

**PREPARING THE LAW FOR A
GMO OUTBREAK**

WILL HARDY

October 2008

CONTENTS

I	INTRODUCTION	1
II	THE GM CONTEXT	4
	A <i>Gene flow</i>	4
	B <i>Potential effects of gene flow</i>	5
	C <i>Inherent difficulties</i>	6
III	CURRENT LIABILITY REGIME	7
	A <i>GM Regulation</i>	8
	B <i>Private nuisance</i>	9
	1 <i>Material damage</i>	9
	2 <i>Interference with enjoyment of land</i>	10
	3 <i>Unreasonable</i>	10
	4 <i>Defences</i>	11
	5 <i>Overview</i>	11
	C <i>Negligence</i>	12
	1 <i>When might negligence arise?</i>	13
	2 <i>Damage</i>	13
	3 <i>Pure economic loss</i>	13
	4 <i>Overview</i>	14
	D <i>Other common law actions</i>	15
	E <i>Actions under environmental law</i>	15
	1 <i>EPBC Act</i>	15
	2 <i>Environment Protection Act</i>	16
IV	CONCLUSION	17

I INTRODUCTION

The commercial release of genetically modified organisms (‘GMOs’)¹ into the environment has prompted heated public discussion, both in Australia² and internationally,³ with the media fuelling highly polarised views.⁴ The intense mood of the debate reflects an inherent conflict between the parties’ positions, and the high stakes they are competing for.

On one side there are the techno-utopianist, antropocentric economists who would like to see the perceived⁵ competitive advantage of GM exploited and see a need for developed countries to strengthen reliance on intellectual

¹The abbreviations GM and GMO will be used throughout, referring to the genetic engineering field and organism respectively.

²See eg Jewel Topsfield, ‘Scientists endorse GM crops; Activist calls report a “bunch of lies”’, *The Age* (Melbourne, Australia), 18 December 2007, 3; David Rood, ‘Furore as ban on GM canola lifted; Future Crop’, *The Age* (Melbourne, Australia), 28 November 2007; David Rood, ‘Future crop: GM canola move brings dissent and praise for Brumby’, *The Age* (Melbourne, Australia), 28 November 2007, 1; Jo Chandler, ‘Give genetically modified canola a chance, experts urge as ban goes’, *The Age* (Melbourne, Australia), 1 March 2008, 8; David Rood and Chee Leung Chee, ‘More grief for Brumby over canola; GM crop opponents step up pressure’, *The Age* (Melbourne, Australia), 29 November 2007, 5; ‘What happened to my choice?; Genetically Modified Crops’, *The Age* (Melbourne, Australia), 29 November 2007, 16; Ellen Whinnett, ‘Labor split widens as GM battle boils over’, *Herald Sun* (Melbourne, Australia), 27 October 2007, 14; Amanda O’Brien, ‘Parties at odds on GM farming’, *The Australian* (Sydney, Australia), 19 August 2008, 12; Chee Leung Chee and Orietta Guerrera, ‘Seeds of dissent: farmers split over GM canola move’, *The Age* (Melbourne, Australia), 1 December 2007, 4; Necia Wilden, ‘The inconvenient truth about GM; Opinion’, *The Age* (Melbourne, Australia), 19 February 2008, 10; Annabel Stafford, ‘Top chefs cook up plan to boycott GM dining’, *The Age* (Melbourne, Australia), 24 May 2008, 8.

³See eg ‘Mixed reaction to GM potato trials’, *Farmers Weekly* (Surrey, United Kingdom), 2 March 2007; Michael Pollan, ‘Playing God in the Garden’, *The New York Times Magazine* (New York, United States), 25 October 1998, 44.

⁴See eg Andrew Bolt, ‘A bitter harvest’, *Herald Sun* (Melbourne, Australia), 8 June 2007, 23; Darren Gray, ‘Fields of genetically modified gold have farmers smiling’, *The Age* (Melbourne, Australia), 11 September 2008, 9; Jeffrey Smith, ‘Eating GM foods is a health risk’, *The Age* (Melbourne, Australia), 28 November 2007, 17; John Roskam, ‘GM foods offer a rosy future’, *The Age* (Melbourne, Australia), 23 May 2007, 17; Jason Koutsoukis, ‘Support grows for modified crops’, *Sunday Age* (Melbourne, Australia), 29 July 2007, 10; Jason Koutsoukis, ‘Why GMO is not such a dirty term’, *Sunday Age* (Melbourne, Australia), 5 August 2007, 15; Asa Wahlquist, ‘GM crops “the only way to feed world”’, *The Australian* (Sydney, Australia), 8 September 2008, 31.

⁵Greenpeace, *Submission for the Review of the Victorian Gene Technology Act 2001* (2006) 4.

property in order to secure their future economic growth,⁶ these benefits are seen to outweigh any risks.⁷

On the other side we have environmentalists who believe that concern for the unknown risks of catastrophic environmental disaster and threat to biological diversity outweigh the as yet unseen advantages of current-generation GMOs.⁸ History provides a broad set of examples of environmental abuse by multinational corporations,⁹ which justifies precaution. Also in opposition are social scientists who see the potential for multinational corporations to exploit structural flaws in a poorly regulated global economic system, pushing a regression to a modern feudal system, further oppressing poorer farmers and consumers.¹⁰

It would be extremely difficult, perhaps impossible, to satisfy all parties, as there are a number of fundamental conflicts. On an environmental level, it does not currently appear to be possible to develop and commercialise GMOs without any risk of environmental damage, nor does it appear that these risks will even be understood in the near future. Furthermore, there is little room for coexistence,¹¹ where farmers and consumers could choose to either embrace or completely avoid GMOs.¹²

It is in this setting that questions of liability arise; some form of harm will almost certainly eventuate when these worlds collide, be it financial loss or

⁶See eg 'The next green revolution; Agriculture', *The Economist* (London, United Kingdom), 23 February 2008; Glenn Tong, 'GM Files: getting the truth out there', *The Age* (Melbourne, Australia), 20 December 2006, 8; Koutsoukis, above n 4; Roskam, above n 4; Asa Wahlquist, 'Support grows for GM', *The Australian* (Sydney, Australia), 25 March 2008, 9; Gustav Nossal, 'GM food can help ease hunger; Comment & Debate', *The Age* (Melbourne, Australia), 23 June 2008, 11; Asa Wahlquist, 'Aussie farmers "lagging on GM" - Climate Challenge', *Weekend Australian* (Sydney, Australia), 16 February 2008, 8.

⁷Greenpeace, above n 5, 4.

⁸See eg Mitchell Harper, 'GM foods can be dangerous. But you do the research', *The Age* (Melbourne, Australia), 14 December 2007, 17.

⁹See eg the Bhopal disaster, the Ok Tedi disaster, Monsanto's PCB pollution in Aniston and the United Kingdom, the Exxon Valdez disaster and the destruction of forests and peatland in Indonesia for palm oil.

¹⁰See eg Gyorgy Scrinis, 'Food production must not be controlled by a few corporations', *The Age* (Melbourne, Australia), 17 August 2007, 13; 'Remember GM is bankrolled by Big Agribusiness', *Sunday Age* (Melbourne, Australia), 13 May 2007, 20.

¹¹'Coexistence' refers to the coexistence between zero-tolerance organic farmers and GM agriculture.

¹²Karinne Ludlow, 'The economic impact of genetically modified organisms as actionable damage in torts' (2005) 13(2) *Tort Law Review* 159, 160.

more serious, irreversible environmental damage. This essay concerns itself with those issues of liability for GMO contamination in Australia.

The current liability regime in Australia insufficiently addresses problems surrounding GMO contamination. Unless something changes in the near future, there will more than likely be cases where the legal system is unable to redress private and public losses resulting from GMO contamination, much less provide an adequate deterrence. A more appropriate liability regime would feature strict liability and presumptive causation alongside the current governmental regulation.

After exploring the nature of GMOs and cross-contamination, I will detail and critique the current state of legal liability in Australia. In concluding this essay, I will briefly look at appropriate characteristics of an alternative liability regime.

II THE GM CONTEXT

GMO contamination can occur in a great variety of ways. Natural processes can carry seed and pollen both short and long distances, agricultural processes can mix, carry and spread seed very long distances and there is of course the human element, where anything can happen.

The effects of the flow of genetic material are intricate, unpredictable and wide-ranging. Other farmers may be affected, so too the quality of their produce, local flora and fauna may react in an unanticipated fashion and the biodiversity of entire ecosystems might be fundamentally altered by widespread adoption. Very little is known about the precise effects, and it may be impossible to completely recall a failed variety from the environment.

A *Gene flow*

Natural processes include wind and bees, larger animals such as birds, kangaroos and emus can carry or digest seed and pollen, as they travel greater distances¹³ and dust storms, floods and mini-tornadoes during harvest will disperse seeds over very large areas.

But the greatest potential for the movement of canola seeds is from post harvest spillage by agricultural machinery or during transportation.¹⁴ Because of Australia's size, produce is often transported thousands of kilometres, for example in 2002 GM seed from New South Wales was spilled in Darwin on its way to Western Australia.¹⁵

Shared transport,¹⁶ harvest and processing facilities are also problematic, as small seed (such as canola) is extremely difficult to clean from the numerous harvesters, augers, trucks, chaser bins, field binds and storage facilities. This can also happen at the breeding stage too, where unapproved varieties contaminate approved varieties, and are subsequently released together.¹⁷

¹³Office of the Gene Technology Regulator, *The biology and ecology of canola (Brassica napus)* (2002) 22.

¹⁴Ibid 21.

¹⁵Office of the Gene Technology Regulator, *Quarterly Report June 2003* (2003) 19.

¹⁶Australian wheat was contaminated during export in 2003: Parliament of New South Wales, *Genetically modified crops: Briefing Paper 19/2003* (2003) 27.

¹⁷This happened in Australia in 2002: Office of the Gene Technology Regulator, *Quarterly Report December 2002* (2003) 21.

Ever present is the human element. Seed can be mistakenly delivered,¹⁸ mistakenly mixed in post-harvest processing,¹⁹ or simply mislabelled.²⁰ Procedures can be breached through ignorance,²¹ or for example in the desperate haste to harvest a crop before an approaching storm.

Nine incidents of GM contamination have been officially recorded in Australia,²² worldwide there were 165 and 42 illegal releases.²³ It is reasonable to assume that there are many more unreported incidents. Sometimes the cause is completely unknown, underlying causes are usually only revealed if official agencies follow it up. Investigations take place in Australia for GM licence breaches, but is not required for seed imports or food contamination.²⁴

Although the potential effects for contamination through human error and agricultural processes are more drastic, they can be controlled to a great extent through diligence and refined procedure. The effects of natural processes can be influenced, but rarely controlled. It is this uncontrollable gene flow that causes concern, especially for those who are vulnerable.

B *Potential effects of gene flow*

GM contamination can trigger a range of economic and emotional harm for non-GM and organic farmers. Most obviously, GM-free and organic certification can be revoked, contracts with GM-free conditions can be lost and markets missed. Products may need to be removed from the market for relabelling or removed altogether,²⁵ and crops might need to be wholly or

¹⁸This happened in Victoria in 2002: William Birnbauer, ‘Farmers hit out at GM seeds bungle’, *The Age* (Melbourne), 9 May 2004.

¹⁹This happened in Queensland in June 2000: Interim Office of the Gene Technology Regulator, *Quarterly Report September 2000* (2000) 14.

²⁰This happened in Victoria in 2005: Office of the Gene Technology Regulator, *Media Release: Genetically Modified Canola Detected in Victoria Safe as Conventional Canola* (2005) 1; ‘Human error “probable cause” of GM canola mix-up’, *Australian Broadcasting Corporation* (Sydney), 7 September 2008.

²¹Office of the Gene Technology Regulator, above n 15, 19.

²²Greenpeace, *GM Contamination Register Report 2007* (2008) 12; Greenpeace, *GM Contamination Report 2005* (2005) 24.

²³Greenpeace, above n 22, 11.

²⁴Greenpeace, above n 22, 12.

²⁵Particularly in the case of pharmaceutical or biofuel GM varieties.

partially destroyed to contain contamination, avoid patent infringement, or meet regulations or certification requirements.

Some losses arise from the mere threat of contamination, such as discarding edge strips,²⁶ genetic testing, equipment cleaning, and even more extreme measures such as moving entire bee colonies into the city when local GM varieties flower.²⁷ Even the cost of GM-free certification is a cost arising from GM farming practices.

Of greatest concern for many are the possibly permanent effects on the wider environment. Invasive species and hybrids damage biodiversity, non-target plants and animals may have dramatic widespread health effects²⁸ and target species may develop a resistance to safe methods of control, for example *Bacillus thuringiensis* (Bt).

C *Inherent difficulties*

Before moving onto a legal analysis, I will briefly look at some characteristic aspects of the GM context that may pose difficulties for a legal framework.

Very little can be done by potential plaintiffs to avoid GM contamination from natural processes; physical barriers, border strips and barren zones in the receiving field are largely ineffective.²⁹ In addition to that, causation is extremely difficult to determine. A liability system that demands causation be proven cannot provide an effective deterrence.

Currently very little is known about the likely environmental effects and the natural processes that enable gene flow,³⁰ Anything less than strict-liability will not consider the unknown risks of future damage, and will not encourage research into these risks by the GM industry.

Finally, financial compensation may not be sufficient, given the emotional and political element of non-GM and organic farming.

²⁶Gavin Ramsay, 'Pollen Dispersal Vecteded by Wind or Insects' in Guy Poppy and Michael Wilkinson (eds) *Gene Flow From GM Plants* (2005) 71.

²⁷This is current practice in Germany for organic beekeepers near GM crops: Bündnis zum Schutz der Bienen vor Agro-Gentechnik, 'Gentechnik im Honig gefunden: Gesamte Jahreseernte in Müllverbrennung entsorgt' (Press Release, 24 September 2008).

²⁸For example Europe-wide Colony Collapse Disorder though the use of the *Clothianidin* pesticide.

²⁹Ramsay, above n 26, 72.

³⁰Ibid 73.

III CURRENT LIABILITY REGIME

When developing their reaction to GMOs, Australia's state and federal governments chose not to implement special liability arrangements for harm caused by GMOs,³¹ an approach the governments continue to support.³² Australia is not alone, most countries have done the same. Only Germany,³³ Austria,³⁴ Nigeria,³⁵ Norway,³⁶ Switzerland,³⁷ China³⁸ and New Zealand³⁹ have legislated GM liability.⁴⁰

This means that Australia's liability currently lies in common law actions, most likely private nuisance⁴¹ or negligence,⁴² but as of 2008, no such claims have been made in Australia.⁴³ Liability for GMOs does not operate in isolation; the regulation framework will always play an important complementary role.⁴⁴ Additionally, state and federal environmental legislation may also provide relevant redress to GMO contamination.

Before detailing the application of the common law actions and environmen-

³¹Senate Community Affairs References Committee, *A Cautionary Tale: Fish Don't Lay Tomatoes – Report on the Gene Technology Bill 2000* (2000) 149.

³²Department of Human Services, *Statutory Review of the Gene Technology Act 2001* (2006) 20; Australian Government Department of Agriculture, Fisheries and Forestry, *Liability Issues Associated With GM Crops in Australia* (2003) 14.

³³*Gentechnikgesetz 1990* (DE) §32.

³⁴*Gentechnikgesetz 1994* (AT) §79k.

³⁵*Nigeria Biosafety Guidelines 2001* (NG) s14.

³⁶*Gentechnologiloven 1993* (NO) §23.

³⁷*Gentechnikgesetz 814.91 2003* (CH) Art.30.

³⁸Canadian Institute for Environmental Law and Policy, *GMO Statutory Liability Regimes: An International Review* (2004) 15 citing *Safety Administration Regulation on Genetic Engineering* (1993) and the *Safety Administration Implementation Regulation on Agricultural Biological Genetic Engineering* (1996).

³⁹*Hazardous Substances and New Organisms Act 1996* (NZ) s124G.

⁴⁰Canadian Institute for Environmental Law and Policy, above n 38, 14. Note that EU Environmental Liability Directive 2004/35/CE also explicitly covers liability from GMOs.

⁴¹Mark Lunney and Robert Burrell, *Legal liability of farmers growing crops: A farmer's choice?* (2006) 17.

⁴²Ludlow, above n 12, 186.

⁴³Troy Anderson, 'Seeds of conflict: Potential Legal Issues with Genetically Modified Crops' (2008) 46(3) *Law Society Journal* 56, 57; Karinne Ludlow, 'Genetically Modified Organisms and Private Nuisance Liability' (2005) 13(2) *Tort Law Review* 92, 92.

⁴⁴New Zealand Government, *Government Response to the Royal Commission on Genetic Modification: Legislative changes for New Organisms — Paper 5: Liability Issues for GM* (2003) 3.

tal legislation, I will briefly turn to Australia's GMO regulation, to provide the appropriate context for the liability discussion.

A *GM Regulation*

The *Gene Technology Act 2000* (Cth) and the *Gene Technology Act 2001* (Vic) provide a regulatory system for dealings involving GMOs in Victoria. Licences and public risk assessments are used to control dealings, with strict liability for breach of these regulations.⁴⁵

But the regulations do not address loss or damage as a result of any breach,⁴⁶ nor does it address any risks unknown to the regulator at the time.⁴⁷ Although the Regulator can give directions in order to protect the environment,⁴⁸ the scope of this power is limited⁴⁹ and does not apply to loss or damage to third parties,⁵⁰ which is more likely to be expensive. Similarly, the power to require insurance is only a limited form of liability, and has never been used.⁵¹

The *Gene Technology Act 2000* (Cth) does not grant immunity from civil actions to compliant licensees,⁵² and tort law does not require the activity to be unlawful.⁵³ The issuing of a GM licence⁵⁴ may however influence tort claims by providing evidence of minimal risk, limiting a finding of a breach of duty of care⁵⁵ and it is possible that a court even deny the existence of a duty of care, if it feels such a duty is inconsistent with express government policy.⁵⁶ Nevertheless, failure to comply with licence conditions would provide strong evidence of carelessness.⁵⁷

⁴⁵ *Gene Technology Act 2000* (Cth) s 34(1),(2).

⁴⁶ Charles Lawson, 'Information Assymetry, GMOs and Strict Liability under the Gene Technology Act 2000 (Cth)' (2005) 5(2) *Law and Justice Journal* 123, 136.

⁴⁷ *Ibid* 136.

⁴⁸ *Gene Technology Act 2000* (Cth) s 145.

⁴⁹ Lawson, above n 46, 137.

⁵⁰ *Ibid* 137.

⁵¹ Greenpeace, above n 5, 3.

⁵² Ludlow, above n 43, 94.

⁵³ *Ibid* 105.

⁵⁴ *Gene Technology Act 2000* (Cth) Part IV.

⁵⁵ Lunney, above n 41, 23, citing *R v Secretary of State for the Environment and MAFF; Ex parte Watson* [1998] EWCA Civ 125.

⁵⁶ Lunney, above n 41, 23; *Hoffman v Monsanto* [2005] SKQB 225, [71].

⁵⁷ Lunney, above n 41, 24.

An argument of statutory authority or that the legislation ‘covers the field’ is unlikely to succeed, given the discussion surrounding the introduction of the legislation,⁵⁸ and the fact that the risk assessments are not comprehensive.⁵⁹

B *Private nuisance*

A central concept in both nuisance and negligence is ‘damage’. Nuisance has a broader, amenity-based concept of ‘damage’, and is therefore more likely to succeed than negligence.⁶⁰ In essence, a claim in nuisance would arise from the unintended presence of a GMO if it causes actual damage or if the use and enjoyment of property is substantially and unreasonably interfered with.⁶¹

1 *Material damage*

If GM contamination can be characterised as material damage to the land, then a claim in nuisance will be much more likely.⁶² There is no direct Commonwealth authority for a material damage threshold in this area,⁶³ but it is clear that diseased, dying or destroyed crops amount to damage,⁶⁴ a loss of value is most likely sufficient,⁶⁵ and the simple genetic change might be enough.⁶⁶ A loss of value test is generally unproblematic, as non-GM farmers would only need to show a lower yield or non-premium price.⁶⁷ But the waters get murky if for example an organic farmer voluntarily destroys their crop because of an emotional or political unwillingness to sell GM-contaminated produce.

Damage will likely be a question of evidence⁶⁸ depending on the particular

⁵⁸Lunney, above n 41, 25; Ludlow, above n 43, 94.

⁵⁹Lunney, above n 41, 25.

⁶⁰Ibid 17.

⁶¹Australian Government Department of Agriculture, Fisheries and Forestry, above n 32, 8; Ludlow, above n 43, 102; Anderson, above n 43, 57.

⁶²Lunney, above n 41, 20.

⁶³Ibid 4.

⁶⁴Ludlow, above n 12, 164.

⁶⁵Lunney, above n 41, 4; Ludlow, above n 12, 165.

⁶⁶Lunney, above n 41, 4.

⁶⁷Ludlow, above n 12, 169.

⁶⁸Lunney, above n 41, 9.

facts at hand. The legal status of seed may also affect the characterisation of damage, so seed that is prohibited, unlicensed or becomes prohibited after contamination may be more readily considered material damage.⁶⁹

Any material damage needs to be ‘significant’, and again, GMOs challenge existing law. Traditionally, ‘visible damage’ is considered significant, but GMOs are not always visibly different.⁷⁰ Scientific examination is permitted, but given the accuracy of modern testing, even minute and otherwise insignificant amounts are detectable. Some argue that class trace amounts as damage would be too low,⁷¹ and that standards set by legislative regulation would provide a better threshold, with lesser quantities remaining eligible for ‘interference with enjoyment of land’.⁷² But given that damage need also be proven not unreasonable, it does not seem too problematic to allow trace amounts as material damage.

2 *Interference with enjoyment of land*

If material damage cannot be made out, nuisance can still be satisfied by proving interference with the enjoyment of land.⁷³ Courts may be more willing to classify contamination of organic or gm-free crops in this way, as opposed to material damage,⁷⁴ particularly if they discount the emotional and political aspects of non-GM and organic agriculture. A claim on this basis may fail the reasonableness test, especially if the GM farmer has implemented at least minimal prevention strategies.⁷⁵

3 *Unreasonable*

The central issue of whether or not the interference was substantial and unreasonable is very much dependent on the relevant facts, and is difficult to predict without authority. A court is likely to consider the nature and

⁶⁹Lunney, above n 41, 7. Note that future legal changes may not be foreseeable damage: *Dovuro Pty Ltd v Wilkins* [2003] 215 CLR 317 (*‘Dovuro’*).

⁷⁰Ludlow, above n 12, 165.

⁷¹Ibid 165.

⁷²Ibid 167.

⁷³Anderson, above n 43, 57.

⁷⁴Australian Government Department of Agriculture, Fisheries and Forestry, above n 32, 8.

⁷⁵Ibid 8.

extent of the harm, regulatory compliance, best farming practices, distance between properties and the number of times contamination occurred.⁷⁶

This might mean that a non-GM or organic farmer will have to ‘put up’ with some GM contamination, if there are a number of GM farmers in the area.⁷⁷

4 *Defences*

Two possible defences are particularly relevant. Firstly, a non-GM or organic farmer’s business might be considered ‘extra-sensitive use’⁷⁸ or ‘unduly sensitive’.⁷⁹ Whether or not this applies to organic agriculture is a difficult question,⁸⁰ one that depends on the framing of the plaintiff’s activity,⁸¹ or even an evaluation of the social desirability thereof.⁸² Note that this may vary over time and location,⁸³ and the nature of regulation and GMO zoning would be relevant.⁸⁴

Secondly, cross-pollination may have occurred by way of an ‘act of god’; events that are utterly out of the control of the defendant, such as an abnormal storm or bees carrying pollen unusually long distances.⁸⁵

Note that the availability of these defences is unsuitable for environmental liability, as it conflicts with the polluter pays principle. Absolute liability would of course not allow these defences.

5 *Overview*

Overall, a claim in nuisance is relatively uncertain and would depend greatly on the given facts. Without material damage, a claim would need more

⁷⁶ Anderson, above n 43, 58.

⁷⁷ Lunney, above n 41, 18; Ludlow, above n 43, 109.

⁷⁸ *Robinson v Kilvert* (1889) 41 Ch D 88.

⁷⁹ Anderson, above n 43, 58, citing *Bridlington Relay Ltd v Yorkshire Electricity Board* [1965] 1 All ER 264; Lunney, above n 41, 19; Ludlow, above n 43, 107.

⁸⁰ Ludlow, above n 12, 171.

⁸¹ *Ibid* 171.

⁸² Such as biodiversity and consumer choice: *Ibid* 172.

⁸³ *Ibid* 171.

⁸⁴ *Ibid* 172.

⁸⁵ Anderson, above n 43, 58.

than mere interference with the right to farm land in a particular way to be actionable.⁸⁶ Apart from the inherent difficulties in establishing causation for GM contamination,⁸⁷ it could be argued that the claimed ‘damage’ is actually caused by a third party (eg an organic certification body) and their insistence of an impossible zero-tolerance, in combination with the plaintiff’s own adherence to those standards.⁸⁸

A Remedy for nuisance is usually an injunction against future conduct, and sometimes damages. An injunction is problematic, because the contamination has already occurred,⁸⁹ as has the act that caused it. A mandatory injunction may be necessary to repair environmental damage or remove a GM crop, but courts are less willing to wield mandatory injunctions for nuisance.⁹⁰

C *Negligence*

Another relevant liability device is the common law tort of negligence.⁹¹ GM producers and farmers may owe a duty of care to non-GM farmers and if they breach that duty, causing damage, compensation may be payable. Even if the plaintiff does not personally experience physical damage, compensation for pure economic loss is possible,⁹² albeit in a particularly uncertain area of law.⁹³ While nuisance is typically used for ongoing interference, negligence is more suitable for single events, and so injunctions are not granted. Negligence liability does however have a strong deterrence effect, particularly where insurance companies are involved,⁹⁴ provided there are no inherent difficulties in establishing a claim.

⁸⁶Lunney, above n 41, 17.

⁸⁷See above, section II.

⁸⁸*Hoffman v Monsanto* [2005] SKQB 225, [106]; Lunney, above n 41, 8; Ludlow, above n 12.

⁸⁹Anderson, above n 43, 58.

⁹⁰Lunney, above n 41, 19.

⁹¹See *Donoghue v Stevenson* [1932] AC 562.

⁹²*Perre v Apand* (1999) 198 CLR 180; Ludlow, above n 12, 174; Lunney, above n 41, 10.

⁹³Lunney, above n 41, 10. See eg the seven separate judgements in *Perre v Apand* (1999) 198 CLR 180.

⁹⁴Note that insurance is unlikely to be available for GM liability, given its uncertainties: Karen Holtby, William Kerr and Jill Hobbs, *International Environmental Liability and Barriers to Trade: Market Access and Biodiversity in the Biosafety Protocol* (2007) 101; Anderson, above n 43, 59.

1 *When might negligence arise?*

The typical situation would be a simple failure to prevent genetic contamination or perhaps a failure to warn non-GM and organic farmers in the area.

As with nuisance, full compliance with licence does not mean negligence is impossible,⁹⁵ but a failure to comply with licence is likely to be treated as strong evidence of negligence.⁹⁶

2 *Damage*

‘Interference with enjoyment of land’ is not in itself actionable damage in negligence as it is in nuisance,⁹⁷ but the law is equally uncertain as to whether or not mere GM contamination amounts to damage. Some cases have held analogous contamination to be a ‘physical change with adverse consequence’,⁹⁸ others have not.⁹⁹ Also of interest is the issue of indeterminate liability, considered in *Hoffman v Monsanto*,¹⁰⁰ as trace amounts of seed and pollen can be distributed over great distances.¹⁰¹

3 *Pure economic loss*

If material damage cannot be established, plaintiffs will have to rely on an action based on pure economic loss. The leading and most relevant¹⁰² case in this area is *Perre v Apand*,¹⁰³ whose facts are conveniently analogous to GM contamination, and sets out a fundamental requirement for an ascer-

⁹⁵ Anderson, above n 43, 58; Ludlow, above n 43, 112.

⁹⁶ Lunney, above n 41, 23; Anderson, above n 43, 58.

⁹⁷ Ludlow, above n 12, 174.

⁹⁸ *McMullin v ICI Australia Operations Pty Ltd* (1997) 72 FCR 1 (*‘McMullin’*); Ludlow, above n 12, 176.

⁹⁹ *Dovuro* [2003] 215 CLR 317.

¹⁰⁰ [2005] SKQB 225.

¹⁰¹ Kathryn Garforth, ‘When Worlds Collide: Biotechnology meets Organic Farming in *Hoffman v Monsanto*’ (2006) 18 *Journal of Environmental Law* 459, 462.

¹⁰² Anderson, above n 43, 58.

¹⁰³ (1999) 198 CLR 180.

tainable class of vulnerable persons,¹⁰⁴ to avoid indeterminate liability.¹⁰⁵ Gene flow itself is not strictly limited to an identifiable class of persons,¹⁰⁶ but neighbouring farms are clearly identifiable¹⁰⁷ and location-aware organic or non-GM certification requirements might provide an avenue for strengthening this. Additionally, gene flow is roughly limited to a finite area, and broader contamination from a given GM crop would not be widespread. Governmental GM zoning is likely to have a great effect on liability,¹⁰⁸ and costs of precautions against contamination should be actionable as pure economic loss.¹⁰⁹

If such an action is allowed, financial loss from losing organic certification would almost certainly be considered foreseeable.¹¹⁰ Although the issue of pure economic loss drifts away from the environmental concerns at the core of this essay, liability in these cases can provoke suitable precaution that might not otherwise exist.

4 *Overview*

A claim in negligence appears to be possible, but uncertain. The same causation difficulties apply equally to negligence and there are a number of defences available. The issue of sensitivity discussed earlier¹¹¹ may be overcome by analogy to the personal injury approach of taking the plaintiff as you find them.¹¹² Overall the common law court would take into account the degree of risk, probability of loss and the expense, difficulty and inconvenience of taking action.¹¹³ Because such a claim's complexity will probably frustrate any deterrence effect, and because the remoteness test disregards previously unforeseen environmental damage,¹¹⁴ negligence appears to be a largely unsuitable liability device for GM contamination.

¹⁰⁴ *Perre v Apand* (1999) 198 CLR 180, 194 (Gleeson CJ), 222 (McHugh J).

¹⁰⁵ *Ibid* 222 (McHugh J).

¹⁰⁶ *Hoffman v Monsanto* [2005] SKQB 225, [73], [77]–[80]; Garforth, above n 101, 462.

¹⁰⁷ Anderson, above n 43, 58.

¹⁰⁸ Ludlow, above n 12, 182.

¹⁰⁹ *Ibid* 183.

¹¹⁰ *Ibid* 182.

¹¹¹ That organic farming might be considered too sensitive; See above section III(B)(4).

¹¹² Ludlow, above n 12, 182.

¹¹³ Anderson, above n 43, 58.

¹¹⁴ Ludlow, above n 43.

D *Other common law actions*

An action in trespass is possible, if for example GM seeds were intentionally, or negligently moved onto someone else's property. The interference needs to be direct, so pollen drift by wind, insect, or water is unlikely to be sufficient.¹¹⁵ Nevertheless, if these problems can be overcome trespass is a more powerful tort; it is actionable *per se* so no actual damage needs to be demonstrated.¹¹⁶

Public nuisance is a less likely action because of difficulties in proving standing.¹¹⁷ A claim on behalf of the harm to biodiversity will not be actionable because the plaintiff is unlikely to suffer greater injury than anyone else.¹¹⁸

E *Actions under environmental law*

Actions may be possible against a GM producer or farmer under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) ('*EPBC Act*') and the *Environment Protection Act 1970* (Vic) ('*EPA*'). International environmental law is probably not relevant for GMO contamination in Australia, due to Australia's isolation.

1 *EPBC Act*

GMOs are not exempt from the *EPBC Act*, but it would be difficult to use it for GMOs. Despite a push for an 'invasive species' trigger or even a GM trigger,¹¹⁹ no such thing was ever included. This means that GMO contamination would only be relevant when there is a significant impact on an existing matter of national environmental significance. For example, a GMO could become dominant in a given area and threaten a listed plant species (endangered), or it could directly threaten a listed insect, animal

¹¹⁵Australian Government Department of Agriculture, Fisheries and Forestry, above n 32, 8; Lunney, above n 41, 28; *Hoffman v Monsanto* [2005] SKQB 225, [131].

¹¹⁶Lunney, above n 41, 28.

¹¹⁷Ludlow, above n 43, 93.

¹¹⁸*Ibid* 93.

¹¹⁹Natasha Stott Despoja, 'A Matter of Public Importance — Genetically Modified Organisms' (Speech delivered at Parliament, Canberra, 21 Jun 2000).

or bird, especially relevant for chemical or pharmaceutical GMOs. Indirect¹²⁰ and off-site¹²¹ impacts are relevant, which would for example allow an action against a GMO that facilitates increased use of pesticides or herbicides, which threaten listed flora or fauna or run off to the Great Barrier Reef.¹²² Unlike common law actions, the precautionary principle can help when scientific information about the likely impact is missing.¹²³

Given that GMOs can travel great distances, it can certainly be argued that GMOs anywhere near a protected area could ‘have a propensity’ to have an effect.¹²⁴ A detrimental effect on a protected species or to a World Heritage value would likely be regarded as a ‘significant impact’, being ‘important, notable or of consequence having regard to its context or intensity.’¹²⁵ Realistically, the lack of relevant triggers will reserve the *EPBC Act* for only a few compatible factual scenarios. When successful, an injunction (possibly mandatory) and much negative publicity would typically result. Because location is not critical to GM producers, the end result would mean that certain areas are avoided, not that more research is undertaken into the environmental risks.

2 *Environment Protection Act*

GMOs may be considered a pollutant under the *EPA*.¹²⁶ The term ‘noxious’ remains undefined by the *EPA*, but may be restrictively defined because of the absolute liability involved.¹²⁷ Notably, weeds were not considered ‘dangerous’ by the High Court in *Dovuro*,¹²⁸ but weeds are not GMOs.

¹²⁰ *Minister for Environment and Heritage v Queensland Conservation Council Inc* (2004) 139 FCR 24 (‘*Nathan Dam*’); *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (‘*EPBC Act*’), s 527E.

¹²¹ *Booth v Bosworth* (2001) 114 FCR 39.

¹²² *Nathan Dam* (2004) 139 FCR 24.

¹²³ *Telstra Corporation Ltd v Hornsby Shire Council* (2006) 146 LGERA 10.

¹²⁴ *Booth v Bosworth* (2001) 114 FCR 39, 64.

¹²⁵ *Ibid* 65.

¹²⁶ *Environment Protection Act 1970* (Vic) (‘*EPA*’), sub-ss 45(1)(a)-(d); Karinne Ludlow, ‘Genetically modified organisms and pollution in Victoria’ (2004) 21 *Environmental and planning law journal* 351, 362.

¹²⁷ Ludlow, above n 126.

¹²⁸ [2003] 215 CLR 317.

IV CONCLUSION

Liability rules typically serve to provide compensation, repair damage and encourage precaution through deterrence.¹²⁹ In the context of GMOs, deterrence holds a particular importance as compensation and funds for repair lose meaning in cases of irreversible harm. Difficulties in proving causation and the absence of the precautionary principle in common law tort actions frustrate the pursuit of these goals, especially that of deterrence.¹³⁰ In addition to that, the application of the existing laws to GMO contamination cases is difficult and uncertain,¹³¹ especially given its political relevance and the fact that contamination is not regulated by the *Gene Technology Act 2000* (Cth).¹³² The issue of scientific uncertainty is central to environmental law, and relying completely on a regulator to assess risk is undesirable, given finite funding and vulnerability to political influence.¹³³

One characteristic problem with GM contamination is that the smallest amounts can have negative consequences and are very difficult to prevent. This might sometimes mean that the only way the polluter can avoid this is would be to not use GM at all.¹³⁴ But that does not mean that liability is pointless. If coexistence is possible, it has its best chances under a comprehensive liability scheme, at the very least, harm will be minimised. It would be lazy and irresponsible to accept damage as inevitable or acceptable.¹³⁵ These points begin to stray partly into the area of politics,¹³⁶ which is out of the scope of this essay.

By legislating specifically for GMO liability, the Government can address these problems and even reduce liability for particular parties in the production chain by relying on the influence exerted by primary liability holders.¹³⁷

¹²⁹New Zealand Government, above n 44, 3.

¹³⁰Holtby, above n 94, 107.

¹³¹See above, section III; Ludlow, above n 43; Ludlow, above n 12; Biological Farmers of Australia, *Gene Technology Act Review Submission* (2006) 3.

¹³²Greenpeace, above n 5, 5.

¹³³For example the appointment of Dr Sue Meek as the Gene Technology Regulator. See Biological Farmers of Australia, above n 131, 6.

¹³⁴Karinne Ludlow, *Submission To Review Of The Victorian Gene Technology Act 2001* (2006) 4.

¹³⁵The Australian Greens Victoria, *A Submission To The Gene Technology Act Review Panel* (2006) 1.

¹³⁶Ludlow, above n 134, 4.

¹³⁷Holtby, above n 94, 91, 108.

Two important devices are strict liability¹³⁸ and a rebuttable presumption of causation.¹³⁹

Recommended by a Senate Committee in 1992,¹⁴⁰ strict liability acknowledges that GM producers, not government regulators, are in the best position to understand and avoid risk.¹⁴¹ Strict liability has been avoided by some Governments¹⁴² because of its inflexibility¹⁴³ and that it might inhibit investment.¹⁴⁴ The circular use of the investment justification has led to a 'race to the bottom' by competing markets.¹⁴⁵

Yes, a strict or absolute liability regime may slow investment by GM developers, increasing the cost of doing business. But only because their actions have the real potential to damage other farmers' crops and the environment at large. Whether it did so deliberately or not, the government's rejection of a customised GM liability framework allows GM producers to externalise the costs of their business, trading environmental risk for foreign investment.

Victoria's GM journey has begun, and in accepting the political decision to go in that direction, an appropriate liability regime would be able to ensure only responsible handling of GMOs, to give coexistence its best chance and to ultimately help pick up the pieces if more serious environmental harm ever eventuates.

¹³⁸See eg Lawson, above n 46; Greenpeace, above n 5, 4.

¹³⁹See eg Canadian Institute for Environmental Law and Policy, above n 38, 3; *Gentechnikgesetz 1990* (DE) §24

¹⁴⁰House of Representatives Standing Committee on Industry, Science and Technology, *Genetic Manipulation: The Threat or the Glory?* (1992) 256.

¹⁴¹Holtby, above n 94, 102; Lawson, above n 46, 139; Greenpeace, above n 5, 4.

¹⁴²Notable exceptions include Germany and Austria.

¹⁴³Ludlow, above n 134, 4.

¹⁴⁴Greenpeace, above n 5, 3.

¹⁴⁵See eg New Zealand Government, above n 44, 5.

BIBLIOGRAPHY

Articles/Books/Reports

- Anderson, Troy, 'Seeds of conflict: Potential Legal Issues with Genetically Modified Crops' (2008) 46(3) *Law Society Journal* 56.
- Andree, Peter, *Genetically Modified Diplomacy: The Global Politics of Agricultural Biotechnology and the Environment* (2007).
- Australian Government Department of Agriculture, Fisheries and Forestry, *Liability Issues Associated With GM Crops in Australia* (2003).
- Ayres, Ian and Braithwaite, John, *Responsive Regulation: Transcending the Deregulation Debate* (1992).
- Barrett, Katherine and Brunk, Conrad, 'A Precautionary Framework for Biotechnology' in Taylor, Iain (ed) *Genetically Engineered Crops: Interim Policies, Uncertain Legislation* (2007).
- Bennett, Belinda and Williams, Greg, 'Gene technology regulation: an overview of the Act and the penalties for non-compliance' (2001) 12(5) *Australian Product Liability Reporter* 69.
- Biological Farmers of Australia, *Gene Technology Act Review Submission* (2006).
- Birnbauer, William, 'Farmers hit out at GM seeds bungle', *The Age* (Melbourne), 9 May 2004.
- Board on Agriculture and Natural Resources, *Genetically Modified Pest-Protected Plants: Science and Regulation* (2000).
- Boer, Ben, Fowler, Robert and Gunningham, Neil, *Environmental Outlook: Law and Policy* (1994).
- Boer, Ben, Fowler, Robert and Gunningham, Neil, *Environmental Outlook No 2: Law and Policy* (1996).
- Braithwaite, John, *Regulatory Capitalism: How It Works, Ideas for Making It Work Better* (2008).
- Canadian Institute for Environmental Law and Policy, *GMO Statutory Liability Regimes: An International Review* (2004).
- Christie, Edward, 'The Role of Law and Science in the Resolution of Disputes over Factual Evidence' (1991) 8 *Environmental and Planning Law Journal* 200.
- Clarke, Andrew, Stanley, John and Taji, Acram, 'GM Crops — Science Agriculture and Potential Legal Issues' in *The AgLaw Papers: Book 2* (2004).
- Clarke, Andrew, Stanley, John and Taji, Acram, 'On agriculture and biotechnology - GM crops - science, agriculture and potential legal issues' (2004) 2 *AgLaw Papers* 7.

Conner, Anthony, Glare, Travis and Nap, Jan-Peter, 'The release of genetically modified crops into the environment: Part II. Overview of ecological risk assessment' (2003) 33 *The Plant Journal* 19.

Dalton, David, 'Transgenic crops and genetic contamination: assessing the need for a regulatory response to protect organic farmers' (2003) 8(3) *Australasian Journal of Natural Resources Law and Policy* 129.

Dawkins, Kristin and DuBois, Josh, 'Toward a Liability and Compensation Regime Under the Biosafety Protocol' in Taylor, Iain (ed) *Genetically Engineered Crops: Interim Policies, Uncertain Legislation* (2007).

Demont, Matty, Wesseler, Justus and Tollens, Eric, 'Irreversible Costs and Benefits of Transgenic Crops: What Are They?' In Wesseler, Justus (ed) *Environmental Costs and Benefits of Transgenic Crops* (2005).

Department of Human Services, *Statutory Review of the Gene Technology Act 2001* (2006).

Dryzek, John, *The Politics of the Earth* (2005).

Entine, Jon (ed), *Let Them Eat Precaution: How Politics Is Undermining the Genetic Revolution in Agriculture* (2006).

Firbank, Les, Lonsdale, Mark and Poppy, Guy, 'Reassessing the Environmental Risks of GM Crops' (2005) 23 *Nature Biotechnology* 1475.

Francioni, Francesco (ed), *Biotechnologies and International Human Rights* (2007).

Fukuda-Parr, Sakiko, *The Gene Revolution: GM Crops and Unequal Development* (2007).

Garforth, Kathryn, 'When Worlds Collide: Biotechnology meets Organic Farming in *Hoffman v Monsanto*' (2006) 18 *Journal of Environmental Law* 459.

Gilliga, Chris, Claessen, David and Bosch, Frank van den, 'Spatial and Temporal Dynamics of Gene Movements Arising From Deployment of Transgenic Crops' in Wesseler, Justus (ed) *Environmental Costs and Benefits of Transgenic Crops* (2005).

Glover, Julie, *Gene Flow Study: Implications for GM Crop Release in Australia* (2002).

Greenpeace, *GM Contamination Register Report 2007* (2008).

Greenpeace, *GM Contamination Report 2005* (2005).

Greenpeace, *Submission for the Review of the Victorian Gene Technology Act 2001* (2006).

Gullett, Warwick, 'The Precautionary Principle in Australia: Policy, Law and Potential Precautionary EIAs' (2000) 11 *Risk: Health, Safety and Environment* 93.

Gunningham, Neil, *Shades of Green: Business, Regulation and Environment* (2003).

Gunningham, Neil, *Smart Regulation: Designing Environmental Policy* (1998).

Halford, Nigel (ed), *Plant Biotechnology: Current and Future Applications of Genetically Modified Crops* (2006).

Havemann, Paul, 'Genetic Modification, Ecological Good Governance and the Law: New Zealand in the Age of Risk' [2003] *James Cook University Law Review* 2.

Higgins, Vaughan and Lawrence, Geoffrey (eds), *Agricultural Governance: Globalization and the New Politics of Regulation* (2005).

Holtby, Kareen, Kerr, William and Hobbs, Jill, *International Environmental Liability and Barriers to Trade: Market Access and Biodiversity in the Biosafety Protocol* (2007).

House of Representatives Standing Committee on Industry, Science and Technology, *Genetic Manipulation: The Threat or the Glory?* (1992).

'Human error "probable cause" of GM canola mix-up', *Australian Broadcasting Corporation* (Sydney), 7 September 2008.

Kloppenburg, Jack, *First the Seed — The Political Economy of Plant Biotechnology* (2nd ed, 2004).

Lawson, Charles, 'Information Assymetry, GMOs and Strict Liability under the Gene Technology Act 2000 (Cth)' (2005) 5(2) *Law and Justice Journal* 123.

Leadbeter, Paul, Gunningham, Neil and Boer, Ben, *Environmental Outlook No 3: Law and Policy* (1999).

Lee, Maria and Burrell, Robert, 'Liability for the Escape of GM Seeds: Pursuing the 'Victim'?' (2002) 65 *Modern Law Review* 517.

Ludlow, Karinne, 'Cultivating Chaos: State Responses to Releases of Genetically Modified Organisms' (2004) 9 *Deakin Law Review* 1.

Ludlow, Karinne, 'Genetically modified organisms and pollution in Victoria' (2004) 21 *Environmental and planning law journal* 351.

Ludlow, Karinne, 'Genetically Modified Organisms and Private Nuisance Liability' (2005) 13(2) *Tort Law Review* 92.

Ludlow, Karinne, *Submission To Review Of The Victorian Gene Technolog Act 2001* (2006).

Ludlow, Karinne, 'The economic impact of genetically modified organisms as actionable damage in torts' (2005) 13(2) *Tort Law Review* 159.

Lunney, Mark, 'On agriculture and biotechnology - what Australian courts might say about 'damage' from cross-pollination by GMO' (2004) 2 *AgLaw Papers* 27.

Lunney, Mark, 'What Australian Courts Might Say About "damage" from Cross-Pollution by a GMO' in *The AgLaw Papers: Book 2* (2004).

Lunney, Mark and Burrell, Robert, *Legal liability of farmers growing crops: A farmer's choice?* (2006).

Mcintosh, Lee, 'Liability for loss of biodiversity caused by the release of genetically modified organisms [Paper presented at the Western Australian State Division Conference (2002)]' (2002) 4 *National Environmental Law Review* 40.

Montgomery, Nicholas, 'GM precaution gone with the wind: commercial pressure and misconceived GM regulation are putting Australia's clean and green agriculture at risk' (2005) 47 *Ethical Investor* 14.

Mooney, Pat, *Seeds of the Earth: A Private or Public Resource?* (1979).

New Zealand Government, *Government Response to the Royal Commission on Genetic Modification: Legislative changes for New Organisms — Paper 5: Liability Issues for GM* (2003).

New Zealand Law Commission, *Liability for Loss Resulting From the Development, Supply or Use of Genetically Modified Organisms* (2002).

Office of the Gene Technology Regulator, *The biology and ecology of canola (Brassica napus)* (2002).

Parker, Christine (ed), *Regulating Law* (2004).

Patel, Raj, *Stuffed and Starved: Markets, Powers and the Hidden Battle for the World Food System* (2007).

Peel, Jacqueline, *The Precautionary Principle in Practice* (2005).

Perriere, Robert Brac de la and Seuret, Franck, *Brave New Seeds : the Threat of GM Crops to Farmers* (2000).

Phillipson, Martin, 'Legal Impediments to the Survival of Organic Production?' In Clements, Belinda (ed) (2007).

Poppy, Guy and Wilkinson, Michael, *Gene Flow From GM Plants* (2005).

Raffensperger, Carolyn, 'The Precautionary Principle and Biotechnology: Guiding a Public Interest Research Agenda' in Taylor, Iain (ed) *Genetically Engineered Crops: Interim Policies, Uncertain Legislation* (2007).

Ramsay, Gavin, 'Pollen Dispersal Vectored by Wind or Insects' in Poppy, Guy and Wilkinson, Michael (eds) *Gene Flow From GM Plants* (2005).

Rissler, Jane and Mellon, Margaret, *The Ecological Risks of Engineered Crops* (1996).

Senate Community Affairs References Committee, *A Cautionary Tale: Fish Don't Lay Tomatoes – Report on the Gene Technology Bill 2000* (2000).

Somsen, Han (ed), *The Regulatory Challenge of Biotechnology : Human Genetics, Food and Patents* (2007).

Soregaroli, Claudio and Wessler, Justus, 'Minimum Distance Requirements and Liability: Implications for Co-Existence' in Wessler, Justus (ed) *Environmental Costs and Benefits of Transgenic Crops* (2005).

Stavropoulos, Basil, 'Genetically modified insurance: food for thought?' (2001) 42(2) *Australian and New Zealand Institute of Insurance and Finance Journal* 24.

Tager, Jeremy, 'Who carries the can: liability and responsibility in the biotechnology debate' (2004) 1(2) *Farm Policy Journal* 23.

Taylor, Iain (ed), *Genetically Engineered Crops : Interim Policies, Uncertain Legislation* (2007).

The Australian Greens Victoria, *A Submission To The Gene Technology Act Review Panel* (2006).

Thieme, Margret, *Agro-Gentechnik in Osteuropa und ihre politische Regulierung* (2005).

Thies, Janice and Devare, Medha, 'An Ecological Assessment of Transgenic Crops' in Herring, Ronald (ed) *Transgenics and the Poor: Biotechnology in Development Studies* (2007).

Thomson, Jennifer, *GM Crops: The Impact and the Potential* (2006).

Weaver, Robert, 'Ex Post Evidence on Adoption of Transgenic Crops: US Soybeans' in Wesseler, Justus (ed) *Environmental Costs and Benefits of Transgenic Crops* (2005).

Wesseler, J (ed), *Environmental Costs and Benefits of Transgenic Crops* (2005).

Wiel, Clemens van de, Groot, Mirella and Nijs, Hans den, 'Gene Flow From Crops to Wild Plants and Its Population-Ecological Consequences in the Context of GM-Crop Biosafety, Including Some Recent Experiences With Lettuce' in Wesseler, Justus (ed) *Environmental Costs and Benefits of Transgenic Crops* (2005).

Case Law

Booth v Bosworth (2001) 114 FCR 39.

Dovuro Pty Ltd v Wilkins [2003] 215 CLR 317.

Hoffman v Monsanto [2005] SKQB 225.

Leatch v National Parks and Wildlife Service (1993) 81 LGERA 270.

McMullin v ICI Australia Operations Pty Ltd (1997) 72 FCR 1.

Minister for Environment and Heritage v Queensland Conservation Council Inc (2004) 139 FCR 24.

Monsanto Canada Inc v Schmeiser [2004] 1 SCR 902.

New South Wales v Buckland [2000] NSWCA 72.

Perre v Apand (1999) 198 CLR 180.

R v Secretary of State for the Environment and MAFF; Ex parte Watson [1998] EWCA Civ 125.

Telstra Corporation Ltd v Hornsby Shire Council (2006) 146 LGERA 10.

Legislation

Agricultural and Veterinary Chemicals (Control of Use) Act 1992 (Vic).

Charter of Human Rights and Responsibilities Act 2006 (Vic).

Control of Genetically Modified Crops Act 2004 (Vic).

Environment Protection Act 1970 (Vic).

Environment Protection and Biodiversity Conservation Act 1999 (Cth).

Flora and Fauna Guarantee Act 1988 (Vic).

Gene Technology Act 2000 (Cth).

Gene Technology Act 2001 (Vic).

Gentechnikgesetz 814.91 2003 (CH).

Gentechnikgesetz 1990 (DE).

Gentechnikgesetz 1994 (AT).

Gentechnologiloven 1993 (NO).

Hazardous Substances and New Organisms Act 1996 (NZ).

Nigeria Biosafety Guidelines 2001 (NG).