www.parliament.uk/post/pn146.pdf> (last visited May 19, 2010).

³⁵ Euan C. Simpson et al., *Gene Flow in Genetically Modified Herbicide Tolerant Oilseed Rape (Brassica napus)*, in *UK.SYMP.PROC.NO.72. GENE FLOW AND AGRICULTURE RELEVANCE FOR TRANSGENIC CROPS* (1999).

³⁶ Ken Belcher et al., *Genetically Modified Crops and Agricultural Landscapes: Spatial Patterns of Contamination*, 53 *ECOLOGICAL ECON.* 387, 388 (2005). The authors suggest that “either a tax on GM growers could be used to compensate non-GM growers for any loss of income due to co-mingling or, alternately, non-GM growers could pay GM growers to restrict their planting. Which route is chosen will depend on how property rights are allocated. Assuming producer interests can be organized efficiently (a strong assumption), either compensation scheme will allow new GM technologies to be optimally adopted.” *Id.* at 398.

³⁷ DAVID R. MOELLER & MICHAEL SLIGH, *FARMERS’ GUIDE TO GMOs* 21 (Karen R. Krub ed., 2004), available at http://www.rafiusa.org/pubs/Farmers_Guide_to_GMOs.pdf.

own the patents on the GM crops that contaminated their fields.³⁸

This introduces the concern of legal issues associated with genetic engineering. GM foods are a product of human intellectual efforts, and intellectual property laws allow developers to recoup costs and earn returns on their investments in research and development by prohibiting unauthorised copying.³⁹ As it is argued, “[o]nce the technology itself is separated from concern of commercial ownership of the food supply, it can be seen that there are real issues and concerns. These issues are largely legal rather than biological in nature and revolve around intellectual property rights.”⁴⁰

Intellectual property rights create a limited monopoly in organisms, and the access to GM technology becomes limited by restrictions. Legal action can be pursued against those who infringe upon the relevant patent by copying the invention or by selling patented seeds without the permission of the patent owner.⁴¹ Moreover, farmers who choose to raise non-genetically engineered crops intended for GM-free markets could, at times, be held liable if crops test positive for GM, even if the patented plant or seed was acquired unintentionally.⁴² The possession of patented GM seeds without the consent of the patent holder could lead to infringement.⁴³

Another problem arising from the use of gene technology concerns its possible threat to the conventional practice of seed saving: the reusing, sharing, exchanging and selling of farm-saved seeds, which has been a practice in agriculture for centuries. One commentator has argued that the multinational seed corporations’ “control over the world’s seeds constitutes an overwhelming threat to agricultural genetic diversity and small-scale

³⁸ Zachary Makanya, *Twelve Reasons for Africa to Reject GM Crops*, GRAIN, July 2004, at 19, available at http://www.grain.org/seedling_files/seed-04-07-04.pdf.

³⁹ Maria Lee & Robert Burrell, *Liability for the Escape of GM Seeds: Pursuing the ‘Victim’?*, 65 MOD. L. REV. 517 (2002).

⁴⁰ Mark C. Jordan, *The Privatization of Food: Corporate Control of Biotechnology*, 92 AGRONOMY J. 803, 805 (2009).

⁴¹ Ninety-seven percent of all patents are held by nationals of industrialized countries and 90% of all technology and product patents are held by global corporations. See U.N. DEV. PROGRAM, HUM. DEV. REPORT 2000 84 (2000).

⁴² Ikechi Mgbeoji, *Adventitious Presence of Patented Genetically Modified Organisms: Is Intent Necessary for Actions in Infringement?*, 27 BULLETIN OF SCI. TECH. SOC’Y 314 (2007), available at <http://bst.sagepub.com/cgi/reprint/27/4/314>.

⁴³ HAROLD G. FOX, CANADIAN PATENT LAW AND PRACTICE 383-84 (1969); see also Stephanie M. Bernhardt, *High Plains Drifting: Wind-Blown Seeds and the Intellectual Property Implications of the GMO Revolution*, 4 NW. J. TECH. & INTELL. PROP. 2, 5 (2005).

traditional farming systems.”⁴⁴ The ability of farmers to select and save seeds that have been adapted to local conditions is essential for the success of local agriculture.⁴⁵ Critics have also questioned the ethics of extending patent rights to plant genes,⁴⁶ forcing non-GM farmers to seek a licence to allow them to replant seeds from an earlier year’s crop⁴⁷ or to purchase new seeds from multinational companies, such as Monsanto⁴⁸ and Syngenta,⁴⁹ when their seeds are inadvertently contaminated by GM material. Patented GM crops are significantly more expensive than conventional or hybrid crops⁵⁰ and “[f]armers that use GM seed have to contract with the seed company not to grow the seeds they harvest.”⁵¹ This would reduce the range of local and native seeds that are fundamental to the local food systems. The introduction of GM crops into the developing world is certain to raise extremely complex issues and policy concerns, and transform agricultural practices without respecting local traditions.⁵²

It is argued that “[c]ertainly there are perceived physical dangers associated with GM technology but there is also an ethical dimension to the debate over the use of GM to enhance food products that may well be acting as an impediment to the widespread acceptance of GM crops.”⁵³ The introduction of such crops could be seen as an immoral application of agricultural biotechnology because the process of modifying genes creates

⁴⁴ Nicole Rogers, *Seeds, Weeds and Greed: An Analysis of the Gene Technology Act 2000 (Cth), Its Effect on Property Rights, and the Legal and Policy Dimensions of a Constitutional Challenge*, 2 MACQUARIE L.J. 1, 1 (2002).

⁴⁵ GRAIN BRIEFING, THE END OF FARM-OWNED SEED?: INDUSTRY’S WISH LIST FOR THE NEXT REVISION OF UPOV (2007), http://www.grain.org/briefings_files/upov-2007-en.pdf (last visited May 21, 2010).

⁴⁶ Lee & Burrell, *supra* note 39, at 519.

⁴⁷ *Id.*

⁴⁸ The Monsanto Company (NYSE: MON) is a U.S. based multinational agricultural biotechnology corporation. It is the world’s leading producer of the herbicide glyphosate, marketed as “Roundup.” Monsanto is also the leading producer of genetically engineered (GE) seed. *See* Monsanto, <http://www.monsanto.com/> (last visited Apr. 17, 2010).

⁴⁹ Syngenta AG is a large global Swiss agribusiness company which notably markets seeds and pesticides. Syngenta is involved in biotechnology and genomic research. The company is a leader in crop protection, and ranks third in total sales in the commercial agricultural seeds market. *See* Syngenta, <http://www.syngenta.com> (last visited Apr. 17, 2010).

⁵⁰ Teresa Anderson, *Patented GM Crops: Making Seed Saving Illegal*, AFRICAN EXECUTIVE, July 2006, <http://www.africanexecutive.com/modules/magazine/articles.php?article=766&magazine=76> (last visited May 21, 2010).

⁵¹ A. Stewart Truswell, *Genetically Modified Plant Foods - Hopes and Fears*, 2 MACQUARIE L. J. 177, 178 (2002).

⁵² THE WORLD CONSERVATION UNION, *supra* note 33.

⁵³ Nigel K. Pope et. al., *Consumer Attitudes Towards Genetically Modified Foods: Development of a Multidimensional Scale*, <http://smib.vuw.ac.nz:8081/WWW/ANZMAC2004/CDsite/papers/Pope1.PDF> (last visited May 21, 2010).

living things that would never occur in nature.⁵⁴ This undermines the natural and biological functions that constitute, and are inherent in, biological life and the organism's natural capacity to generate new life. GM cropping is, therefore, viewed as being inconsistent with transcendent and foundational moral, spiritual and biological principles.⁵⁵ It is also claimed that GM crops are immoral because, as we have seen, they threaten the traditional rights of farmers by denying their ability to save the seeds of their harvests.⁵⁶

The socio-economic issues surrounding GM crops encompass the growing power of multinational corporations over traditional farming. The involvement of large multinational corporations (particularly chemical corporations) in the creation and marketing of agricultural biotechnologies, and the use of intellectual property in the form of patents, are raising new and interconnected social and ethical questions.⁵⁷

Despite the negative publicity that genetic engineering has received, many people are strongly supportive of genetically modified crops and believe the benefits gained from the technology outweigh the associated risks. One commentator has argued that, "[m]any of the issues that determined the GM debate did not in fact originate from risk based on a scientific understanding, but rather from a plethora of other arguments." That same commentator points out that,⁵⁸ "risk and its perception is a social phenomenon rather than a scientifically determinable factor."⁵⁹

It is believed that this technology has the potential to revolutionize agriculture and to achieve long-term agricultural growth and food security. GM crops have been proven to enhance agricultural productivity so that farmers are able to produce more crops from the same area of land.⁶⁰ In fact, a study indicated that biotechnology helped to increase America's

⁵⁴ Critics think of this as "tampering with nature." Defenders of GM crops see the process of modifying genes as no more unethical than any other form of science or technology. "Humans, they say, have always altered their environment to benefit themselves and genetic engineering, these supporters emphasize, holds the promise of very great benefits indeed, including major new weapons against hunger and disease." Lisa Yount, *Introduction, in AT ISSUE: ETHICS OF GENETIC ENGINEERING*, (Lisa Yount ed., 2004), available at <http://www.enotes.com/ethics-genetic-article/39264>.

⁵⁵ Rogers, *supra* note 44, at 8.

⁵⁶ Frederick H. Buttel, *The Environmental and Post-Environmental Politics of Genetically Modified Crops and Foods*, 14 ENVTL. POL. 309, 309-23 (2005).

⁵⁷ Fern Wickson, *Australia's Regulation of Genetically Modified Crops: Are We Risking Sustainability?*, 2 AUSTL. J. EMERGING TECHS. & SOC'Y 36, 40 (2004).

⁵⁸ Helge Torgersen, Special Issue, *The Real and Perceived Risks of Genetically Modified Organisms*, 5 EMBO REP. S17 (2004).

⁵⁹ *Id.* at S20.

⁶⁰ GM crops "can allow food production to be increased by creating hardier agricultural species that ripen faster, have more offspring and mature more quickly." See Stephen Kelly Lewis, "Attack of the Killer Tomatoes?" *Corporate Liability for the International Propagation of Genetically Altered Agricultural Products*, 10 TRANSNAT'L L. 153, 158 (1997).

agricultural production by 8.34 billion pounds on 123 million acres in 2005, an increase of thirty percent in corn yield since 1996, and a twenty-two percent increase in soybeans.⁶¹ Worldwide, conservative estimates indicate that biotech crops increased farmers' income by \$4.8–6.5 billion in 2004, contributing to a cumulative gain of nineteen to twenty-seven billion dollars between 1996 and 2004.⁶² By transferring genes from one organism to another, genetic engineering can overcome the productivity constraints of conventional plant breeding,⁶³ enabling new varieties of crops to be developed at a faster rate than was possible using traditional methods.⁶⁴

In addition, GM crops reduce the need for pesticides, decreasing the number of annual sprays required and allowing farmers to use no-till agriculture, which leaves the soil and weed cover undisturbed over winter, greatly reducing soil erosion and the loss of groundwater.⁶⁵ A reduction in soil erosion would also lead to the protection of the structure and biodiversity of soil, as well as increasing its organic matter content.⁶⁶ Furthermore, genetic modification can provide improved resistance to pests and diseases, thus reducing the pesticide-induced mortality of natural enemies.⁶⁷ GM plants are protected from various predators—including bacteria, fungi, insects and animals—enabling farmers to protect their natural resources. In summary, the adoption of GM crops has led to improved yield, permitting productive farming on unproductive lands, minimizing crop damage from pests and diseases, and decreasing the use of pesticides.⁶⁸ These considerations show that, while some have fears about this technology, others see only advantages. The polarity and passion of the debate makes it essential to weigh the risks and benefits very carefully.

⁶¹ Media Release, Victoria Announces Review of GM Canola Moratorium (May 22, 2007), http://www.dpc.vic.gov.au/domino/Web_Notes/newmedia.nsf/8fc6e140ef55837cca256c8c00183cdc/b337c2d1974f3981ca2572e40000cef2 (last visited May 21, 2010).

⁶² Graham Brookes & Peter Barfoot, *GM Crops: The Global Economic and Environmental Impact—The First Nine Years 1996-2004*, 8 *AGBIOFORUM* 187, 194-95 (2005).

⁶³ GRAIN BRIEFING, DEVLIN KUYEK, GENETICALLY MODIFIED CROPS IN AFRICAN AGRICULTURE: IMPLICATIONS FOR SMALL FARMERS (2002), http://www.grain.org/briefings_files/africa-gmo-2002-en.pdf (last visited May 21, 2010).

⁶⁴ *Biotechnology & Indian Agriculture: The Challenge of the Next Millennium*, KRISHIWORLD, <http://www.krishiworld.com/html/bio2.html> (last visited Apr. 17, 2010).

⁶⁵ Nigel G. Halford & Peter R. Shewry, *Genetically Modified Crops: Methodology, Benefits, Regulation and Public Concerns*, 56 *BRIT. MED. BULL.* 62, 66 (2000).

⁶⁶ P. P. Motavalli, *Impact of Genetically Modified Crops and Their Management on Soil Microbially Mediated Plant Nutrient Transformations*, 33 *J. ENVTL. QUALITY*, 816, 816-24 (2004).

⁶⁷ Atella G. Uzogara, *The Impact of Genetic Modification of Human Foods in the 21st Century: A Review*, 18 *BIOTECH. ADVANCES* 179, 179-06 (2000).

⁶⁸ Gurinder Jit Randhawa, *Transgenic Crops and Biosafety Concerns*, 70 *SCI. & CULTURE* 305, 305-06 (2004).

III. GM CONTAMINATION AND FARMER LIABILITY

The production and use of GM crops creates many potential liabilities⁶⁹—some of these legal liabilities have been the topic of considerable debate both in Australia and overseas. Legal issues are raised in the production and use of GMO crops in a number of ways. In this context, “contamination” is intended to mean simply the presence of a genetically modified plant or plant part in the production process of a crop or product which is intended by the grower or producer to be “GM-free.”⁷⁰ As an example, a non-GM farmer’s crop, harvest or land could become contaminated by GM crops, and in the course of their farming practice, this farmer replants his fields with seeds taken from those contaminated plants. The farmer subsequently faces legal action for patent infringement.⁷¹ Another farmer who chooses to raise non-GM crops intended for GM-free markets could be held liable for patent infringement if the crops test positive for GM.

Contamination of conventional crops mostly results from the (often inadvertent) spread of GM seed and pollen from one farm to another. Thus, farmers with non-GM crops may face legal liability issues due to such contamination. The companies that create GM crops have intellectual property rights in the crops usually in the form of patents.⁷² The companies can, and have, taken legal action against farmers who grow the transgenic crops without the companies’ permission.⁷³ A farmer who is the victim of gene contamination could find himself liable to the corporation that created the GM crop, regardless of the mental state of the person who carries out the

⁶⁹ Richard Y. Boadi, *Managing Liability Associated with Genetically Modified Crops*, in *INTELLECTUAL PROPERTY MANAGEMENT IN HEALTH AND AGRICULTURAL INNOVATION: A HANDBOOK OF BEST PRACTICES* 1385 (2007), <http://aatf-africa.org/UserFiles/File/ipHandbook-14.pdf> (last visited May 19, 2010).

⁷⁰ Keir Bristow et.al., *GMO’s Liability for “GM” Contamination*, 10 *AUSTRALASIAN BIOTECH.* 37, 39 (2000).

⁷¹ GREENPEACE AUSTRAL., *GENETICALLY ENGINEERED FOOD CROPS: FINANCIAL AND LIABILITY RISKS FOR NON-GE FARMERS* (2003), http://sites.greenpeace.org.au/truefood/downloads/liability_briefing_nov_03.pdf (last visited May, 21 2010).

⁷² Mike Adcock, *Intellectual Property, Genetically Modified Crops and Bioethics*, 2 *BIOTECH. J.* 1088, 1088 (2007).

⁷³ “Currently, patent law does not require a patent holder to prove that an alleged infringer knew or even ought to have known about the reproduction of a patented invention. This situation places individuals without knowledge of the reproduction of a patented plant, seed, or animal on their property or in their care in a difficult situation. That individual (the ‘innocent bystander’) may face a patent infringement suit – one of the most difficult and expensive legal actions against which to defend – and damages for infringement without a countervailing remedy against the patent holder.” See Norman Siebrasse, *The Innocent Bystander Problem in the Patenting of Higher Life Forms*, 49 *MCGILL L. J.* 349, 360 (2004) (quoting the Canadian Biotech. Advisory Comm. Rep.).

infringing acts.⁷⁴ The inadvertent presence of GM crops on the non-GM farmers' lands and the infringement under patent law has, therefore, raised a number of legal issues, since even a completely innocent neighbour could be held liable for patent infringement.⁷⁵

A recent successful suit brought by Monsanto in Canada against a conventional farmer, Percy Schmeiser, highlights some of these legal issues. Monsanto had a patent for glyphosate-resistant canola plants.⁷⁶ In other words, the seeds were resistant to Roundup, a pesticide used to eradicate weeds.⁷⁷ Glyphosate-resistant canola plants were found to be growing on Schmeiser's farm, and he did not have a licence to use the Monsanto seeds.⁷⁸ Monsanto sued for patent infringement.⁷⁹ Schmeiser has consistently claimed⁸⁰ that he did not knowingly acquire and plant Monsanto's GE seed and that windborne seed must have contaminated his crop.⁸¹ Despite Schmeiser's argument that he should not be liable for the infringement, the trial Judge found that "Schmeiser knew or ought to have known that those plants were glyphosate-resistant when he saved their seeds in 1997 and planted them the following year."⁸² The court held that knowledge or intention was irrelevant to the question of infringement.⁸³ Some

⁷⁴ Paul J. Heald & James C. Smith, *The Problem of Social Cost in a Genetically Modified Age* (UGA Legal Studies Research, Paper No. 06-004, 2005), <http://ssrn.com/abstract=878691> (last visited May 18, 2010).

⁷⁵ Roger A. McEowen, *Legal Issues Related to the Use and Ownership of Genetically Modified Organisms*, 43 WASHBURN L.J. 611, 611 (2004); see also Bernhardt, *supra* note 43.

⁷⁶ *Monsanto v. Schmeiser*, [2001] F.C. 256 (Can.); *Schmeiser v. Monsanto*, [2002] F.C. 309 (Can.).

⁷⁷ *Monsanto v. Schmeiser*, [2001] F.C. 256 (Can.); *Schmeiser v. Monsanto*, [2002] F.C. 309 (Can.).

⁷⁸ Philippe Cullet, *Monsanto v Schmeiser: A Landmark Decision concerning Farmer Liability and Transgenic Contamination*, 17 J. ENVTL. L. 83, 83 (2005).

⁷⁹ *Monsanto v. Schmeiser*, [2001] F.C. 256 (Can.); *Schmeiser v. Monsanto*, [2002] F.C. 309 (Can.).

⁸⁰ Percy Schmeiser describes this: "Like most farmers in Western Canada, I collected and stored my own seed. After years of selection I had a variety that gave a good yield, was quite resistant to local diseases and was relatively weed-free. In 1997, I sprayed Roundup as usual on the weeds and stray rapeseed plants growing around my fields. I was surprised that so much rapeseed survived the application. Had I got the herbicide concentration wrong? I now realize this was the first sign that my fields had been contaminated by genetically modified (GM) rapeseed." See Percy Schmeiser, *Genetic Contamination and Farmers' Rights*, SYNTHESIS/REGENERATION, May 24, 2002, <http://www.greens.org/s-r/29/29-21.html> (last visited May 19, 2010).

⁸¹ Rogers, *supra* note 44, at 5.

⁸² *Schmeiser v. Monsanto*, [2002] F.C. 309 (Can.) (Schmeiser's appeal was later dismissed).

⁸³ According to Judge MacKay: "The defendants grew canola in 1998 in nine fields, from seed saved from their 1997 crop, which seed Mr. Schmeiser knew or can be taken to have known was Roundup tolerant. That seed was grown and ultimately the crop was harvested and sold. In my opinion, whether or not that crop was sprayed with Roundup during its growing period is not important. Growth of the seed, reproducing the patented gene and cell, and sale of the harvested crop constitutes taking the essence of the plaintiffs' invention, using it, without permission. In so doing the defendants infringed upon the patent interests of the plaintiffs." See *Contaminating Canada's Seed Supply*, GRAIN, April 2003, http://www.grain.org/seedling_files/seed-03-04-en.pdf (last visited May 22, 2010).

commentators have argued that “this decision, *Monsanto v. Schmeiser*,⁸⁴ presents us with the specter of a successful action being brought against a farmer who is entirely unaware of the presence of the claimant’s patented genetic material, and who infringes merely by replanting seeds taken from these plants as part of normal farming practice.”⁸⁵ One critic argues that *Monsanto Co. v. Dawson*⁸⁶ also confirms that the inadvertent presence of contaminated crops does not protect the innocent possessor from infringement and farmers will be liable for patent infringement if they use a patented plant without any knowledge that a patent exists.⁸⁷ Intrinsically, where a patented invention is used without permission, the patent holder’s rights will be infringed, even though the defendant did not know and had no reason to believe that the patent was infringed.⁸⁸ Thus “if farmers grow non-transgenic crops in an area where transgenic crops are grown, there could be a presumption that they ‘ought to know’ of the possible presence of protected transgenic seeds on their fields.”⁸⁹ Even a completely innocent farmer could be held liable for patent infringement when unknowingly harvesting and saving seed containing patented genes. Farmers who choose to cultivate non-GM varieties can be sued for the unintentional presence of transgenic DNA in their crops because it is presumed that they “ought to know” of the possible presence of protected GM seeds on their fields.⁹⁰

In fact, the *Monsanto v. Schmeiser* decision gives a clear warning to farmers worldwide that they have to monitor their fields for the presence of GM seeds even if they have no knowledge of the potential presence of GM seeds.⁹¹ This is an odd situation, as the farmer is deemed to have infringed upon the patent even if his fields were, in fact, inadvertently contaminated by drifting pollen.⁹² One commentator argued “it is true that intellectual property rights are not fully consistent with tangible property rights, but in the case of a farmer unintentionally acquiring a patented seed, intellectual property rights do not seem totally appropriate.”⁹³ This highlights the

⁸⁴ *Monsanto v. Schmeiser*, [2001] 3 F.C. D-36, 2001 FCT 256 (Can.).

⁸⁵ Maria Lee & Robert Burrell, *Liability for the Escape of GM Seeds: Pursuing the ‘Victim’?*, 65 MOD. L. REV. 517, 519 (2002).

⁸⁶ *Monsanto Co. v. Dawson*, 2000 WL 33953542 (E.D. Mo. 2000).

⁸⁷ Drew L. Kershen, *Of Straying Crops and Patent Rights*, 43 WASHBURN L. J. 575, 582 (2004).

⁸⁸ Brad Sherman, *Biological Inventions and the Problem of Passive Infringement*, 13 AUSTL. INTEL. PROP. J. 146, 149 (2002).

⁸⁹ Philippe Cullet, *Case Law Analysis—Monsanto v. Schmeiser: A Landmark Decision Concerning Farmer Liability and Transgenic Contamination*, 17 J. ENVTL. L. 83, 83 (2005).

⁹⁰ MOELLER & SLIGH, *supra* note 37.

⁹¹ Cullet, *supra* note 32, at 2551.

⁹² Cullet, *supra* note 89, at 83.

⁹³ Bernhardt, *supra* note 43, at 1.

“disequilibrium between these broad patent rights and the lack of legal responsibility for harms caused by GMO products.”⁹⁴

It is questionable as to whether non-GM seed users or those with contaminated crops should be liable or responsible to those farmers who are actively seeking to gain from the cultivation of GM crops and who are also in a position to reduce the risks of contamination of non-GM crops.⁹⁵ Concurrently, the question arises whether the mere fact of possessing the patented gene should lead to liability and whether it would be reasonable to transfer the burden to the users. The potential for liability due to genetic contamination and its effects on non-GM farmers must be carefully assessed. Legislative protection should be introduced and enforced to protect farmers from liability concerns in relation to GM crops, specifically to protect farmers who grow conventional crops from any contamination by genetically modified crops. Strict legislation on contamination is therefore vital to protect non-GM growers against the multinational companies that develop and own the intellectual property rights in the GM crop causing the contamination. There is a need for the recognition of an innocent bystander’s defense and a farmer’s privilege under patent law.⁹⁶ Matthew Rimmer⁹⁷ argues that:

Whatever the facts of the Percy Schmeiser case, it does seem a possibility that a farmer could infringe a patent innocently when saving seed. I realise that the risk of innocent infringement is hotly contested.⁹⁸

However, it must be noted that *Monsanto v. Schmeiser* has not been followed or referred to by cases in other jurisdictions. The case has, however, received approval from secondary sources (both books and journal articles) in other jurisdictions, including Australia and the United States.⁹⁹ For example, Professor Brad Sherman, a leading academic in intellectual

⁹⁴ Katie Black & James Wishart, *Containing the GMO Genie: Cattle Trespass and the Rights and Responsibilities of Biotechnology Owners*, 46 OSGOODE HALL L. J. 397, 397 (2008).

⁹⁵ SOIL ASSOC., GM LIABILITY—WHO SHOULD CARRY THE CAN? SOIL ASSOCIATION RESPONSE TO CONSULTATION PAPER FROM MARK RUSKELL MSP (2004), [http://www.whyoorganic.org/web/sa/saweb.nsf/librarytitles/1956A.HTML/\\$file/GMregul049,%20response%20to%20MRuskell%20cons%20on%20liability%20bill.pdf](http://www.whyoorganic.org/web/sa/saweb.nsf/librarytitles/1956A.HTML/$file/GMregul049,%20response%20to%20MRuskell%20cons%20on%20liability%20bill.pdf) (last visited Apr. 14, 2010).

⁹⁶ Posting of Matthew Rimmer to http://www.opendemocracy.net/percy_a_hero_0 (Apr. 13, 2004, 03:13:00 GMT) (last visited June 1, 2010).

⁹⁷ Dr. Matthew Rimmer is a senior lecturer and the associate director of Research at the ANU College of Law, and an associate director of the Australian Centre for Intellectual Property in Agriculture (ACIPA).

⁹⁸ Rimmer, *supra* note 96.

⁹⁹ Sherman, *supra* note 88, at 152–53.

property in Australia, has discussed this decision and suggested that the outcome would likely be the same if the matter was heard in Australia.¹⁰⁰

IV. COMMON LAW REMEDIES FOR GM CONTAMINATION

As discussed, GMO patent rights have grave implications for farmers. While farmers are liable under patent law for any unintended presence of patented GM seeds, it would be virtually impossible for farmers to seek compensation for GM contamination of their crops. However, the non-GM farmer could bring a claim against the GM farmer under common law if the seed handling was negligent. Common law works with patent law to ensure that a farmer's choices are respected.¹⁰¹ Therefore, "farmers and seed companies who are responsible for genetically contaminating neighboring fields might be liable for damages based on the tort claims of trespass to land, nuisance, negligence, or strict liability."¹⁰² These remedies may enable farmers to receive financial compensation for loss or damage suffered as a result of GM contamination of their crops.¹⁰³

A claim of trespass to land can arise when someone intentionally enters or intentionally causes something to enter another person's land and causes damage through carelessness, including the handling or movement of GM seeds from one's own property onto another's.¹⁰⁴ "It is also a trespass if the defendant does not intend to cause the entry of object, but knows that it is substantially certain to occur."¹⁰⁵ However, the spread of pollen via wind drift or insect pollination would be unlikely to amount to a trespass, because this would not constitute a direct interference.¹⁰⁶ Kershen points out that:

¹⁰⁰ *Id.*

¹⁰¹ Paul J. Heald & James Charles Smith, *Pollen Drift and the Bystanding Farmer: Harmonizing Patent Law and Common Law on the Technological Frontier*, *ADVOCATE* 3, 4 (2006), http://digitalcommons.law.uga.edu/cgi/viewcontent.cgi?article=1006&context=fac_pm/7 (last visited May 19, 2010).

¹⁰² DAVID R. MOELLER, FARMERS' LEGAL ACTION GROUP, *GMO LIABILITY THREATS FOR FARMERS: LEGAL ISSUES SURROUNDING THE PLANTING OF GENETICALLY MODIFIED CROPS* 3 (2001), http://www.gefoodalert.org/library/admin/uploadedfiles/GMO_Liability_Threats_for_Farmers_PDF_Ver.pdf (last visited May 19, 2010).

¹⁰³ Karinne Ludlow, *Genetically Modified Organisms and Private Nuisance Liability*, 13 *TORT L. REV.* 92, 92 (2005); see also Stephen M. Scanlon, *Should Missouri Farmers of Genetically Modified Crops Be Held Liable for Genetic Drift and Cross-Pollination?*, 10 *MO. ENVTL. L. & POL'Y REV.* 1, 8 (2002).

¹⁰⁴ Julie A. Davies & Lawrence C. Levine, *Biotechnology's Challenge to the Law of Torts*, 32 *MCGEORGE L. REV.* 221, 223-24 (2000); see also Richard A. Repp, *Biotech Pollution: Assessing Liability for Genetically Modified Crop Production and Genetic Drift*, 36 *IDAHO L. REV.* 585, 600-05 (2000).

¹⁰⁵ Carie-Megan Flood, *Pollen Drift and Potential Cause of Action*, *J. CORP. LAW* 474, 482 (2003).

¹⁰⁶ AUSTL. GOV'T DEP'T OF AGRIC., FISHERIES AND FORESTRY, SCI. & ECON. POL'Y BRANCH, *LIABILITY ISSUES ASSOCIATED WITH GM CROPS IN AUSTRALIA* 8 (2003), http://www.daff.gov.au/___data/assets/word_doc/0007/182842/liability_issues_paper_final.doc (last visited May 22, 2010).

Pollen flow between cultivars of the same crop or between related plant species is a biological fact. Hence, if pollen flow by itself gave rise to legal liability for trespass on a neighbor's crops, all farmers would be exposed to legal liability for trespass for almost every crop they grow.¹⁰⁷

Therefore, GMO patent holders and persons engaged in GMO agriculture will only be held liable for trespass if the trespass is intentional, reckless or negligent.¹⁰⁸ Negligence is another legal concept in tort law, normally used to achieve compensation or damages for injured or affected parties.¹⁰⁹ The GM farmer who knows that the neighboring farmer may be adversely affected by pollen drift from GM crops may be liable to the non-GM farmer for negligence when failing to act reasonably under the circumstances, if this failure causes harm to another.¹¹⁰ To prove that GMO contamination was the result of negligence, the plaintiff must demonstrate: 1) that physical damage occurred to the plaintiff's land or to things growing on it, 2) that the physical damage was foreseeable, 3) the use of the land was not reasonable, and 4) that there was no defense of statutory authority.¹¹¹ The non-GM farmer has to prove, on the balance of probabilities, that there is a greater than fifty per cent chance that the GM farmer's carelessness caused the non-GM crops to be contaminated. If the evidence of both sides is found to be equal, the non-GM farmer will lose the case. One commentator has argued that establishing the standard of care is likely to be the most difficult element of the plaintiff's case:¹¹²

Whether the courts will recognise a duty of care in any particular case depends on the foreseeability of the harm and the proximity of the relationship between the parties. There are issues with both the foreseeability of different types of harm with a new technology and with proximity of non-GM farmers who may be some distance away. The claimant must also prove the defendant failed to exercise reasonable care. Damage from

¹⁰⁷ Drew L. Kershen, *Legal Liability Issues in Agricultural Biotechnology*, 44 CROP SCI. SOC'Y AM. 456 (2004), available at <http://crop.scijournals.org/cgi/content/full/44/2/456> (last visited May 22, 2010).

¹⁰⁸ AUSTL. GOV'T DEP'T OF AGRIC., *supra* note 106, at 8.

¹⁰⁹ Christopher P. Rodgers, *Liability for the Release of GMOs into the Environment: Exploring the Boundaries of Nuisance*, 62 CAMBRIDGE L.J. 371, 371-492 (2003).

¹¹⁰ Paul J. Smith & James C. Smith, *The Problem of Social Cost in a Genetically Modified Age*, (U. Ga. School of Law Research Paper Series, Paper No. 06-004, 2006), <http://ssrn.com/abstract=878691> (last visited May 19, 2010).

¹¹¹ MOELLER, *supra* note 102, at 3-4; see generally Christian Witting, *Physical Damage in Negligence*, 61 Cambridge L.J. 189 (2002).

¹¹² McEowen, *supra* note 75, at 621.

a cause which may be considered outside the reasonable knowledge or skill of a GM farmer may not be compensated: the courts will look at the common practice of an industry to determine whether a defendant was negligent.¹¹³

Another potential tort claim related to GMO contamination is the claim of nuisance, which can be brought when a defendant engages in an activity that unreasonably interferes with a neighbor's use and enjoyment of the land they own or occupy.¹¹⁴ Under common law, therefore, GM farmers must control activities occurring within the boundaries of their own land, and must ensure that such activities do not harm the interests of the owners or occupiers of other land. If a GM farmer interferes with a neighbor's quiet enjoyment of his or her own property—for example, by emitting pollen onto the non-GM farmer's lands and destroying crops; or by creating smells, sounds, pollution or any other hazard that extends past the boundaries of the property—the affected party may make a claim of nuisance.¹¹⁵ The nuisance does not have to be intentional, and the person who released the organism would be responsible subject to any available defenses. However, McEowen has argued that “persons bringing a nuisance claim may have a difficult time establishing that the planting of GMO seed and the harvesting of GMO crops constitutes an unreasonable agricultural practice unless a court were to adopt a zero tolerance standard for cross-pollination.”¹¹⁶

Another potential claim related to GMO contamination is strict liability. Strict liability arises:

When someone engages in an abnormally dangerous activity; in such cases, a person harmed by the abnormally dangerous activity can recover damages from the person who engaged in the activity, without having to prove that the person who did the activity was reckless or negligent.¹¹⁷

The following factors are to be considered: 1) the existence of a high degree of risk of some harm to the person, land or chattels of others, 2) the likelihood that the harm that results from such risk will be great, 3) the inability to eliminate the risk by the exercise of reasonable care, 4) the extent to which the activity is not a matter of common usage, 5) the

¹¹³ Duncan E.J. Currie, *Globelaw International Environmental and Transnational Law, Briefing on Australian Liability for Damage Caused by Genetically Modified Crops* (Mar. 2008), <http://www.non-gm-farmers.com/documents/DuncanCurrieAustralianLiabilityBriefing.doc> (last visited May 22, 2010).

¹¹⁴ Scanlon, *supra* note 103, at 22-23.

¹¹⁵ *Id.*

¹¹⁶ McEowen, *supra* note 75, at 624.

¹¹⁷ Repp, *supra* note 104, at 612-20.

inappropriateness of the activity to the place where it is carried out, and 6) the extent to which its value to the community is outweighed by the danger involved.¹¹⁸ Some legal scholars argue, if a farmer and/or seed company knows that a GMO crop is difficult to control and is likely to cross-pollinate with crops in adjacent fields, the farmer and/or seed company should be held strictly liable for any resulting damages.¹¹⁹

The above discussion shows that farmers and seed companies who are responsible for genetically contaminating neighbouring fields might be liable for a neighbour's damages based on tort claims of trespass to land, nuisance, negligence, or strict liability.¹²⁰ However, these common law remedies are not sufficient to deal with the potential harm of the GMO, and farmers are facing increased difficulties in gaining compensation for damages. Firstly, it is questionable to what extent tort law remedies may be applicable to GM contamination, as "the GMO-related harms are not the kind of potential harms anticipated within the principles of the torts scheme."¹²¹ The tort law remedies were constructed during the nineteenth century, before the development of GM technology.¹²² It is debatable whether old tort law remedies are relevant to the uniqueness of twenty-first century GMO technology.

Secondly, negligence is a form of conduct caused by carelessness, which must have caused the damage to the plaintiff, and the damage must be of a kind that was reasonably foreseeable.¹²³ In other words, in order to be wrongful, the identified conduct must have given rise to a reasonably foreseeable risk of injury. The problem is that, at present, it is not clear what risks are posed by GM crops, or what sort of damage they might cause. It is also difficult to assess whether or not the risk posed by GMOs is reasonably foreseeable.

Thirdly, the common law does not directly address questions of environmental damage. One commentator has argued that:

¹¹⁸ Kershen, *supra* note 107.

¹¹⁹ MOELLER, *supra* note 102, at 3; *see also* Repp, *supra* note 104, at 617-18; A. Bryan Endres, "GMO: Genetically Modified Organism or Gigantic Monetary Obligation? The Liability Schemes for GMO Damage in the United States and the European Union," 22 *LOY. L.A. INT'L & COMP. L. REV.* 453, 488-91 (2000); MOELLER & SLIGH *supra* note 37, at 4.

¹²⁰ Ariel Salleh, *Organised Irresponsibility: Contradictions in the Australian Government's Strategy for GM Regulation*, 15 *ENVTL. POL.* 399, 408-09 (2006).

¹²¹ Paul Havemann, *Genetic Modification, Ecological Good Governance and the Law: New Zealand in the Age of Risk*, 10 *JAMES COOK U. L. REV.* 7 (2003), available at <http://www.austlii.edu.au/cgi-bin/sinodisp/au/journals/JCULRev/2003/2.html?stem=0&synonyms=0&query=Paul%20Havemann>.

¹²² Gary T. Schwartz, *Tort Law and the Economy in Nineteenth-Century America: A Reinterpretation* 90 *YALE L.J.* 1717, 1717-75 (1981).

¹²³ Marc Stauch, *Risk and Remoteness of Damage in Negligence*, 64 *MOD. L. REV.* 191, 191-14 (2001).

Tort focuses on interests in bodily integrity or property, and environmental interests are at most an incidental issue. Private law ignores unowned environmental resources; thus, it does not cover many of the potential damages associated with the release of GMOs.¹²⁴

Tort law at its historic core is assumed to be a predictable route to compensation.¹²⁵ Its primary function is to compensate losses, but it cannot prevent them,¹²⁶ nor can it indemnify all interferences with a claimant's sphere. Non-GM farmers therefore have little chance for legal recourse in tort law. Rather, common law tort actions relating to GM contamination present numerous difficulties, including the fact that it may be difficult to recover the losses, or even to persuade the court that the losses are economic.¹²⁷ Legal action is likely to be very expensive, and the outcomes doubtful. The whole area of liability for genetic contamination and its effects is not statutorily defined in law.¹²⁸ The lack of a legal precedent specific to GM contamination, or a liability scheme to address the legal issues surrounding GMOs, remains a significant concern. There is an urgent need to establish the duty owed by GM farmers to their non-GM neighbours and to protect the interests of all concerned through a specific legislative framework or a statutory liability instrument.

V. THE GENE TECHNOLOGY ACT OF 2000 (CTH) AND AUSTRALIA'S RESPONSE TO GM CROPS

This section describes the main provisions of the legislation and evaluates the extent to which the legislation effectively addresses key issues raised by the development of genetically modified organisms in Australia.

The Gene Technology Act of 2000 ("GT Act") came into force on June 21, 2001, and constituted the first national scheme for the regulation of

¹²⁴ MICHAEL MIGUS, CAN. INST. FOR ENVTL. L. & POL'Y, GMO STATUTORY LIABILITY REGIMES: AN INTERNATIONAL REVIEW 9 (2004), http://www.munlochygmvigil.org.uk/%20canada_gm_liability.pdf (last visited May 10, 2010).

¹²⁵ EUR. CENTRE OF TORT & INS. L., ECONOMIC LOSS CAUSED BY GENETICALLY MODIFIED ORGANISMS LIABILITY AND REDRESS FOR THE ADVENTITIOUS PRESENCE OF GMOs IN NON-GM CROPS 591 (Bernard Koch ed., 2008).

¹²⁶ Pierre Widmer, Address at the 5th International Liability Forum in Munich: How Tort Law Deals With Apprenticeship in Sorcery (2001) (emphasizing that "in respect of the damaging event, tort law always comes too late").

¹²⁷ Ronen Perry, *The Economic Bias in Tort Law*, 5 U. ILL. L. REV. 1573, 1573-22 (2008).

¹²⁸ NAT'L FARMERS' UNION, POLICY POSITION: LIABILITY RELATING TO GMO CROPS 4 (2003), <http://www.cabinetoffice.gov.uk/media/84191/nfu2.pdf> (last visited May 19, 2010).

GMOs in Australia.¹²⁹ The object of the GT Act is to protect the health and safety of people and the environment, by identifying risks posed by or as a result of gene technology, and by managing those risks by regulating certain dealings with GMOs.¹³⁰ The legislation refers specifically to the identification and management of risks to people and the environment posed by gene technology.¹³¹ The Act's use of the word "protect" suggests that the Act also aims to reduce and prevent the overall risks associated with genetic engineering.¹³² For example, because GMOs have had demonstrated effects on human health, the GT Act must adequately protect human health by reducing and preventing potential health risks and enhancing people's safety, not merely managing it.

According to Part IV of the GT Act, before a deliberate release of a GM seed into the environment, which necessarily accompanies the planting of a GM crop, "the person planting the crop must have the authority of a licence to do so issued by the Gene Technology Regulator."¹³³ The Regulator is an independent authority, appointed by the Governor-General.¹³⁴ Before issuing the license, the Regulator must prepare risk assessment and risk management plans in relation to the dealings that the license would authorize, if granted.¹³⁵ The Regulator has extensive power to monitor and enforce the legislation and is responsible for a large spectrum of dealings, from experiments contained within a laboratory to the wholesale commercial production of GM crops.¹³⁶ To assist and advise the Regulator, the GT Act has established the Office of the Gene Technology Regulator ("OGTR").¹³⁷ The GT Act has, however, given broad discretion to the Regulator in carrying out his or her duties.¹³⁸ The Regulator has discretion in the performance of his or her functions and he or she is not subject to direction from anyone in relation to whether or not a particular application

¹²⁹ Gene Technology Act, 2000 (Austl.), available at http://www.austlii.edu.au/au/legis/cth/consol_act/gta2000162.

¹³⁰ *Id.* § 3.

¹³¹ *Id.*

¹³² *Id.*

¹³³ *Id.* § 31.

¹³⁴ *Id.* § 118.

¹³⁵ Gene Technology Act, 2000, § 50 (Austl.), available at http://www.austlii.edu.au/au/legis/cth/consol_act/gta2000162.

¹³⁶ Charles Lawson, *Risk Assessment in the Regulation of Gene Technology Under the Gene Technology Act 2000 (Cth) and the Gene Technology Regulations 2001 (Cth)*, 19 ENVTL. & PLAN. L.J. 195, 195-96 (2002).

¹³⁷ Gene Technology Act, 2000, §§ 101-102, 117 (Austl.), available at http://www.austlii.edu.au/au/legis/cth/consol_act/gta2000162.

¹³⁸ *Id.* § 28 (states that "the Regulator has power to do all things necessary or convenient to be done for or in connection with the performance of the Regulator's functions").

for a GMO license is issued or refused; the same degree of discretion applies to the conditions imposed upon a particular GMO license.¹³⁹ This gives the Regulator extensive power with respect to the granting of licenses and the terms on which they are granted, and his or her decision-making is outside the scope of questioning.¹⁴⁰

Furthermore, the GT Act only requires the Regulator to consider risks to human health and safety and the environment when granting a license.¹⁴¹ The GT Act should recognize the economic consequences that may arise from the adventitious presence of GM crops in non-GM and organic farmlands. As it is argued that the economic costs associated with the contamination of non-GM crops may involve “meeting tolerances for the adventitious presence of unwanted material (for example, by having to change farming practices, initiating on-farm segregation of crops) and/or; the economic consequences of not meeting tolerances (possible loss of non-GM or organic price premia).”¹⁴² There are clear economic implications, especially for organic farmers, and the economic costs of GM contamination must be recognized.¹⁴³ The GM farmers must be responsible for not only the potential harm to human health and safety and to the environment, but also for any economic loss resulting from the contamination of non-GM seeds by GM seeds.

Moreover, “it is an offence under the Act to intentionally release a GMO into the environment without a lawful authorisation, such as a licence.”¹⁴⁴ The GT Act does provide for a monitoring system¹⁴⁵ to oversee and detect the dealings of authorized GMO license holders, and this places license holders under an obligation to adequately monitor any new risks or

¹³⁹ *Id.* § 30.

¹⁴⁰ However, applicants have merit appeal rights to the Administrative Appeals Tribunal to appeal any decision by the Regulator.

¹⁴¹ Gene Technology Act, 2000, § 50 (Austl.), available at http://www.austlii.edu.au/au/legis/cth/consol_act/gta2000162.

¹⁴² See GRAHAM BROOKES, PG ECONS. LTD., CO-EXISTENCE OF GM AND NON-GM CROPS: ECONOMIC AND MARKET PERSPECTIVES (2003), http://www.pgeconomics.co.uk/pdf/Coexistence_paper_01.pdf (last visited May 22, 2010).

¹⁴³ Letter from Int’l Fed’n of Organic Agric. Movements-EU Regional Group to the Cabinet of Pres. Prodi et al. (Mar. 25 2004), <http://www.gmfreeireland.org/resources/documents/science/IFOAM/IFOAMgmlabelling.pdf> (last visited May 22, 2010).

¹⁴⁴ Gene Technology Act, 2000, § 32 (Austl.), available at http://www.austlii.edu.au/au/legis/cth/consol_act/gta2000162; see also Lee McIntosh, Conference held by Conservation Council WA, For Who’s Benefit? - Evaluating Genetically Modified Organisms in Western Australia from a Different Perspective (Oct. 10, 2002), http://www.edowa.org.au/archives/5A_gmo_liability.pdf (last visited May 22, 2010).

¹⁴⁵ In response to issues identified during any of these monitoring processes, the Regulator has the power to: vary the conditions of the license; direct licensees to take certain actions; and/or cancel or suspend the license.

unintended effects.¹⁴⁶ It has also established a system to monitor compliance with legislative requirements by authorizing inspectors to conduct unannounced spot checks of premises of license holders.¹⁴⁷ The GT Act does not, however, “impose liability upon GMO licence holders for any damage caused to the environment or to biodiversity resulting from an authorised release of a GMO.”¹⁴⁸ The GT Act only enforces liability for an unauthorized release of GMOs into the environment.¹⁴⁹

The GT Act defines “genetically modified organism” as an organism that has been modified by gene technology; or an organism that has inherited particular traits from an organism (the initial organism), where those traits occurred in the initial organism because of gene technology; or anything declared by the regulations to be a genetically modified organism; or anything that belongs to a class of things declared by the regulations to be genetically modified organisms.¹⁵⁰ The GT Act, however, does not deal with certain organisms, or classes of organisms, that fall outside the definition of GMO.¹⁵¹ One commentator has argued, “[T]his is potentially a large class and could capture some significant dealings . . . the Regulator may have no knowledge of such dealings as they are outside the scope of the Act’s obligations.”¹⁵² The GT Act also distinguishes between GMOs and GM products. “GMO” means a genetically modified organism.¹⁵³ A genetically modified product or GM product means a thing (other than a GMO) derived or produced from a GMO—another artificial distinction.¹⁵⁴

Non-GMO farmers are to be protected by the Act against innocent infringement,¹⁵⁵ and no liability is to occur for the unintentional or

¹⁴⁶ Gene Technology Act, 2000, § 64 (Austl.), available at http://www.austlii.edu.au/au/legis/cth/consol_act/gta2000162.

¹⁴⁷ See generally OFF. OF THE GENE TECH. REGULATOR, AUSTL. GOV’T. DEP’T OF HEALTH & AGING, PRACTICE NOTE: UNANNOUNCED SPOT CHECKS; IN ACCORDANCE WITH THE GENE TECHNOLOGY ACT OF 2000 (2007), [http://www.health.gov.au/internet/ogtr/publishing.nsf/Content/monprot-3/\\$FILE/03b%20Practice%20note%20-%20Spot%20Checks%20July2007.pdf](http://www.health.gov.au/internet/ogtr/publishing.nsf/Content/monprot-3/$FILE/03b%20Practice%20note%20-%20Spot%20Checks%20July2007.pdf) (last visited May 22, 2010).

¹⁴⁸ McIntosh, *supra* note 144.

¹⁴⁹ *Id.*

¹⁵⁰ Gene Technology Act, 2000, § 10 (Austl.), available at http://www.austlii.edu.au/au/legis/cth/consol_act/gta2000162.

¹⁵¹ Charles Lawson, *Information Asymmetry, GMOs and Strict Liability Under the Gene Technology Act 2000 (Cth)*, 9 QUEENSL. U. TECH. L. & JUST. J. 123, 129 (2005).

¹⁵² *Id.*

¹⁵³ Gene Technology Act, 2000, § 10 (Austl.), available at http://www.austlii.edu.au/au/legis/cth/consol_act/gta2000162.

¹⁵⁴ *Id.* § 10.

¹⁵⁵ *Id.* § 40(A)(1) (stating that if the Regulator is satisfied that a person has come into possession of a GMO inadvertently the Regulator may, with the agreement of the person, treat the person as having made an inadvertent dealings application).

inadvertent presence of GM material on the farmers' land.¹⁵⁶ According to the GT Act, there will be no offence if a farmer does not know about the possible presence of patented GM seeds in his or her fields.¹⁵⁷ However, the GT Act does not compensate innocent farmers for the contamination of their non-GM seeds by GM seeds. Neighboring farmers should have statutory remedies or the right to compensation if genetic contamination occurs as a consequence of genetic pollution.¹⁵⁸ One commentator has argued that:

In circumstances in which genetic contamination occurs *despite* the licenceholder's complete compliance with the Act and Regulations, no remediation or clean up costs would be recoverable from the licenceholder. Victims of genetic pollution are left only with the option of seeking damages in trespass, negligence or nuisance through the common law. The legislation fails not only to provide statutory remedies for third parties affected by genetic pollution, but also fails to confer upon them immunity from prosecution.¹⁵⁹

Cross-pollination appears to be the major cause of most instances of seed contamination and it can arise at any stage of development—from the laboratory, to the field, to the plates.¹⁶⁰ The GT Act could give relevant ministers or authorities strong powers to take action regarding any GM contamination.¹⁶¹ Certainly, “compensation should be payable if conventional farmers in a coexistence region are unable to guarantee delivery of non-GM and pesticide-free produce.”¹⁶² It would thus be necessary to establish a compensation fund for farmers adversely affected by the unintended presence of GMOs.¹⁶³ The existing common law of trespass, nuisance, and negligence are not adequate to protect the economic and legal

¹⁵⁶ Rogers, *supra* note 44, at 5.

¹⁵⁷ *Id.*

¹⁵⁸ *Id.*

¹⁵⁹ *Id.*

¹⁶⁰ GENEWATCH UK & GREENPEACE INT'L, GM CONTAMINATION REPORT 2005: A REVIEW OF CASES OF CONTAMINATION, ILLEGAL PLANTING AND NEGATIVE SIDE EFFECTS OF GENETICALLY MODIFIED ORGANISMS (2005), http://www.genewatch.org/uploads/f03c6d66a9b354535738483c1c3d49e4/gm_contamination_report.pdf (last visited May 22, 2010).

¹⁶¹ See GENE TECH. MINISTERIAL COUNCIL, AUSTL. GOV'T DEP'T OF HEALTH & AGEING, STATUTORY REVIEW OF THE GENE TECHNOLOGY ACT OF 2000 AND THE GENE TECHNOLOGY AGREEMENT (2006), [http://www.health.gov.au/internet/main/publishing.nsf/Content/CE28398A33AF02E6CA25707400080A57/\\$File/Stat_Review_GeneTechAct_01.pdf](http://www.health.gov.au/internet/main/publishing.nsf/Content/CE28398A33AF02E6CA25707400080A57/$File/Stat_Review_GeneTechAct_01.pdf) (last visited May 22, 2010).

¹⁶² Salleh, *supra* note 120, at 408.

¹⁶³ AUSTL. GOV'T DEP'T OF AGRIC., *supra* note 106, at 3.

rights of organic and non-GM farmers in Australia.¹⁶⁴ Those rights must be protected by authorities either at the federal or state level.

The GT Act has also failed to resolve any of the risk management issues associated with the impact on biological diversity¹⁶⁵ and the agricultural industry.¹⁶⁶ The Act has given a narrow definition to the meaning of the word environment to include only ecosystems and their constituent parts, natural and physical resources, and the qualities and characteristics of locations, places and areas.¹⁶⁷ The definition is silent on biological diversity and the agricultural industry.¹⁶⁸ Section 528 of the Environment Protection and Biodiversity Conservation Act 1999 defines the “environment” to include:

- (a) ecosystems and their constituent parts, including people and communities;
- (b) natural and physical resources;
- (c) the qualities and characteristics of locations, places and areas;
- (d) heritage values of places, and the social, economic and cultural aspects of a thing mentioned in paragraph (a), (b) (c) or (d).¹⁶⁹

The less comprehensive definition of environment in the GT Act effectively narrows the scope of what issues can be considered in any risk assessment process.

Moreover, the Act should also require the Regulator to specifically consider the social and cultural aspects of genetic technology when making decisions on licence applications.¹⁷⁰ It is widely accepted that the legislation considered only the technical aspects of dealings with GE organisms, rather than the complex social, ethical and ecological issues.¹⁷¹ This technology may have an adverse effect on the practice and retention of the traditional knowledge of indigenous people and farmers—their social, cultural and spiritual values and practices—as well as on food security and the protection of biodiversity. Those issues should also be taken into account when making decisions on license applications.

¹⁶⁴ GREENPEACE AUSTL., *supra* note 71.

¹⁶⁵ Sarah Kiyork, *The Gene Technology Act 2000 (Cth) and the Licensing of Australia's First Genetically Modified Crop: A Case Study in Ignoring Risks to Biodiversity*, 22 ENVTL. & PLAN. L.J. 174, 175 (2005).

¹⁶⁶ Agricultural industry can include harvesting crops, plants, livestock feeding, grazing etc.

¹⁶⁷ Gene Technology Act, 2000, § 10 (Austl.), available at http://www.austlii.edu.au/au/legis/cth/consol_act/gta2000162.

¹⁶⁸ *Id.*

¹⁶⁹ Environment Protection and Biodiversity Conservation Act, 1999, § 528 (Austl.) (“the EPBC Act”).

¹⁷⁰ Annie Lin Jin Tsui, *Australian Regulation of Gene Technology: Impacts on Biodiversity*, 1 MACQUARIE J. INT'L & COM. ENVTL. L. 95, 95-09 (2004).

¹⁷¹ Rogers, *supra* note 44, at 2.

Furthermore, the GT Act is considered to be lacking in terms of 'liability' and imposing liability upon GM farmers. Generally speaking, each and every farmer must be liable severally and jointly for any damages resulting from dealings with GMOs covered by the Act.¹⁷² This means that if it is unclear which farmers contributed to the damage and to what extent, then the affected farmers must be allowed to take actions against all neighboring GM farmers who may have caused the contamination by growing the GMOs. In fact, "it is not necessary for the non-GM farmer to identify the particular source of the contamination in each incident, which would be impossible."¹⁷³ For example, Germany has a very strong statutory base for GMOs in which all those from whom the GMOs may have originated will be jointly and severally liable for the victim's full loss if the actual neighbour from whose fields the GMOs spread cannot be identified.¹⁷⁴ The liability legislation of Germany is set firmly in place to allocate liability for the financial risk arising from the cultivation of GMOs, with a general focus on responsible parties meeting the costs and a clear intent to protect non-GM farmers.¹⁷⁵ These amendments must be introduced into the Australian Act.

The legislation appears to favor the introduction of gene technology and, as it currently stands, has effectively encouraged the industry. The Act was designed to facilitate and encourage GM farming, not to restrict it.¹⁷⁶ One commentator has argued that the Act does not establish the required credible framework; thus, it may harm the ability of the industry to produce safe GMOs and GM products.¹⁷⁷ The primary purpose of the Act is to regulate GMO dealings in a way that will relieve public health and safety concerns; it does not pay much attention to the environmental and economic risks.¹⁷⁸ The GT Act also does not consider the economic or financial effects

¹⁷² Gene Technology Act, 2000, §§ 11, 13 (Austl.), available at http://www.austlii.edu.au/au/legis/cth/consol_act/gta2000162.

¹⁷³ Soil Assoc., National GM Co-existence Regimes 1-2, [http://www.northeastorganic.org/Web/SA/saweb.nsf/848d689047cb466780256a6b00298980/6edc8e5037d383c5802571c700509b2b/\\$FILE/National%20GM%20Co-existence%20regimes.pdf](http://www.northeastorganic.org/Web/SA/saweb.nsf/848d689047cb466780256a6b00298980/6edc8e5037d383c5802571c700509b2b/$FILE/National%20GM%20Co-existence%20regimes.pdf) (last visited May 22, 2010).

¹⁷⁴ EUR. CENTRE OF TORT & INS. L., *supra* note 125.

¹⁷⁵ ANJA GERDUNG, SUSTAINABILITY COUNCIL OF N.Z., GERMANY'S LIABILITY LAW FOR GMO CULTIVATION 14-15 (2006), <http://www.sustainabilitynz.org/docs/GermanLiabilityLawforGMCultivation.pdf> (last visited May 22, 2010).

¹⁷⁶ See Mark Tranter, *A System Under Strain: The Regulation of Gene Technology*, 2 NAT'L ENVTL. L. REV. 32 (2003); see also Mark Tranter, *A Question of Confidence: An Appraisal of the Operation of the Gene Technology Act 2000*, 20 ENVTL. & PLAN. L.J. 245 (2003).

¹⁷⁷ See Tranter, *A Question of Confidence*, *supra* note 176.

¹⁷⁸ Monique Hain et. al., *Regulating Biosciences: The Gene Technology Act 2000*, 19 ENVTL. & PLAN. L.J. 163, 165 (2002); Annie Lin Jin Tsui, *supra* note 170, at 99-100.

of the assessment of GMOs.¹⁷⁹ The Act is quite restrictive; for example, rights to appeal decisions are not extended to third parties.¹⁸⁰ The Act provides no remedial protection for anyone who may be harmed by genetic contamination and no remedies for any economic losses resulting from genetic pollution or for any loss of plant germplasm.¹⁸¹ In addition, the liability regime has been left weaker by the Act and no compensation fund has been established for contaminated farm land. In order to offer such protections, the legislation will require broad regulatory changes, including allowing third parties to appeal.

VI. CONCLUSION

It was the intention of this paper to investigate more closely the effects of GM technology and to explore the potential implications—both advantageous and disadvantageous—that it may have for agriculture, biodiversity, the environment and traditional farming systems. The paper explored the challenges that GM poses to existing legal regimes and examined wider issues relating to the development and use of GM farming, with particular emphasis on legal liability issues and the approach currently adopted in Australia. This paper considered the level of protection provided by Australia's Gene Technology Act of 2000 Australia and highlighted the inadequacy of the protection it provides.

Gene technology appears to be an effective and highly adaptable mechanism with which to address the challenges of producing agricultural products, but appropriate intellectual property systems do not adequately exist or are not enforceable. This advanced technology appears to offer several significant advantages, including the potential to provide seed companies with a safe and efficient way to maximize the benefits from their protected products and processes. However, this is a technology that presents both benefits and challenges for biodiversity, agriculture, food security and sustainable livelihoods. One of the biggest threats to farmers is the simple fear of having to defend themselves in court due to unintentional crop contamination.¹⁸² Subsistence farmers are also critically disadvantaged by the prohibition against saving and replanting seeds. GM seeds threaten farmers' livelihoods and seed security. The challenges posed by the use of

¹⁷⁹ Tranter, *A question of Confidence*, *supra* note 176.

¹⁸⁰ Rogers, *supra* note 44.

¹⁸¹ Gene Technology Act, 2000, §§ 62(2)(g), (j), (n), (o) (Austl.), available at http://www.austlii.edu.au/au/legis/cth/consol_act/gta2000162; see also Rogers, *supra* note 44, at 5.

¹⁸² Bernhardt, *supra* note 43.

GM crops in farming may be daunting, but they must be faced in order to maximise the benefits for all concerned.