Addressing Legal Liability Issues in Cases of Harm due to Agricultural Genetically Modified Organisms (GMOs):

Does current liability law find a suitable balance between the injuring and injured party?

Master Thesis for a Master of Law in "Biotechnology, Law and Ethics" by Course Work and Dissertation

by

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I hereby declare that I have read and understood the regulations governing the submission of Master of Law Dissertations, including those relating to length and plagiarism, as contained in the rules of this university, and that this dissertation conforms to those regulations.

Mainz, 21 February 2010

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I. Introduction

In 1973, the first creation of recombinant bacteria, E. coli, allowed for gene engineering. After this development, it was possible to create a genetically modified organism (GMO) by adding a new gene into an organism's genome.[1] A short time after this invention, the commercial value of these genetically modified products was discovered which resulted in the establishment of biotechnology companies. Nowadays, GMOs have a wide application in biological and medical research, production of pharmaceutical drugs, experimental medicine and agriculture.[2]

As agricultural biotechnology has become an agronomic alternative, discussion has emerged about what legal liabilities, if any, exist for those who create, distribute and produce transgenic seeds and crops.[3] Many governments have debated legal liability tools in regards to agricultural biotechnology.[4] This debate has also been influenced by numerous commentators – academics from several disciplines, government lawyers, and representatives from non-governmental organisations. In this regard, the basic question is whether or not the current liability regimes provide an appropriate solution for liability claims in the field of agricultural GMO application.

This thesis will examine existing liability rules in North America as well as Germany. The starting point, however, will be an introduction into the scientific background and the terminology of genetics and genetic engineering in order to provide the necessary information for the understanding of the complex liability claims in the field of agricultural GMOs. Following this, the thesis will, in particular, examine the risk potential of the use of these kinds of GMOs.

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[1] In 1973 Stanley Cohen, Herbert Boyer, and others developed recombinant DNA (rDNA) molecules and the following year demonstrated the expression of foreign genes implanted in a bacterium by rDNA methods: Morrow, J.F., Cohen, S.N, Chang, A.C.Y., Boyer, H., Goodman, H., and Helling, R. 1974. Replication and transcription of eukaryotic in Escherichia coli. Proceedings of National Academy of Sciences USA 71: 1743-1747.

[2] See Taylor, 2007 10.

[3] Ibid.

[4] M Migus 'GMO Statutory Liability Regimes: An International Review' (2004) Canadian Institute for Environmental Law and Policy 3.

In addition, the aims of tort law will be presented in order to provide a basis for the question of whether or not the results of liability claims can be justified. The main focus of this dissertation lies in the analysis of the legal liability laws in the previously mentioned jurisdictions. Special attention in this regard will be given to five specific damage scenarios. With regards to the North American liability regime, what will initially be examined is the role reasonable foreseeability, as a requirement of the tort of nuisance, plays in the assessment of liability resulting from innovations in biotechnology. Using these results, the thesis will then analyse liability issues by presenting the statutory regimes from Germany with special regard to the German Law of Genetic Engineering (GenTG). The comparison of the different jurisdictions seeks to clarify which of these regimes most appropriately deals with the liability issues raised by the production of agricultural GMOs.

The thesis will conclude by using the results of the legal comparison to point out existing possibilities to secure equitable legal compensation in cases of GMO harm due to agricultural application.

II. Genetically Modified Organisms (GMOs) in their present context[5]

The legal problems arising out of the handling and application (use) of GMOs are due to the connection between nature, science and legal ramifications which are not understandable without a basic scientific background. Therefore, this chapter will illustrate the natural science background of the manufacturing of GMOs. In this context, the scientific terms, as well as the genetic manufacturing process, will be explained. This is necessary for a good understanding of the dynamics at work within GMO-related legal liability issues.

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[5] This chapter will deal with biotechnology Post-1973 which fundamentally based on the scientific achievements of J.F., Cohen and Herbert Boyer. See JF Cohen et al 'Replication and transcription of eukaryotic in Escherichia coli' (1974) 71 *Proceedings of National Academy of Sciences USA* 1974 at 1743-1747.

A. Fundamentals of genetics and genetic engineering

1. Terminology

Genetic engineering covers every method which is necessary for analysis, isolation, transformation, composition or reproduction of the substrate of genetic information.[6] Genetic engineering is a sector of the broader field of biotechnology.[7] 'Biotechnology is a technique that uses living organisms (or parts of organisms) to make or modify products, to improve plants or animals or to develop microorganisms for specific uses.'[8]

2. The Development of Genetic Engineering

In 1973, the American scientists Stanley Cohen, Herbert Boyer, and others developed recombinant deoxyribonucleic acid (rDNA) molecules and, the following year, demonstrated the expression of foreign genes implanted in a bacterium by rDNA methods.[9] Biotechnology, in general, can be divided into the new and the old.[10] The new biotechnology (post 1973) is 'based on a set of techniques for undertaking "precision" genetic and cell engineering that includes uses of rDNA, cell fusion, monoclonal antibodies, tissue culture technology, and novel bioprocessing methods'.[11] There are three different discoveries which are fundamental to new biotechnology which can be distinguished from traditional fermentation engineering and cross-breeding of animals and crops.[12] These include the discovery of new classes of enzymes, DNA sequencing, and methods of transposing genes within and across species.[13]

Furthermore, the new, discovered enzymes can be distinguished by their characteristics into different groups. One of these enzymes called 'restriction enzyme'

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[6] I Wildhaber *Haftung fuer gentechnische Produkte* (2009) 5.
[7] Ibid.
[8] Ian Taylor *Genetically Engineered Crops* (2007) 5.
[9] J.F. Cohen and Herbert Boyer (note 5) at 1743-1747.
[10] I Taylor (note 8) at 5.
[11] Ibid.
[12] Ibid.
[13] Ibid.

is used to cut DNA at predictable sites.[14] This special enzyme gave scientists the tool to isolate DNA sequences that could be reintegrated into other organisms.[15]

Another group of enzymes called 'ligases' was found to seal the ends of DNA molecules. The ligases are the 'chemical glue' that gives scientists the ability to splice together segments of DNA from different organisms. Lastly, an enzyme called reverse transcriptase transcribes single-stranded messenger ribonucleic acid (RNA) into double-stranded DNA.

The second important discovery has been the sequencing of genes. Sequencing of genes is the process by which the precise nucleotide components of a gene are determined.[16] Gene sequencing is 'essential in order to understand which segments of DNA correspond with specific proteins, or how the coding and noncoding regions of DNA differ'.[17]

The third discovery covers methods which can be used for transporting segments of DNA across biological systems.[18]

3. The application of genetic engineering

In genetic engineering, it is important to have the ability to isolate DNA parts. This is achieved by the use of the already mentioned restriction enzymes.[19] Today, hundreds of such restriction enzymes are known, all with different detection and fission characteristics.[20]

Ligase is used to assemble different DNA fragments, previously part of various organisms, allowing the creation of new DNA combinations.[21] A vector allows the

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[14] I Wildhaber (note 6) at 12f.
[15] Ibid.
[16] I Taylor (note 8) at 5.
[17] Ibid.
[18] Ibid.
[19] This restriction enzymes where discovered by Hamilton O. Smith and Daniel Nathans. See HG Gassen *Der Stoff aus dem die Gene sind* 2ed (1988) 47ff.
[20] EL Winnacker *Gene und Klonen, Eine Einfuehrung in die Biotechnologie* (1984) 3ff.
[21] I Wildhaber (note 6) at 13.

transferral of the already cut DNA fragments into cells.[22] Common vectors are viruses, plasmids, phages, cosmids, and yeast artificial chromosomes (YACs).[23] Different vectors vary with regards to their cloning capacity which means the size of the loadable DNA molecules.[24] Furthermore, vectors enable the replication of integrated DNA fragments into a cell.[25]

Bacteria have the negative quality that they assimilate only a small amount of external DNA.[26] That is why cells are physically and chemically processed with the goal to achieve adhesion of external DNA to the cell membrane.[27] These processed cells are called 'competent' and enable an easier assimilation of the DNA.[28] There are different methods of attaining competent cells. To achieve this goal, vectors which make the host resistant against antibiotics are used. These vectors serve as selective markers inside the host DNA.[29] After the use of selective markers, it is possible to distinguish transformed and untransformed cells and, as a result, to separate the transformed, antibiotic-resistant cells.[30] There are also other separation processes that can be used during this phase.[31]

B. Biotechnology: Different Types of GMOs

After addressing the fundamental principle of biotechnology in general, an illustration of the different types of GMOs shall be conducted, with special regard to each arising risk scenario.

In general, it is alleged that the products of genetically modified organisms could effectively be harmful - a thought that is supported by numerous product liability cases.[32] There are several specifically characterised GM products, such as

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[22] A Reineke *Gentechnik – Grundlagen, Methoden und Anwendungen* (2004) 71ff.
[23] Ibid at 110ff.
[24] I Wildhaber (note 6) at 13.
[25] Ibid.
[26] Ibid.
[27] Ibid.
[28] Ibid.
[29] Ibid.
[30] EL Winnacker (note 20) at 373 ff.
[31] JD Watson et al. *Recombinant DNA* 2ed (1992) 221ff.
[32] Winterbottom v. Wright [1842] 152 Eng. Rep. 402.

microorganisms, animals and plants that could potentially raise cause for concern. Hence, it has to be determined if these products could have risk proximity in particular. Occurring damages could further lead to possible liability claims between the different right holders.

Liability in general is caused due to an occurring damage. The specific GMO damage risk is important for determining which duty of care is established to prevent any harm of legal objects. Similarly, it seems clear that with rising risk, the demands of the level of duty of care are rising.[33] This demand to determine the risk factor is strengthened by the point that possible tort of negligence requires foreseeability of the risk, which in turn requires that a risk exits.[34] Moreover, unusually high damage proximity could influence the applicability of culpa-based liability claims like negligence in the common law model or § 823 of the German civil code.[35]

For this purpose, what is meant by the term 'risk' has to be defined. This term derives from the Latin word 'risicare which means to dare'[36]and was defined by the World Health Organization (WHO) in 2000 as 'a probability of an adverse effect under specific circumstances.'[37] The risk refers to any non-intentional injuring success.[38] Risk is built by the product, damage probability and size of the possible damage.[39] Accordingly, it is imperative to initially examine whether or not these products all have the same risk of harm and, as a result, if these products can be legally addressed in a similar way.

1. GM Bacteria, Viruses, and Microorganisms

The first group of GMOs encompasses the genetic modification of single-cell life forms such as bacteria, viruses and other microorganisms. This biotechnology was a progeny

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[33] P Osborne *The Laws of Tort* (2000) 13f.
[34] L Khoury and Stuart Smyth 'Reasonable Foreseeability and Liability in Relation to Genetically Modified Organisms' (2007) 27 *Bulletin of Science Technology Society* 214 at 216.
[35] Buergerliches Gesetzbuch (BGB).
[36] I Wildhaber (note 6) at 47.
[37] I Wildhaber (note 6) at 47; O Kaeppeli *Bio –und Gentechnologie I* (1994) at 100.
[38] I Wildhaber (note 6) at 47.
[39] O Kaeppeli (note 37) at 100.

of modern genetics that started in the early 1950s with the discovery by Watson and Crick in 1953 of the double helix in deoxyribonucleic acid (DNA).[40] In 1973, Stanley Cohen, Herbert Boyer and others developed recombinant DNA (rDNA) and later demonstrated the expression of foreign genes implemented in a bacterium by rDNA methods.[41] The GMO research continued throughout the 1970s and resulted in a greater understanding and heightening of concern about the future application of biotechnology.[42] At the Gordon Conference on Nucleic Acids, in 1973, public attention was called for the first time to potential risks of GMO technology.[43] The participating scientists 'were concerned that unfettered pursuit of this research might engender unforeseen and damaging consequences for human health and the Earth's ecosystems'.[44] At the Asilomar Conference in 1975, the risks of gene modification were addressed in a public debate.[45] The conference's focus was to talk about *'the possible risks of the research, the conditions needed to ensure that the risks were adequately addressed, and such safety precautions as would be necessary to remove the moratorium and allow future research to proceed safely*'.[46] The striking aspect of this conference was that '*the world's leading experts on rDNA research developed the safety guidelines for subsequent research themselves, rather than having the guidelines developed and imposed on researchers by the government.*'[47]

It is imaginable that during outdoor tests, laboratory experiments, or by dint of transport, unintentional release of GMOs into the environment can occur, with the result that unaltered microorganisms are replaced or negative effects on the ground arise.[48] Furthermore, it is feared that GM bacteria could pass their genetic information to other organisms due to the creation of new plasmids which have the attribute of

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[40] L Khoury and S Smyth (note 34) at 217.
[41] I Taylor (note 8) at 4.
[42] P Berg and M Singer 'The recombinant DNA controversy: Twenty years later' (1995) 92 *Proceedings of the National Academy of Science* at 9011.
[43] L Khoury and S Smyth (note 34) at 217
[44] P Berg and M Singer (note 42) at 9011.
[45] L Khoury and S Smyth (note 34) at 217
[46] Ibid.
[47] Ibid.
[48] D Parr *Genetic engineering: Too good or to wrong?* (1997) 4.

reproduction.[49] Many field trials, and also basic research, in the field of gene transfer point out that an uncontrolled reproduction of GM bacteria is unlikely.[50] This reduced risk scenario is also supported by the Exxon Oil Company patent for oil-eating microorganisms. These oil-eating microorganisms were never actually commercialised because of the concerns around their release into the environment.[51] Due to this reason, the first commercialisation of a genetically modified product took place late in 1983 in the form of insulin producing GMOs.[52] These general concerns have had the effect that GM microorganisms are mostly produced and used in laboratories and closed facilities.

2. GM Animals

The second group of genetically modified organisms covers animals. Research in this field was initiated in the 1970s and was focused on cancer treatment.[53] In 1980, Gordon, Scangos, Plotkin, Barbosa and RuddleGenetic enabled the transformation of mouse embryos by microinjection of purified DNA.[54] An example of a commercialisation in this group is the so-called 'Onco-mouse', an experimental achievement by the Harvard University in 1988.[55] This mouse had been modified to develop cancer and was supposed to be used in laboratory research. Another commercialised development was a genetically modified goat. This goat was modified with an inserted spider gene which codes for producing silk. The goat's milk produces silk at a much higher rate and with greater economies of scale than spiders do.[56] The developer, Nexia Biotechnology, ensures in this case 'that the goats and all their possible by-products do not come in contact with the human food supply chain'.[57]

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[49] JP Morrissey and Walsh UF et al. 'Exploitation of genetically modified inoculants for industrial ecology application' (2002) 81 *Antonie van Leeuwenhoek* at 599ff.
[50] RV Miller 'Gentransfer zwischen Bakterien in der Natur' (1998) Spektrum at 50ff. Available at http://www.spektrumverlag.de/artikel/824429 [Accessed 17 September 2009].
[51] L Khoury and S Smyth (note 34) at 217.
[52] Ibid.
[53] Ibid. at 218.
[54] JW Gordon and GA Scangos et al. 'Genetic transformation of mouse embryos by microinjection of purified DNA' (1980) 77 *Proc. Natl. Acad. Sci. USA* at 7380 ff.
[55] European Patent Register entry for European patent no. 0169672 Available at http://register.epoline.org/espacenet/application?number=EP85304490 [Accessed 6 September 2009].
[56] L Khoury and S Smyth (note 34) at 218.
[57] Ibid.

A change took place in 2004 when Yorktown Technologies of Austin, Texas started to sell genetically modified zebrafish, known as 'GloFish'. These fish contain a translucent jellyfish gene which allows them to glow in the dark.[58] Despite the case of the GloFish being the only one of its kind and the unknown consequences of the GM animal application in the environment (especially in Europe), ethical objections still decrease the use of GM animals outside research and production facilities. This examination is, furthermore, strengthened by the point that 'aquarium fish are not used for food purposes'[59]; they consequently should not pose any threat to the food supply.

3. GM Plants

The final category of biotechnology covers genetically modified plants. This category is of great importance since most of the global population's food supply is gained out of plant products.[60] For that reason, this thesis will focus on the application of GM plants.

a) History of GM plant developments

The first genetic modification of a plant was recorded in 1983 with tobacco as the host plant.[61] Only a few years later, in 1985, the first patent on a genetically modified plant was granted.[62] In the time following, the research in the agricultural GMO field grew rapidly by reason of the widespread application of field trials with different crop varieties. It was only a question of time before the first commercialisation of genetically modified crops in China took place in 1992.[63] Two years later, in 1994, Calgene made it possible to grow and purchase 10,000 acres of the transgenic, delayed-ripening tomato "FlavrSavr".[64] The FlavrSavr was, furthermore, the first genetically engineered food for

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[58] NC Steward '*Go with the glow: fluorescent proteins to light transgenic organisms'* (2006) 24 *Trends in Biotechnology* at 155ff.
[59] FDA Statement Regarding Glofish Available at http://www.fda.gov/AnimalVeterinary/DevelopmentApprovalProcess/GeneticEngineering/GeneticallyEngineeredAnimals/ucm161437.htm [Accessed 6 September 2009].
[60] G Dutfield *Intellectual Property Rights, Trade and Biodiversity: Seeds and Plant Varieties* (2000) 2.
[61] L Khoury and S Smyth (note 34) at. 216.
[62] Ibid.
[63] C James and AF Krattiger '*Global Review of the Field Testing and Commercialization of Transgenic Plant 1986 to 1995 The First Decade of Crop Biotechnology'* (1996). Available at https://www.isaaa.org/resources/publications/briefs/01/download/isaaa-brief-01-1996.pdf [Accessed 9 September 2009].
[64] L Khoury and S Smyth (note 34) at 218.

which a license for human consumption has been granted.[65] In 1995, other genetically modified crops were introduced, including cotton, canola, potatoes, and maize.[66] Since these initial projects, the scope of scientific research in this field has covered a huge amount of different GM varieties, including cereals, oilseed, fruits and vegetables.

b) Risks for the environment

(1) Gene flow and spreading of GM plants

Before a GM plant is allowed to be grown, what negative results could arise for the environment must be examined. In 1996, the biologists Mikkelsen et al. proved that herbicide-resistance-coding transgenes could chip out in the first generation in a related wild species.[67] The possibility that GM pollen could spread out was also recognised in the Northwestern United States after a strain of transgenic grass, bred for golf courses, spread out.[68] The proximity of gene spreading is dependent on region and plant species.[69] On the one hand, canola in particular has the characteristic to spread out easily inside the cultivated plant species as well as related wild species.[70] On the other hand, wheat has a minimised risk of outspreading due to the fact that this plant species is a self-pollinator.[71] Moreover, 'step by step' principles in the form of specific distances of acreage seem to be useful in isolating the GM plants and avoiding affecting the environment.

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[65] Ibid.
[66] Ibid.
[67] TR Mikkelsen and B Andersen et al. 'The risk of crop transgene spread' (1996) 380 *Nature* at 31.
[68] M Hopkin 'Escaped GM grass could spread bad news' Available at http://www.nature.com/news/2006/060811/full/news060807-17.html [Accessed 7 September 2009].
[69] T Clarke 'Crop's weed crossings highlight GM fears' Available at http://www.nature.com/news/2003/031010/full/news031006-13.html [Accessed 7 September 2009].
[70] I Wildhaber (note 6) at 50.
[71] GMO Compass. Available at http://www.gmo-compass.org/eng/safety/environmental_safety/188.wheat.html [Accessed 24 July 2009].

(2) Unintended plant physiological transformation

Other damage risks could arise due to unintended plant transformation. These risks are unexpected due to the fact that they are not connected to the gene product or were not known before the transformation happened.[72] The risk of damage would arise if an integration of a genetically modified gene changes the expression of close genes with the negative result of toxic metabolic pathways being activated.[73]

(3) Herbicide-resistant vermin

Another problem could arise in the way of herbicide-resistant vermin due to the high selective pressure in the field of Bt-maize. 'Bt-corn is a variant of maize, genetically altered to express the bacterial Bt toxin, which is poisonous to insect pests'.[74] The gene-manipulated plants produce the Bt toxin throughout the whole growing season. Following this, vermin could be able to develop new defence mechanisms.[75] A way of reducing the risk of herbicide resistance is the application of multi-herbicide resistance;[76] but since the first application of Bt-plants, a special accelerated herbicide resistant has not appeared.[77]

(4) Undesirable effects on soil life

Herbicide-resistant GM plants could have adverse effects on soil life. Scientists stated, in 1999, that larva of the monarch butterfly (danaus plexippus) which lives on Bt-maize pollinated 'vincetoxicum hirundinaria' show a higher death rate.[78] This study was later withdrawn because the same author later stated that 'Pollen from genetically modified corn plants which contain the insecticidal Bt toxin' are 'not a significant danger to North American monarch butterflies'.[79] This statement was made due to the availability of

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[72] I Wildhaber (note 6) at 52.
[73] W Pawloski and Somers et al. *'Transgenic DNA integrated into the oat genome is frequently interspersed by host DNA'* (1998) 95 The National Academy of Science at 12106.
[74] R Bessin *Bt-Corn:What it is and how it works*. Available at http://www.ca.uky.edu/entomology/entfacts/entfactpdf/ef130.pdf [Accessed 7 September 2009].
[75] YB Liu and E Bruce et al. 'Development time and resistance to Bt-Crops' (1999) 400 *Science* at 519.
[76] I Wildhaber (note 6) at 53.
[77] BE Tabashnik and F Jeffrey et al. 'DNA Screening reveals pink bollworm resistance to Bt cotton remains Rare after a decade of exposure' (2006) 99 *Journal of Economic Entomology* at 1525ff.
[78] J Losey and L Rayor et al. 'Transgenic pollen harms monarch larvae' (1999) 399 *Nature* at 214.
[79] T Clarke 'GM plant pollen may be off the hook, but regulators are still feeling the heat' Available at http://www.nature.com/news/2001/010912/full/news010913-12.html [Accessed 22 December 2009].

new research results. The scientists analysed the leaves of 'Asclepias syriaca' and concluded that the pollen concentration on the leaves were not sufficient to harm monarch butterflies.[80] Furthermore, it was stated that only a part of the monarch butterfly population feeds next to the maize fields.[81] Moreover, in the opinion of the scientists, the pollen flow did not overlap with the occurrence of the monarch butterfly.[82]

Finally, in June 2007, a report provided the information that 'fields of transgenic cotton and corn contain more non-target insects than those of traditional crops sprayed with insecticides'.[83]

c) Risks for humans due to the application of GM food

As a matter of principle, the negative impacts of food are classified into toxic and non-toxic food reactions.[84] Toxic food reactions concern all customers and are based on the growing and manufacturing process of GM plants.[85] Non-toxic food productions could be important for people with a specific allergy or intolerance due to components of the product.[86]

(1) Toxic reactions

Agricultural GM food could have the ability to change existing or unanticipated toxic characteristics of food.[87]

Some scientists have pointed out that gene insertion can lead to an increase in levels of naturally occurring toxins.[88] Studies have been conducted involving recombinant yeast cells, '*where genes from yeast were cloned and then reintroduced through conventional GE techniques. The analyses showed a threefold increase in the*

[80] Ibid.
[81] Ibid.
[82] Ibid.
[83] H Ledford 'Transgenic crops relatively kind to insects' Available at http://www.nature.com/news/2007/070607/full/news070604-9.html [Accessed 22 August 2009].
[84] I Wildhaber (note 6) at 57.
[85] Ibid.
[86] Ibid.
[87] I Taylor (note 8) at 85.
[88] Ibid.

accumulation of an enzyme in the glycolytic pathway and a 40 to 200 fold increase in the production of methyl-glyoxal, a substance that is toxic and mutagenic in high concentrations'.[89] Furthermore, many GM crops contain a promoter from the cauliflower mosaic virus which is named 'CaMV 35S' transcript.[90] Michael Hansen stated that 'the CaMV 35S promoter effectively puts the transgene outside of virtually any regulatory control by the host genome as the natural plant promoters for each gene allow'.[91] Moreover, CaMV 35S has the ability to affect gene expressions thousands of base pairs upstream and downstream from the insertion site on a given chromosome and even alter the behaviour of genes on other chromosomes. but a present effect on human health is still not clearly stated.[92] Overall, it seems clear that '*in general, very little is known about the potential long-term effects of any foods, and that identification of such effects may be very difficult, if not impossible, due to the many confounding factors and the great genetic variability in food-related effects among the population'*.[93]

(2) Allergenicity

Allergic reactions to food arise of adverse immunological reactions to proteins and, to a lesser extent, other components in food.[94] Approximately two per cent of people, including eight per cent of children, in industrialised countries are affected by food allergies.[95] The genetic modification of food could cause an allergenic reaction to it due to the introduction of a foreign gene or an alteration in gene expression. On the one hand, it is reported by the Royal Society that 'there is presently no evidence that GM foods that are commercially available cause any clinical manifestations of allergenicity, and assertions to the contrary have not been supported by systematic analysis'. [96] The risks to human health associated with the use of specific viral DNA sequences in GM

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[89] Ibid.
[90] Ibid.
[91] Ibid.
[92] Ibid.
[93] HA Kuiper and GA Kleter 'Assessment of the food safety issues related to genetically modified foods' (2001) 27 *The Plant Journal* at 505.
[94] I Wildhaber (note 6) at 58.
[95] I Taylor (note 8) at 82.
[96] The Royal Society 'Genetically modified plants for food use and human health –an update' at p. 7 Available at http://royalsociety.org/displaypagedoc.asp?id=11319 [Accessed 30 August 2009].

plants should be negligible.[97] On the other hand, two cases provide evidence that there is a risk that gene coding for allergens and immunogens may be inadvertently transferred into the human food supply.[98]

In the first case, Pioneer Hi-Breed[99] was in the process of developing GM soybeans which contained a gene which coded for a methionine-rich protein from Brazil nuts.[100] Julie Nordlee et al. proved that a major Brazil nut allergen had been transferred to Pioneer Hi-Bred soybeans.[101]

The second case involved Starlink corn.[102] Tests showed that cryc9c, the toxin encoded in the corn due to Bt gene insertion, was resistant to human digestion.[103] Due to this analysis, the United States Department of Agriculture (USDA) restricted this corn to animal consumption.[104] A discussion of the Starlink case would go beyond the scope of this chapter. A detailed and specific discussion, however, will be provided in chapter IV.

4. Discussion

Firstly, one cannot deny that GM products in general have risks for legally protected interest. Furthermore, GM products concern almost every area of life. It was illustrated that there are different groups of GM application, each with their differences. On the one hand, GM microorganisms (incl. bacteria and viruses) as well as GM animals are generally handled in laboratories. This limited handling results in restricted contact with legally protected interests. This, in turn, results in a lower level of risk, which could be important in a potential liability claim for negligence. Moreover, this lower risk level allows for the conclusion that a lower amount of damages cases, as well as an increased

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[97] Ibid.
[98] I Wildhaber (note 6) at 58.
[99] Pioneer Hi-Breed is by its own account the world's leading developer and supplier of advanced plant genetics to farmers worldwide Available at http://www.pioneer.com/web/site/portal [Accessed 30 August 2009].
[100] JA Nordlee and JA Taylor et al. 'Identification of a Brazil-nut allergen in transgenic soybeans' (1996) 334 *New England Journal of Medicine* at 334f.
[101] Ibid.
[102] I Taylor (note 8) at 83.
[103] Ibid.
[104] Ibid.

amount of loss, seems to be possible. On the other hand, GM plants are used in agriculture and as food in North America. Moreover, GM plants were also introduced in limited field trials in Europe. Due to the practical application of GM plants, the GM materials appear to be in direct contact with human health, farmer's property rights as well as economic interests. Damages, with regards to the already mentioned gene flow, toxic and allergic reaction of GM plants, are more likely or at least possible. Consequently, this examination shows that a specific liability rule for the purposes of managing GM plants is needed. It would have to deal with irreversible, different and huge damage in a satisfactory way. As a result, an application of GM plants demands a need for quicker legal action and, additionally, a broader necessity of regulation. The existence of the GloFish seems to be due to commercialisation and an exception to the mentioned risk distinction between the different GM groups. This animal appears not to share the same level of risk as the group of plants on the basis that this product is set apart 'because tropical aquarium fish are not used for food purposes'[105] and they are in the domestic isolation of a fish tank. Therefore, there is a total isolation in this instance in terms of risk and the GloFish will never transmit genes to the wild type variety, the zebrafish. Consequently, the GloFish does not pose any threat to the food supply.[106] According to this examination, the liability uniqueness of agricultural GMO application is established. For this reason, it is necessary to examine how a satisfactory liability system should handle some key legal issues. The ethicist Sass says '…cooperation in the sharing of responsibility between all parties involved…is what I call the marriage of ethics and expertise'.[107] Consequently, the management of the question of liability is of particular importance concerning the risk of GM plants.

[105] FDA Statement Regarding Glofish. Available at http://www.fda.gov/AnimalVeterinary/DevelopmentApprovalProcess/GeneticEngineering/GeneticallyEngineeredAnimals/ucm161437.htm [Accessed 6 September 2009].
[106] Ibid.
[107] I Wildhaber (note 6) at 63.

III. The aims and scope of tort law

The second chapter has provided basic information about GMO technology and possible adverse effects. The following chapter will illustrate that the occurring risk under the new GMO technology has to be balanced due to freedom aspirations and purposes of society. Furthermore, it will be shown that tort law tries to enable coexistence between the development and introduction of new technologies and the protection of already recognised legal rights.

A legal order would be unnecessary if the citizen would live in permanent harmony.[108] The reality is that individual interests are continually in a state of real or threatened conflict.[109] The previous chapter has shown that the introduction of GMOs produce risks in several fields. This conflict creates a field of tension between the legal spheres of the legally affected persons and the state. Consequently, a solution is needed to settle the originated conflicts and to allow satisfactory coexistence. The law of torts and the law of Delict determine which interests are recognised by liability law and, furthermore, under which circumstances they are protected against infringement.[110] The wrongdoer has an 'obligation' to compensate for the damage suffered; and the injured person has the right to claim a particular amount of compensation.[111] As a result, a legal obligation is created between both parties which attach the law of tort as part of private law known as the 'law of obligations'.[112]

There are several opinions on this matter and each considers the aims of tort law in different ways. The first opinion understands tort law as an ethical system which promotes the responsibilities of wrongdoers for the damage they have caused to other people.[113] This understanding leads to the conclusion that it is the tort law's function to correct injustice between legal persons. The second opinion 'suggests that tort law is a

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[108] J Neethling and JM Potgiether et al. *Law of Delict* 4ed (2006) 3.
[109] Ibid.
[110] Ibid.
[111] Ibid.
[112] Ibid.
[113] P Osborne (note 33) at 403ff.

legal construct designed to achieve a number of identifiable functions'[114] like compensation, punishment, deterrence, education and the ombudsman role. All of these functions are in the public interest.[115] This conflict of different opinions of what the role of tort law is does not have to be solved due to the fact that both opinions try to achieve a result that establishes a harmonic society with satisfied individuals.

It was further pointed out that one of the demands of tort law is to protect specific interests.[116] Based on this, what interests could be affected in the case of agricultural GMO application should be examined during the case study. The second step should determine if these interests are appropriately protected by current liability systems. In order to identify protectable interests, examination of possible liability claims is required. At this juncture, the emphasis shall be on claims which have a connection to pure economic loss due to the widespread practical implication of economical damages.

In the field of the Common Law and Civil Law system several potential scenarios for agricultural GMO damage claims exist.

Firstly, it is imaginable that damage arises from the application of an unapproved GM crop which is mixed with commercial agricultural crops.[117]

In a second scenario, it could be possible that damages arise from an approved transgenic crop compounding with non-transgenic crops resulting in a loss of a premium for a person or company who intended to sell a non-transgenic commodity or food product.[118]

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[114] Ibid at 12.
[115] Ibid.
[116] Supra chapter I and III.
[117] SJ Smith and DL Kershen 'Agricultural Biotechnology: Legal Liability Regimes from Comparative and International Perspectives' (2006) 6 *Global Jurist Advances* 1 at 6.
[118] Ibid.

In a third scenario, damages could arise from an approved transgenic crop mixing with organic crops resulting in a loss of the organic label for the specific organic crop or of organic certification for the organic farmer's farm.[119]

A fourth scenario depicts the possibility that damages could arise from the loss of market access in the case of a buyer deciding against buying a farmer's crop even though there is no evidence of transgenic material or the evidence of transgenic material is below legally-set thresholds.[120]

Furthermore, a fifth scenario demonstrates the possibility of damages arising from a decision by a farmer to forgo planting a particular crop because of concern about proximity to transgenic crops or market perception about transgenic crops.

Scenario-related case studies will be addressed in detail in chapter IV. After addressing the possible claims and interests, the law has to define if, and possibly how, such an infringement may be restored.[121] The basis in law is that damage rests where it falls, which means that, each person must bear the damage he suffers *(res perit domino)*.[122] This rule, deduced from fundamental justice thinking, expresses the idea that every legal person has to consider their own risk of life.[123] Nevertheless, damage does not always rest where it falls. An exception to the above rule is needed in some cases due to the fact that an injured person might not accept the status quo and as a result many injured people might not be able to live peacefully or according to the law together with the injurers in a common society.

In summary, the law determines the circumstances under which a person has to bear the damage which he caused.[124] That is why it is desirable to examine if such a special case in regard to agricultural GMOs does exist. In any case, the plaintiff needs a special reason in order to have a promising claim be exempt from the principle 'res perit

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[119] Ibid.
[120] Ibid.
[121] J Neethling and JM Potgiether et al. (note 108) at. 3.
[122] BS Kang *Haftungsprobleme in der Gentechnologie* (2001) 46.
[123] Ibid.
[124] J Neethling and JM Potgiether et al. (note 108) at 3.

domino'. The dissertation will have a closer look at these aspects with special focus on economical damages.

Economical damages are connected to farmers' demands for GM-free products. Yet, in this context it has to be borne in mind that problems can also arise without the interference of GMO crops. For that reason, it may be possible to address the issue of liability in cases of GMO crops within general liability regimes. However, due to possible irreversible gene transfer (chipping out), the results of which are currently widely unclear, GM agriculture products create unique legal problems including difficulties regarding premium classes and organic labelling requirements on specific markets. This consideration is strengthened by the point that numerous people express their concerns in relation to GM products, especially in Europe. Therefore, it might be necessary to address GMO liability claims in a more specialised system. The following chapter will take a closer look at these issues and raise the question whether or not a general liability regime which has been used to deal with conventional agricultural liability cases provides an appropriate framework to deal with GMO interferences.

In this chapter, however, it can be concluded that a legal liability application in several cases of agricultural GMO interferences does exist and further that a basic exception of the 'res perit domino' principle seems possible in general.

IV. Legal liability systems

The introduction to different legal liability systems in this section of the discussion will allow the possibility for the examination of different systems that deal with liability issues in the field of agricultural GMOs.

The first section will deal with the civil law in Canada and the United States of America. The US and Canada were chosen due to the fact that the legal system in these countries is based on common law.[125] An additional reason is that Canada and the

[125] Except in the Canadian province of Québec, where these issues may be dealt with under products liability provisions of the civil code: Art. 1468, 1469, and 1473 C.C.Q.

United States of America produce between seven and ten million tons of canola seed per year[126] which impacts the occurrence of liability applications hugely. Since GMO production is a recent scientific development, the question must be raised whether or not the 'older' tort law system is capable of dealing adequately with legal concerns arising from the GMOs' presence.

A. Legal Liability: Canada and the United States of America (USA)

In the Canadian and American legal systems, legal liability can be classified into three general types: civil liability, administrative liability and criminal liability. This dissertation will only deal with civil liability due to its high practical relevance in cases of agricultural GMO application.

1. Introduction

The legal system in North America is characterised as 'common law'.[127] Liability law consists of several causes of actions (torts). Tort law can be characterised as law created by judges as part of common law and in cases where the law is grounded on a legislature act, as statutory law. Legislature has the ability to reverse common law judgments, rejecting either particular rules or supplanting a whole area of the law.[128] In Canada and the USA, the fields of damages which are caused by transgenic crops are not addressed by any specific statutory liability regimes.[129] Therefore, a potential plaintiff is referred 'to several causes of action (torts) from which to choose for the legal pleadings that formally present the case (plaintiff v. defendant) to the court'.[130]

2. Origins of tort law

After this introduction into 'common law', the following part of the discussion will take a closer look at the origin of tort law. This historical background information will be

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[126] Herbicide-resistant GM canola is grown on about 80% of the acres. GM canola was first introduced in 1995. Available at http://www.canola-council.org/facts_gmo.aspx. [Accessed 20 September 2009].
[127] AB Morrison *Fundamentals of American Law* (1996) at 9.
[128] AB Morrison (note 127) at 240.
[129] SJ Smith and DL Kershen (note 117) at 6.
Heretofore there are only a few GMO liability bills in the US legislation. For example US Congressman Kucinich introduced three genetically engineered food bills in 2008 which dealt also with GMO liability provisions. Available at http://kucinich.house.gov/Issues/Issue/?IssueID=1459#Genetically [Accessed 20 September 2009].
[130] SJ Smith and DL Kershen (note 117) at 6.

helpful in regards to comparison with the German 'Civil Law System', which will be dealt with in chapter IV.

The origin of the Canadian tort law is grounded 'in the thousand-year evolution of the English common law of torts'.[131] In contrast, the system of continental Europe is derived from Roman law. England has never absorbed Roman law principles due to the work of the 'Inns of Court' and rather developed its law from national sources.[132] Due to the beginning of colonisation, these achievements in liability law of the English 'Inns of Court' formed the basis of the North American Law.[133]

3. Causes of Action

It is of fundamental relevance to consider in detail the causes of action (torts) of GMO cases. In Canada and the US, a plaintiff who is claiming civil liability harm caused by a GM crop 'has several torts from which to choose for the legal pleadings that formally present the case (plaintiff v. defendant) to the court'.[134] Generally, in Canada and the United States, the plaintiff has the opportunity to bring more than one tort in the same case, if the plaintiff has a reasonable basis to believe that they can provide facts that establish each tort set forth in the legal pleadings.[135] Therefore, the GMO-significant torts, namely negligence, nuisance, trespass and the rule of stricter liability will be introduced hereinafter.

a) Tort of negligence

This section seeks to examine how uncertainties related to biotechnology developments affect or could affect the evaluation of the impact of reasonable foreseeability under the tort of negligence.

Reasonable foreseeability is a principal requirement under the tort of negligence, which can be used for a claim for property damage and financial loss injuries due to

[131] C van Dam *European Tort Law (*2006) at 80.
[132] Ibid 81.
[133] AB Morrison (note 127) at 9.
[134] SJ Smyth and DL Kershen (note 117) at 3.
[135] Ibid.

biotechnology activities.[136] The tort of negligence is composed of a number of different elements.[137] Most of these elements have to be proved by the plaintiff.[138] These elements are the 'negligent act', 'causation' and 'damage'.[139] With regards to the negligent act, this element 'is determined by identifying the appropriate standard of care and applying it to the facts of the case'.[140] Moreover, reasonable foreseeability is an important aspect of the duty of care, breach of the standard of care, and a potentially legal causation.

(1) Duty of Care

A person owes a duty of care toward all those people whom one may contemplate as being reasonably foreseeable.[141] The plaintiff, as a particular individual, need not have been contemplated, but the general class of persons to which he belongs must be foreseeable.[142] However, under Canadian common law, a simple demonstration of reasonable foreseeability is not sufficient to establish a specific duty of care.[143] This is due to the fact that the plaintiff must demonstrate proximity between himself and the defendant.[144] This implies the obligation to prove that the defendant was in a close and direct relationship with the plaintiff. If a plaintiff is successful in proving proximity, a duty of care is 'prima facie' established. However, another requirement still has to be fulfilled in this case. It is further necessary to ask if remaining policy considerations exist which could justify the denial of liability claims. Residual policy considerations can include the effect of recognising the present duty of care on other legal obligations, the impact of the imposition of the duty of care on the legal system, as well as the effect of imposing liability on society in general.[145] It can be stated that Canadian common law courts are generally reluctant to extend duties of care to broad classes of potential

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[136] L Khoury and S Smyth (note 34) at 223.
[137] PH Osborne (note 33) at 24.
[138] Ibid.
[139] Ibid.
[140] Ibid.
[141] L Khoury and S Smyth (note 34) at 223.
[142] Donoghue v Stevenson [1932] AC 562, 1932.
[143] Edwards v Law Society of Upper Canada, [2001] 3 S.C.R. 562, 2001.
[144] L Khoury and S Smyth (note 34) at 223.
[145] Ibid.

and much less so to the public at large.[146] The already mentioned debates about how far GM pollen and seeds may travel from one field to another field therefore affects, to some extent, the identification of the reasonably foreseeable class likely to suffer injury as a result of the spread of GM crops.

(2) Breach of the Duty of Care

The requirement of reasonable foreseeability is also an essential consideration in the courts' analysis if the defendant has breached his duty of care toward the plaintiff.[147] In this context, it has to be asked if a reasonable person placed in the defendant's position would have foreseen that some harm could flow from his actions and taken precautions against it.[148] The examination is basically objective, but special knowledge available at the time of the events must be taken into account.[149]

Following this, available information within the research community, as well as common research efforts by the industry itself, could have a direct impact on the courts' analysis of the reasonable foreseeability of the damage. The level of knowledge available in the industry may give the courts some indication of what they can expect reasonable foresight to consist of at a specific point in time.[150]

It could be argued that governmental approval for GM varieties requires a precedent-based risk assessment. Therefore, it could be concluded that if a technology is considered to be safe, unknown risks could not be seen as unforeseeable.[151] In sharp contrast to this rule, however, the Canadian Supreme Court ruled in 1999 that compliance with legislation does not immunise defendants from liability and cannot be used to avoid their basic obligation of taking reasonable care.[152] Furthermore, in Canadian law, a breach of a specific statute or regulation does not constitute a

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[146] Ibid.
[147] Ibid 224.
[148] Bolton v Stone [1951] A.C. 850 (H.L.).
[149] Ter Neuzen v. Korn, [1995] 3 S.C.R. 674 (1995).
[150] L Khoury and S Smyth (note 34) at 224.
[151] Ibid.
[152] Ryan v Victoria (City), [1999] 1 S.C.R. 201.

negligence claim, per sé.[153] However, such a breach is admissible as evidence of negligence.[154] In the past, Canadian courts have proven agreeable to departing from statutory or regulatory standards when they believe them to be unreasonable.[155] This Court distancing itself from the regulatory compliance justification is of great interest due to the fact that Canadian regulatory agencies have been criticised in the past for being under industry's influence in deciding whether to grant the application of GMOs in the environment.[156] This criticism is based on the fact that the agencies 'rely heavily on data and information provided by the biotechnology companies'[157] while conducting their approval decision.

(3) Legal causation

Reasonable foreseeability is also the basic 'concept at the basis of the demonstration of whether there is a sufficient "legal" or "proximate" causal relationship between the plaintiff's injury and the defendant's negligence'.[158] The requirement of factual '*causation* is established by showing a link between the defendant's negligent act and the plaintiff's damage'.[159] In this case, it has to be decided if liability must be attributed totally or partially to the defendant (legal causation).[160] The condition of legal causation is fulfilled if the manner or the extent of the damage which has been suffered by the plaintiff was reasonably foreseeable.[161]

However, there is no scientific proof needed as to the link between the activity and its potential effects.[162] The courts stated that it is enough if the defendant can reasonably foresee the specific type of 'injury that can "possibly" flow from the activity

[153] L Khoury and S Smyth (note 34) at 224.
[154] Ibid.
[155] The Queen (Can.) v. Saskatchewan Wheat Pool, [1983] 1 S.C.R. 205.
[156] JM Glenn 'Footlose: Civil Responsibility of GMO Gene Wandering in Canada' 43 *Washburn Law Journal* 547 at 569.
[157] Ibid 570.
[158] L Khoury and S Smyth (note 34) at 224.
[159] PH Osborne (note 33) *at* 24.
[160] L Khoury and S Smyth (note 34) at 224.
[161] Hughes v Lord Advocate [1963] AC 837.
[162] L Khoury and S Smyth (note 34) at 224.

in question'.[163] As was previously mentioned, existing objective knowledge concerning risks plays an important role in assessing legal causation.[164] Generally, the more uncertainty there is as to the relationship between the release of a GMO and the potential injury suffered by the victim at the time the activity was undertaken, the less likely it is that the courts will find that the injury was foreseeable.[165] This means that uncertainty, as well as lack of reliable scientific data about the effect of genetic modifications on living organisms, could act as a legal shield for the manufacturer or patent holder from liability. It is, therefore, what uncertainty surrounds the "type of injuries" that can flow from genetic modifications of seeds and plants that needs to be examined.[166]

The level of uncertainty depends on the type of injury which is involved. As proven previously, a general damage risk does exist in the field of agricultural GMOs.[167]

Consequently, the level of uncertainty depends on the type of injury involved, whether injury to economic and property interests, to health, or to ecosystems.[168]

b) Tort of private nuisance

Private nuisance may be best described as an unlawful interference with a person's use or enjoyment of land or some right over, or in connection with it.[169] The tort of private nuisance is applicable to indirect physical or intangible interference with property and all direct interference which is not physical.[170] Furthermore, private nuisance is considered as a form of stricter liability, which means that it is not required that the defendant knew about the risk of his action.[171] Nevertheless, 'private nuisance is not

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[163] Ibid.
[164] Supra chapter II and IV.
[165] L Khoury and S Smyth (note 34) at 225.
[166] Ibid.
[167] Supra chapter II.
[168] L Khoury and S Smyth (note 34) at 225.
[169] WVH Rogers *Winfield and Jolowicz* on Tort (2002) 16ed para. 14.4.
[170] PH Osborne (note 33) at 329.
[171] Cambridge Water v Eastern Counties Leather [1994] 1 All ER 53

applicable unless the interference is unreasonable and the plaintiff has suffered some damage'.[172]

Private nuisance is an act which, without being trespass (not physical), interferes with a person's enjoyment of his land or premises or a right which he has over the land of another person.[173] Following this, 'the plaintiff must claim reasonable use and enjoyment reflective of the character of the locality where the plaintiff's land lies and reflective of what normal persons, as opposed to especially sensitive persons, may reasonably expect from neighbours'.[174] 'The primary function of nuisance is to draw an appropriate balance between the defendant's interest in using land as he pleases and the plaintiff's interest in the use and enjoyment of land'.[175]

c) Tort of trespass on land

A claim under the tort of trespass requires the direct physical interference upon the property of the plaintiff by the defendant or things (animals, equipment, substances, or particles) under the defendant's control.[176] The defendant's interference with the land has to be intentional or negligent.[177] The burden of proof is, however, on the defendant's side.[178] The plaintiff needs to prove only a direct interference with his land.[179] In this case, the defendant has to show a lack of intention or negligence to avoid a claim under the tort of trespass.[180] Furthermore, under this tort it is not necessary to prove that the defendant intended to do a wrongful act against the plaintiff possessor.[181] Moreover, the intention to intrude on, or interfere with land that is, in fact, in the possession of the plaintiff, is sufficient. In this case a mistake on the part of the defendant is no defence.[182] Trespass is actionable without proof of damage.[183] Following

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[172] PH Osborne (note 33) at 329.
[173] WVH Rogers (note 169) at para 14.1.
[174] SJ Smyth and DL Kershen (note 117) at 6.
[175] PH Osborne (note 33) at 329.
[176] Ibid.
[177] PH Osborne (note 33) at 329.
[178] Ibid.
[179] Ibid.
[180] Ibid.
[181] Ibid.
[182] PH Osborne (note 33) at 329.

this, every unauthorised intrusion onto the plaintiff's land, no matter how trivial, is actionable.[184] However, the interference must be 'physical'.[185] Furthermore, the tort of trespass may provide case wise a remedy.[186]

d) Strict liability

The distinguishing feature of strict liability torts is that there is no need to prove that the defendant is guilty of any wrongful (intentional or negligent) conduct.[187] Following this, it is sufficient to impose liability to prove that the defendant caused the plaintiff's loss in a manner prescribed. The torts of strict liability include the rule in Rylands v Fletcher.[188] This case dealt with an earthen water reservoir which failed and flooded the plaintiff's coal mine.[189] The reservoir had been built by contractors on land occupied by the defendant.[190] The contractors where negligent and built the reservoir over disused mine shafts connecting to the plaintiff's mining operation.[191] The contractors have not been sued due to the fact that they were not employees of the defendant.[192] Furthermore, the defendant was not liable for the negligence because he did not employ the contractors.[193] In this case, the plaintiff's claim, therefore, depended on the recognition of a strict liability for the break out of the water. The court drew on ancient strict liability for damage caused by dangerous animals, cattle trespass and some early nuisance cases and stated 'that the person who for his own purposes brings on his land … must keep it in his peril and if he does not do so he is prima facie answerable for all the damage which is the natural consequence of the escape'.[194]

The House of Lords dismissed the defendant's appeal, but in the course of his judgment, Lord Cairns introduced the concept of a non-natural use of land and

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[183] Ibid.
[184] Ibid.
[185] Ibid.
[186] Ibid at 255.
[187] Ibid.
[188] Rylands v Fletcher (1868) LR 3 HL 330.
[189] Ibid.
[190] Ibid.
[191] Ibid.
[192] Ibid.
[193] Ibid.
[194] Rylands v Fletcher (1866) LR 1 Ex 265 at 279-280.LR 1 Ex 265

concluded that no liability could be demanded for the natural run-off water from higher land to the lower land.[195] In the case of Rylands v Fletcher, the defendant had artificially collected water and a strict liability was appropriated for this non-natural use of land.[196] This special concept has played a central role within the evolution of this tort.

(1) Non-natural Use of Land

As previously outlined, the requirement of non-natural use of land is an essential element of strict liability in the case of Rylands v Fletcher.[197] This circumstance raises the question of what the definition of this term actually is. Today, non-natural use has a different meaning from that initially described by Lord Cairns. In his new definition, non-natural use is described as artificial, foreign, or not arising in the course of nature.[198] The pivotal case in this context was Rickhard v Lothian[199] which dealt with the escape of water from a domestic plumbing system. In this case, the court defined a non-natural use of land as a 'special use [of land] bringing with it increased danger to others, and must not merely be the ordinary use of the land or such a use as is proper for the general benefit of the community'.[200] Following this definition, the defendant's plumbing system cannot be regarded as a non-natural use of land. The seeds of future confusion and uncertainty about the specific meaning of non-natural use were sown by this landmark case due to the fact that there was no consistency in the mentioned terms in this judgment.[201]

However, the cases indicate two general categories of non-natural use. The first category includes uses of land which are commonly regarded by the public as dangerous in themselves.[202] This includes the storage of water in bulk; the manufacture and use of explosives; fumigation with poisonous gas; the bulk storage of transportation of natural

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[195] Ibid.
[196] Ibid.
[197] Supra chapter IV.
[198] PH Osborne (note 33) at 299.
[199] Rickhards v Lothian [1913] A.C. 263 (P.C.).
[200] Ibid at 280.
[201] Ibid.
[202] Ibid at 300

gas, propane, dangerous chemicals, or gasoline; the storage or use of nuclear materials and the storage or use of dangerous biological agents.[203] In general, these land uses are, in almost all circumstances, highly dangerous and they, consequently, demand the application of strict liability.[204]

The second category covers uses of land which do not carry the same degree of danger. The cases in this category are more balanced and consideration is given to all the relevant factors set out in Rickhards v Lothian, including the degree of danger of the land use, the utility and normality of the land use, and the specific circumstances of time and place.[205] It seems as difficult to predict what causes a non-natural use of land. In Mihalchuk v Ratke[206] the defendant farmer sprayed herbicide on his land from an aircraft. Over time, some of the herbicide drifted onto the plaintiff's property and damaged the plaintiff's crops.[207] In this case, the court concluded that spraying in this manner was a non-natural use of the defendant's land and, therefore, liability was imposed.[208] Furthermore, the judgment stated that the use of an airplane and the mixture of oil and herbicide increased the danger of herbicide drifting onto the plaintiff's crops.[209]

In the case Gertsen v Metropolitan Toronto (Municipality of) the defendant municipality disposed of garbage in a landfill adjacent to a residential area. As the organic material decomposed, it produced methane gas which drifted, over time, onto the plaintiff's land and accumulated in his garage. The gas ignited when he was starting his car and he was injured. The court ruled that this proceeding was a non-natural use of land. Furthermore, the court placed special emphasis upon the time, place and circumstances of the land use. The dumpsite was located in a small gorge nearby a residential neighbourhood and there was also no compelling public need for such an

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[203] Ibid.
[204] Ibid.
[205] Ibid.
[206] Mihalchuck v Ratke (1966), 57 D.L.R. (2d) (Sask.Q.B.).
[207] Ibid.
[208] Ibid.
[209] Ibid.

application in this area.[210] This type of decision is typical in this category of non-natural use due to the fact that they are highly fact-specific and involve a juggling of the various Rickhards factors in no fixed pattern.[211] Therefore, it can be concluded that these cases have only a little precedential value.[212]

(2) The Escape of Something Likely to Cause Mischief

Another essential element of the rule in Rylands v Fletcher is the escape of something likely to cause mischief from land controlled by the defendant. There are two components of this element: mischievous things and escape.[213]

The term 'mischief' is, nowadays, quite useless due to the fact that the concept of non-natural use carries the implication of special danger.[214] However, the element 'escape from land' remains as an essential element of liability.[215] Canadian courts had it in mind in the past to reduce the effect of the escape component to have the opportunity to address all the losses which are generated by ultrahazardous activities.[216] Nevertheless, due to the need to establish some sort of a limitation, the escape component remains as essential and confining in the field of liability law.[217]

4. Causes of action in an agricultural GMO context

a) Overview

Using these four common law causes of action (negligence, nuisance, trespass and the rules of stricter liability) several potential scenarios for damage claims exist. The first possibility is that a claim could be brought to court for damages arising from an unapproved transgenic crop mixing with commercial agricultural crops.[218]

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[210] PH Osborne (note 33) at 301.
[211] Ibid.
[212] Ibid.
[213] Ibid at 302.
[214] Ibid.
[215] Ibid.
[216] Ibid at 303.
[217] Ibid.
[218] SJ Smyth and DL Kershen (note 117) at 6.

The United States covered the above scenario with the 'StarLink™' litigation, which dealt with legal liability claims arising from an unapproved transgenic crop commingling with commercial agricultural crops.[219] StarLink™ was a GM corn approved only for animal feed as well as ethanol production, but not permitted for human food supply. When 'StarLink™' corn mixed with corn for human food demands, farmers filed lawsuits against the developer Aventis Cropscience USA.[220] The various lawsuits were finally consolidated into a single, class action lawsuit in the United States Federal Court for the Northern District of Illinois.[221] In the ensuing legal proceedings, the trial judge ruled that plaintiffs who could prove that their crop or stored grain had been physically contaminated by unapproved StarLink™ – making their crops and cereals unmarketable as food corn due to the adulteration by an unapproved substance – had a viable legal claim through negligence, private nuisance, and public nuisance.[222] After these rulings, the parties to the litigation reached a settlement of the legal claims.[223]

Moreover, it is quite likely that, due to the similarities between the successful causes of action in the StarLink™ litigation and Canadian Common Law causes of action, Canadian courts would reach a similar result.[224] Due to practical reasons, the StarLink™ case will be introduced and discussed more precisely at a later stage of this thesis.

In a second scenario, a claim could be brought to court for damages arising from an approved transgenic crop mixing with non-transgenic crops resulting in a loss of premium for a person or company who intended to sell a non-transgenic commodity or food product.

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[219] StarLink Corn Products Liab. Litig., 211 F. Sup.2d 1060, 1062 (N.D. Ill. 2002).
[220] Ibid.
[221] Ibid.
[222] Ibid.
[223] SJ Smyth and DL Kershen (note 117) at 6.
[224] Ibid.

However, this second scenario related to labelling does not apply to North America since 'requirements do not exist in the domestic markets of Canada and the United States because there are no laws requiring transgenic ingredients or foods to bear a "genetically modified" label'.[225] Irrespective of labelling, the injured party should be able to scientifically demonstrate that there is a certain content of modified element in the output production of the crop, which will then stand in court regardless of the labelling issue.

Additionally, claims could be possible for damages arising from an approved transgenic crop which is mixed with organic crops resulting in a loss of the organic label for the specific organic crop or an organic certification for the organic farmer's farm products.[226] In Canada, Saskatchewan organic farmers filed a class action lawsuit against transgenic seed developers, which is related to several other scenarios.[227] This case will also be discussed in more detail at a later stage of thesis.[228]

In the fourth scenario, it is likely that the injured party makes claims for damages arising from the loss of market access. This situation could occur out of market perceptions 'when a buyer decides against buying a farmer's crop even though there is no evidence of transgenic material or the evidence of transgenic material was below legally-set thresholds'.[229]

Finally, a cause of action could be brought to court as a claim 'for damages arising from a decision by a farmer to forgo planting a particular crop because of concern about proximity to transgenic crops or market perception about transgenic crops'.[230]

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[225] Ibid at 7f.
[226] Ibid at 9.
[227] Hoffman and Beaudoin v Monsanto and Bayer 2005 SKQB 225 at 1.
[228] This only affects a certain privileged segment of the market, as another issue is the imprecise nature of the exact definition of what constitutes an 'organically-produced' product when consulting different producers and experts on the matter.
[229] SJ Smyth and DL Kershen (note 117) at 10.
[230] Ibid.

Scenario four and five are grouped together due to the fact that they share the following attributes: 'lack of physical damage to the plaintiff's property; the claims relate to disappointed commercial expectations; and the plaintiff and defendant are relational strangers who, therefore, have not allocated risks between themselves in a contractual relationship'.[231] Furthermore, these scenarios apply to what is known in Canadian and American law as the 'pure economic loss' doctrine.[232] The expansion of negligence law, prompted by Donoghue v Stevenson,[233] has provided a broad protection of personal security and property interests. It was not until the case of Hedley Byrne & Co. Ltd. v. Heller & Partners Ltd.,[234] however, that the courts began to extend the tort of negligence to provide a remedy for pure economic loss.[235] The word 'pure' is used in this context to exclude those situations where the economic loss is resultant upon damage to the person or property.[236] This economic loss covers loss due to insecurity about the market's demand for such crops, and the apprehension producers may have for wanting clear assurance of commercial viability of a crop before advancing into that venture.

There are three reported cases in Canadian and American jurisprudence which represent these two scenarios. The first one involves the already mentioned organic certification scenario of group three.

b) Hoffman and Beaudoin v Monsanto Canada Inc and Bayer CropScience

The case of Hoffman and Beaudoin v Monsanto Canada Inc and Bayer CropScience involves a group of Saskatchewan organic farmers bringing this action on behalf of all organic grain farmers in Saskatchewan in order to pursue class action litigation against both Monsanto Canada Inc. (Monsanto) and Bayer CropScience Inc (Bayer) which are 'both manufacturers and distributors of agricultural products including chemical fertilisers and pesticides'.[237] The case concerns the plaintiff's application for certification as a class, and so the decision addresses this issue 'rather than the potential

[231] Ibid.
[232] Ibid.
[233] Donoghue v Stevenson [1932] AC 562.
[234] Byrne & Co. Ltd. v. Heller & Partners Ltd. [1963] A.C. 465 (H.L.) [Hedley Byrne].
[235] PH Osborne (note 33) at 156.
[236] Ibid.
[237] Hoffman and Beaudoin v Monsanto and Bayer (note 229) at 1.

liability claims resulting from the development and commercial introduction into Canada of genetically modified ("GM") canola by the two defendants'.[238]

In the late 1980s and early 1990s Monsanto and AgrEvo Canada, as the predecessors to Bayer, developed different varieties of canola known as 'Roundup Ready Canola' and 'Liberty Link Canola'.[239] In the ensuing time, both companies got the approval from the Agriculture and Agri-Food Canada (AAFC) for the release of the GM canola varieties into the environment.[240] Due to their advantage '*in permitting superior weed control (growing crops can be sprayed with Roundup or Liberty without damage to the crop), GM canola has now been embraced by conventional grain growers in Western Canada with the result that by 2003 approximately 70 per cent of all canola grown in Western Canada was either a Roundup Ready or Liberty Link variety*'.[241]

Hoffman and Beaudoin have brought forward three major complaints against the companies. Firstly, the farmers argued that the release of GM canola has resulted in the impossibility 'for farmers to guarantee that canola grown as 'organic' and does not contain traces of GM canola seed'.[242] Following this, it shall no longer be possible to grow canola for the organic market under complying with the prohibitions on GMOs in the organic market.[243] On 30 June 2009, the Organic Products Regulations (OPR) came into effect, making the new Canadian Organic Standards (COS) mandatory.[244] The OPR will legally require organic products to be certified according to the COS if they are traded across provincial or international borders or use the Canada Organic Logo.[245] Secondly, it was argued that even farmers who are not attempting to grow canola suffer 'contamination of their fields by reason of the prevalence of Roundup Ready canola or

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[238] Ibid.
[239] Ibid at 8.
[240] Ibid at 9.
[241] Ibid at 10.
[242] Ibid at 19.
[243] Ibid.
[244] Canadian Organic Growers 'Canadian Organic Standards and Regulations' (2010) Available at http://www.cog.ca/about_organics/organic-standards-and-regulations [Accessed 30 January 2010].
[245] Hoffman and Beaudoin v Monsanto and Bayer (note 229) at 19.

Liberty Link canola "volunteers" growing on their land.[246] Another claim was brought forward with regards to the past and future cleanup costs resulting from this contamination.[247]

The final complaint focused on the creation and abandonment of an identity preservation programme (IPP) by the defendants.[248] The plaintiffs alleged that the abandonment of the programme, which had been implemented by the defendants when GM canola was first introduced on a commercial basis in 1995-96 to ensure the segregation of GM canola from conventional canola for the purposes of export, has resulted in the loss of the European market for all Canadian canola.[249]

The three arguments against Monsanto and Bayer were broken down into four torts during the case: negligence, nuisance, trespass and the rule in Rylands v Fletcher.

(1) Torts

(a) Negligence

With regards to the tort of negligence, the farmers alleged that two different duties of care have been breached by Monsanto and Bayer.

Firstly, it was argued 'that the defendant owed a duty to certified organic grain farmers to ensure that their GM canola would not infiltrate and contaminate farmland where it was not intended to be grown'[250] 'or at least the defendant ought to have warned growers purchasing their products of cross-pollination, and advised them of farming practices designed to limit the spread of the gene'.[251] The plaintiff stated, furthermore, 'that the defendant knew, or ought to have known, that the introduction of GM canola into the Saskatchewan environment'[252] would result in GM canola

[246] Ibid at 20.
[247] Ibid.
[248] Ibid at 21.
[249] Ibid.
[250] Hoffman and Beaudoin 'Amended statement of claim' (2002) 34. Available at http://www.saskorganic.com/oapf/pdf/amended-claim.pdf [Accessed 4 November 2009].
[251] Hoffman and Beaudoin v Monsanto and Bayer (note 229) at 35.
[252] Ibid at 34.

infiltrating and contaminating the environment, seed supplies and finally the property of certified organic grain growers.[253]

Secondly, the plaintiff stated that due to the fact that '*the export of GM canola was not regulated in Canada, the defendant undertook to develop their own export rules needed to assure continued access to foreign markets for Canadian canola in regard to the introduction of GM canola'*.[254] The plaintiff stated further that Monsanto and Bayer 'dropped their identity preserving programme (IPP), which was designed to ensure that no GM canola entered the Canadian export market',[255] when the approval for the Japan market was given.[256] With regards to this, the plaintiff argued 'that the defendant knew that the removal of the IPP would result in the eventual loss of the European market for Canadian canola'.[257] As a consequence, it is stated '*that the defendant, when undertaking the task of developing export rules to ensure continued access to foreign markets, owed a duty not to do so negligently and, in particular owed the plaintiff a duty to maintain an adequate IPP to preserve the European canola export market, where most of the Canadian organic produced canola was sold'*.[258] Therefore, the defendant shall be liable for the losses as particularised as particularized above.[259]

In summary, the damage which arises from the breach of these alleged duties derives from disadvantages caused by: (1) loss of canola as a crop to be used within regular rotation; (2) loss of opportunity to participate in the certified organic canola market; (3) past and future cleanup costs caused by Roundup Ready or Liberty Link canola volunteers growing on the fields of organic farmers.

The two already mentioned duties were addressed by the judge separately. In this context, it has firstly been mentioned that the duty to ensure that GM canola would not infiltrate farmland was novel. With regards to this circumstance, the judge turned to

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[253] Ibid.
[254] Ibid at 36a.
[255] Ibid.
[256] Ibid.
[257] Ibid.
[258] Ibid.
[259] Ibid.

the test of Anns v Merton London Borough Council[260] to examine if this new duty of care should be recognised in the case.

The judge stated insofar that 'The Anns test is … said to be a two-pronged test. Firstly, one has to determine whether a prima facie duty of care arises; and secondly, whether there are any policy considerations that ought to reduce or limit the scope of the duty'.[261]

The first part of the 'Anns test is whether the pleadings allege reasonably foreseeable harm and relational proximity sufficient to establish a prima facie duty of care'.[262] The judgment asserted that the farmers' allegations where sufficient to conclude 'that the adventitious presence of GM canola in fields and crops where it was not intended to be grown, including those of organic farmers, was foreseeable.'[263] However, the court was less certain with regards to the fact that the farmers' claim supported the presumption that the loss and damage being claimed '(viz., loss of the use of canola as a marketable organic commodity and loss of canola for use in crop rotation, plus the clean-up costs and loss of use of fields as a result of GM canola volunteers) was foreseeable'.[264] Concerning this matter, the judge pointed out that the organic standards in place at the time did not, for the most part, prohibit the use of GMOs in organic agriculture.[265] Nonetheless, she assumed that the pleadings were sufficient to support this allegation, or that they could be easily amended to support the allegation.[266] Following this, the judge stated, while mentioning the case Cooper v. Hobart,[267] that 'foreseeability of loss is not sufficient to establish a prima facie duty of care'.[268] Additionally, the judgment clarified that the plaintiff failed to allege whether there was

[260] Anns v Merton London Borough Council [1978] A.C. 728 (H.L.).
[261] Hoffman and Beaudoin v Monsanto and Bayer (note 229) at 54.
[262] Ibid at 60.
[263] Ibid at 63.
[264] Ibid at 64.
[265] Ibid at 64f.
[266] Ibid at 66.
[267] Cooper v. Hobart 2001 SCC 79, [2001] 3 S.C.R. 537.
[268] Hoffman and Beaudoin v Monsanto and Bayer (note 229) at 67.

any relationship between themselves and the defendants.[269] Following this argument, the plaintiff's pleadings did not support the required relational proximity needed to establish a prima facie duty of care. [270]

In addition, the judge noticed that 'there were policy considerations that, in accordance with the second leg of the test, would in her view, bar or limit the imposition of the duty of care'.[271] The first policy consideration was the issue of government approval of the tentative release of the defendant's varieties of GM canola. Therefore, the court's imposition of a duty of care not to release these substances into the environment appears 'to be in conflict with express governmental policy'.[272] Moreover, the judge described that 'the bulk of the plaintiffs' claim for loss of use of organic canola as a marketable crop, is a claim for pure economic loss of a category not previously recognised by Canadian courts'.[273] It was concluded that, in effect, 'the alleged damage is not of physical harm to the plaintiffs' crops, but arises from the alleged inability to meet the requirements of organic certifiers or of foreign markets for organic canola'[274] and 'there is no allegation that GM canola is unhealthy or causes detrimental physical problems to humans or plant life'.[275] On the basis of these facts, the judge held that there was no duty of care.[276] Moreover, it was pointed out in this ruling that common law is generally 'reluctant to find a duty of care to avoid causing foreseeable pure economic loss, largely for policy reasons. By definition, such losses are not the direct result of the defendants' action'.[277]

Following this, *'it has been argued that imposition of liability for causing pure economic loss risks exposing the defendant to indeterminate liability ("liability in an indeterminate amount for an indeterminate time to an indeterminate class") and, in a*

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[269] Ibid.
[270] Ibid at 70.
[271] Ibid at 71.
[272] Ibid.
[273] Ibid at 72.
[274] Ibid.
[275] Ibid
[276] Ibid.
[277] Ibid at 73.

competitive commercial environment, may be "inconsistent with community standards in relation to what is ordinarily legitimate in the pursuit of personal advantage"'.[278] According to the court's opinion, exceptions have been made *'where the courts have found a special relationship, or proximity, such as the cases of negligent misstatement, where it can be shown that the defendant claimed special skill or knowledge and the plaintiff, to the defendant's knowledge, relied on the statement or professional negligence'.*[279]

As already mentioned, the plaintiffs amended their statement of claim to include an alleged breach of an alleged duty of care not to negligently undertake the development of an identity preserving programme. According to this amendment, the judge concluded that in order of such a duty the plaintiff had to rely in any way on the implementation of the IPP.[280] However, following the judgment, the plaintiff failed to plead detrimental reliance.[281] Accordingly, the claim does not give reasons to disclose a reasonable cause of action in negligence.[282]

(b) Private nuisance

With regards to private nuisance, the court distinguished 'between activities or conditions that cause physical injury or damage to another's land from activities and injuries that interfere with use or enjoyment of land, without actual physical damage'.[283] Furthermore, the court quoted an *'authority for the proposition that no action can be brought by a plaintiff who is unduly reactive to the defendant's conduct because he is carrying on a business or operation that is particularly sensitive to the kind of intervention that is in question'.*[284] Unfortunately, the judge failed to name the authority she was referring to. However, the same issue of sensitivity of organic farming to GM

[278] Ibid.
[279] Ibid at 73.
[280] Ibid at 88.
[281] Ibid
[282] Ibid
[283] Ibid at 100.
[284] Ibid at 104

crop production was raised as a potential barrier to a claim in nuisance in the English case of R. v Secretary of State for the Environment ex parte Watson.[285]

The defendants provided several counter arguments against the alleged cause of action in nuisance. In the opinion of the defendants, it is questionable *'(1) whether the harm claimed by the defendants (transfer of genetic material by pollen drift to the plaintiffs' organic canola crops and the unwanted presence of volunteer canola plants on the plaintiffs' organic fields) falls within the scope of the tort of nuisance, and (2) if so, whether the defendants are liable in nuisance for the harm alleged.'*[286]

With regards to the first point, the defendants claimed that the alleged damage was not caused by GM canola 'but by the actions of third parties who have promulgated the standards affected by the inevitable adventitious presence of GM canola and by the decisions of individual organic farmers to seek to adhere to those standards'.[287] Inherent in this argument is the claim that the adventitious presence of GM canola is not naturally harmful to crops or to land.[288] In response to this, the defendants described cases which have imposed liability, for example, for the spread of weeds or for the drift of herbicides, both of which have harmed or endangered the physical wellbeing of growing crops.[289] The second and related argument was that the injury or interference alleged is not sufficiently "unreasonable" or "substantial" to sustain a claim in nuisance.[290]

The defendants pointed out that agricultural activity in the Saskatchewan region generally involved the production of open-pollinating crops. They also drew attention to the fact that the release of GM canola was subject to federal approval and that the growing of GM canola is, according to the pleadings, widespread.[291] Therefore, the release of GM canola should be a 'usual and ordinary' activity and pollen flow is a

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[285] R. v Secretary of State for the Environment ex parte Watson [1999] *Env LR* 310.
[286] Hoffman and Beaudoin v Monsanto and Bayer (note 229) at 105.
[287] Ibid at 106.
[288] Ibid.
[289] Ibid.
[290] Ibid at 107.
[291] Ibid.

natural phenomenon'.[292] Furthermore, the activities of organic farmers are said to raise the issue of hypersensitivity, which is a consequence of their voluntary decision to grow organics.[293]

With regards to this argumentation, the judge pointed out that 'the plaintiffs' allegation is in effect that the crops and land of organic farmers is effectively contaminated by the presence of GM canola'.[294] In the judge's opinion, 'the analogy to contamination of land by weeds is too close to make it certain that the plaintiffs' argument on this point cannot succeed'.[295]

Furthermore, referring to the judgment, it can be argued 'that just as weeds make it difficult or impossible to grow a conventional crop successfully, so too does contamination by GM canola make it impossible to grow organic crops'.[296] The significance of the distinctions argued by the defendants is one which must be assessed by the trial judge on the whole of the evidence.[297]

Moreover, Monsanto and Bayer argued that 'they cannot be liable unless the alleged nuisance emanated from land they occupied or controlled'.[298] The judge disagreed and pointed out that 'anyone who actively creates a nuisance whether or not in occupation of the land from which it emanates can be liable and this liability continues so long as the offensive condition remains regardless of his ability to abate it and stop the harm'.[299] Additionally, the court went on and characterised 'the defendant's true objection as being that no harm can be said to have been caused by the mere sale or marketing of GM canola'.[300]

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[292] Ibid.
[293] Ibid.
[294] Ibid at 108.
[295] Ibid at 108.
[296] Ibid at 108
[297] Ibid.
[298] Ibid at 112.
[299] Ibid at 113.
[300] Ibid at 114.

Moreover, the adventitious presence of non-organic canola in the crops and on the land of organic farmers should have required the intervention of neighbouring farmers who cultivated GM canola.[301] The judge concluded that holding *'the defendants liable in nuisance on the basis of the commercial marketing of the product would be equivalent to holding the manufacturers of pesticide responsible for the nuisance caused by the harmful drift of the pesticide. While the "release" of the GM varieties of canola by the defendants may have been a necessary condition for the occurrence of the harm alleged, it was far from sufficient, in itself'.*[302]

Consequently, the judge pointed out that 'the implications of holding a manufacturer, or even inventor, liable in nuisance for damage caused by the use of its product or invention by another would be very sweeping'.[303] It was judged that '*where the activity complained of is the activity of one who is not in occupation or control of adjoining land, and no independent malfeasance is alleged, then, at the very least, direct causation of the damage alleged must be alleged.'*[304] The court went on and stated that 'there are no facts alleged in this case that could support a finding that the defendants substantially caused the nuisance alleged'.[305]

(c) Trespass

The dispute centred on whether direct interference by the defendants was required for the action of trespass. Concerning this matter, the plaintiff argued that directness should not be required where, as was alleged here, the spread of the genes to where they were not wanted was foreseeable.[306] It is also argued that the GM gene in Roundup Ready and Liberty Link is the property of the defendants. Therefore, it has been argued, the presence of the GM gene on land where it is not wanted is analogous to the "stray bull cases"[307], which hold an owner strictly liable for damage caused by a bull which strays

[301] Ibid.
[302] Ibid at 114.
[303] Ibid at 122.
[304] Ibid.
[305] Ibid.
[306] Ibid at 129.
[307] See for example Acker v Kerr (1973), 2 O.R. (2d) (Co. Ct.).

onto a neighbour's land.[308] The justice disagreed in this matter and concluded that *'the authority of a number of English and Canadian cases that require more direct interference, such as where Lord Denning denied that oil jettisoned by the defendant from a ship, carried by waves to the plaintiff's shore, constituted trespass'.*[309] *'The interferences in these cases were set in motion by the defendants, assisted only by natural and inevitable forces, and ought to have been treated as sufficiently direct to constitute a trespass. If the results were unexpected, or could not reasonably have been foreseen, this would defeat the claim, not, however, because the injury was not direct, but because it was neither intentional nor negligent*'.[310]

Consequently, there is more needed than natural and inevitable forces between the marketing of GM canola and its spread to plaintiffs' land.[311] Furthermore, it was judged that the 'stray bull' cases are not trespass cases:[312]

In the judge's opinion, the imposition of strict liability for the consequences of stray bulls should clearly be a policy decision intended to place a heavy onus on the owners and possessors of bulls to keep these animals confined and under control.[313] Although the plaintiff argued *'that the defendants "own" their GM canola gene - a claim that the defendants say is a misunderstanding of the nature of their interest under patent law - it can point to no similar public policy that would have, in effect, placed an onus on the defendants not to have commercially released GM canola. For the plaintiffs' claim is that once GM canola was commercially released, cross-pollination of conventional canola crops was natural and inevitable*'.[314]

In the judge's conclusion, it was ruled that action in trespass for the adventitious presence of GM canola in the crops and on the lands of organic grain farmers did not lie against the defendants, as the inventors and marketers of GM canola, because even the

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[308] PH Osborne (note 33).
[309] Southport Corporation v. Esso Petroleum Co., [1954] 2 Q.B. 182, 2 All E.R. 561 (C.A.).
[310] Ibid at 131.
[311] Ibid.
[312] Ibid at 132.
[313] Ibid.
[314] Ibid.

liberalised requirement for direct interference could not be met in the circumstances of the case.[315] Therefore, the tort of trespass could not be upheld.[316]

(d) The Rule in Rylands v Fletcher

The court did not decide on whether or not GM canola was a dangerous substance or whether field trials of GM canola were an unnatural use of land.[317] To a certain extent the judge pointed out that '*it is not reasonably arguable that the commercial release and sale of Roundup Ready canola seed and Liberty Link canola seed constituted an "escape" of a substance, dangerous or otherwise, from property owned or controlled by the defendants in the sense of "escape" required by the rule in Rylands v. Fletcher.*'[318] She concluded the plaintiff's pleading does not constitute a cause of action under the rule of Rylands v Fletcher.

(2) Summary

The judgment stated that it was clear, as well as obvious, that the plaintiffs' pleadings failed to disclose reasonable causes of action under the common law rules on negligence, strict liability under the rule of Rylands v. Fletcher, and trespass. Furthermore, it was judged that the pleading in nuisance was insufficient except for the possibility of linking it to statutory causes of action. Therefore, it can be concluded that it is unlikely for a farmer to have promising liability claims considering the Hoffman and Beaudoin v Monsanto Canada Inc and Bayer CropScience judgment.

c) Sample v. Monsanto Co.[319]

In the case Sample v Monsanto Co the plaintiffs Frederick Sample and George Naylor brought a putative class action against the defendant Monsanto Co. (Monsanto), a developer and distributer of genetically modified corn and soybean seeds.[320] The plaintiffs argued that farmers, such as themselves, who did not grow genetically modified crops, would lose revenue due to the fact that the European Community (EC)

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[315] Ibid at 133.
[316] Ibid.
[317] Ibid at 94f.
[318] Ibid at 97.
[319] Sample v. Monsanto Co., 283 F. Supp. 2d 1088, 1090 (E.D. Mo. 2003).
[320] Ibid at 1091.

rejects Monsanto's genetically modified products and, as a result, boycotts all American corn and soybean.[321] Following this statement, the plaintiffs brought up claims for negligence as well as public nuisance against Monsanto with regards to the introduction of non-genetically modified seeds into the market. Yet, the plaintiff had not suffered any injury to his person or his property due to the presence of genetically modified corn and soybeans on the market.[322]

Monsanto moved for summary judgment, while arguing that the economic loss doctrine would block negligence and public nuisance claims which are not based on physical injury to persons or property.[323]

Meanwhile, the plaintiffs argued that the economic loss doctrine was inapplicable as a result of the fact that some jurisdictions permit recovery solely of special damages, such as loss of income in public nuisance actions.[324] The judges rejected this argument with the statement that neither Illinois nor Iowa would allow such cause of actions.[325]

Furthermore, the plaintiffs stated that the economic loss doctrine 'should not bar their negligence claims because there is no contractual or warranty relationship between Monsanto and the non-GM farmers'.[326] In particular, the plaintiffs argued that because the parties missed the opportunity to determine the risk of loss through contractual means, the economic loss doctrine should be inapplicable.[327] The judges also rejected this argument due to the reason that even if the economic loss doctrine is rooted in freedom of contract theory, the doctrine has 'grown beyond its original freedom-of-contract based policy justifications'.[328] In the court's opinion, 'farmers'

[321] Ibid.
[322] Ibid at 1091f.
[323] Ibid at 1092.
[324] Ibid.
[325] Ibid.
[326] Ibid at 1093.
[327] Ibid.
[328] Ibid.

expectations of what they will receive for their crops are just that, expectations'.[329] While any physical injury is absent, the plaintiffs cannot recover for drops in market prices.[330] Finally, the court concluded that 'because the economic loss doctrine applies to all tort claims…the plaintiffs' claims fail as a matter of law'.[331]

d) In re StarLink Corn Products Liability Litigation[332]

This case deals with the StarLink Corn Products Liability Litigation. The defendant, Aventis CropScience USA Holdings, Inc. (Aventis), genetically engineered a corn seed to produce the protein Cry9C which is toxic to certain insects, and marketed the seed under the name 'StarLink'.[333] When Aventis applied to register the seed with the Environmental Protection Agency (EPA), pursuant to the agency's responsibilities under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA),[334] the EPA issued only a limited use registration due to the fact that 'Cry9C had several attributes similar to known human allergens'.[335] Consequently, the EPA determined that StarLink corn was not appropriate for human consumption.[336] For this reason, the separation of StarLink corn from non-StarLink corn was an important process.[337] To guarantee separation, the EPA ordered *'segregation methods to prevent StarLink from commingling with other corn in cultivation, harvesting, handling, storage and transport, and a 660–foot "buffer zone" around StarLink corn crops to prevent cross-pollination with non-StarLink corn plants'*.[338]

StarLink corn was distributed throughout the United States from approximately May 1998 through to October 2000.[339] Finally, 'in October 2000, after numerous reports that human food products had tested positive for Cry9C, a wave of

[329] Ibid.
[330] Ibid.
[331] Ibid.
[332] In re StarLink Corn Products Liability Litigation, 212 F. Supp.2d 828, 838-43 (N.D. Ill. 2002).
[333] Ibid at 833f.
[334] The US Federal Insecticide, Fungicide, and Rodenticide Act of (P.L. 75-717) 7 U.S.C. § 136 47 as revised and amended in 1972, 1988 and 1996.
[335] In re StarLink Corn Products Liability Litigation (note 334) at 834.
[336] Ibid.
[337] Ibid.
[338] Ibid.
[339] Ibid.

manufacturers issued recalls for their corn products'.[340] Shortly after this, the plaintiffs filed a law suit alleging that the contamination occurred as a result of the defendants failing to comply with the EPA's requirements.[341]

The plaintiffs argued that *'Aventis did not include the EPA-mandated label on some StarLink packages; did not notify, instruct and remind StarLink farmers of the restrictions on StarLink use, proper segregation methods and buffer zone requirements; and did not require StarLink farmers to sign the obligatory contracts'.*[342] Moreover, it was alleged that prior to the 2000 growing season, Aventis '*instructed its seed representatives that it was unnecessary for them to advise StarLink farmers to segregate their StarLink crop or create buffer zones because Aventis believed the EPA would amend the registration to permit StarLink use for human consumption'.*[343] In summary, the plaintiffs brought claims for negligence, strict liability failure-to-warn, conversion, public nuisance, and private nuisance.[344] This case will now be considered with regards to the same issues as the previous cases.

(1) Nuisance

The FIFRA prohibits enforcement of state laws that require additional packaging and labelling requirements, but does not prohibit state laws containing identical requirements.[345] For instance, FIFRA allows states to create civil remedies for violations of the federal standard, but it does not allow states to add to or take away from the federal requirements.[346]

For this reason, the court held that FIFRA did not pre-empt the plaintiffs' negligence claims per sé, and the court allowed the plaintiffs to proceed on their theory that the defendant's 'violated duties imposed by the limited registration' and 'made representations to StarLink growers that contradicted the EPA-approved label'. They

[340] Ibid at 835.
[341] Ibid.
[342] Ibid.
[343] Ibid.
[344] Ibid at 829.
[345] Ibid at 836.
[346] Ibid.

also ‘failed to inform parties handling StarLink corn downstream of the EPA-approved warnings’.[347]

The Economic Loss Doctrine permits parties to recover from physical injuries or injuries to property. However, purely economic injuries are not compensated. Consequently, the defendants argued that the plaintiffs' damages were purely economic in nature and were, therefore, forbidden by the Economic Loss Doctrine.[348] Nevertheless, the Court held that to ‘the extent plaintiffs alleged that their crops were themselves contaminated, either by cross-pollination in the fields or by commingling later in the distribution chain, they had adequately stated a claim for harm to property.’[349]

In the following, the defendants challenged three separate elements of the plaintiffs' negligence claim: duty of care, proximate cause, and an occurring damage.[350] In particular, the defendants argued that any effect StarLink may have had on corn markets was too far removed from defendants' conduct.[351] Nonetheless, the Court pointed out that the defendants misunderstood summary judgment standards as well as procedure.[352] The Court went on and stated that when a motion for summary judgment is filed, the Court ‘must not only accept plaintiffs' version, but also any set of facts consistent with it’.[353] More precisely, the Court held that ‘Aventis had a duty to ensure that StarLink did not enter the human food supply, and their failure to do so caused plaintiffs' corn to be contaminated’.[354]

[347] Ibid at 838.
[348] Ibid at 842.
[349] Ibid at 842f.
[350] Ibid at 843.
[351] Ibid.
[352] Ibid.
[353] Ibid.
[354] Ibid.

(2) Trespass to chattels

The plaintiffs alleged 'that the defendants' role in contaminating the corn supply amounted to a conversion of their property.'[355] The Court rejected this statement due to the fact that the plaintiffs' corn was not destroyed and they were not deprived of possession.[356] In the Court's opinion, the plaintiffs' damages were only 'a lower price, for which plaintiffs could be compensated without forcing a sale.'[357] Additionally, the tort of trespass to conversion requires intention of the injuring party.[358] The plaintiffs failed to prove that the defendants intended to cross-pollinate or physically mix StarLink corn with corn which was intended for human consumption.[359] Out of this reason, the trespass of chattel claims was dismissed.[360]

(3) Private Nuisance

Finally, the Court addressed the nuisance claims.[361] With regards to this claim, it was alleged that the defendants 'created a private nuisance by distributing corn seeds with the Cry9C protein, knowing that they would cross-pollinate with neighbouring corn crops'.[362] As a direct response, it was argued by the defendants that they could not 'be liable for any nuisance caused by StarLink because they were no longer in control of the seeds once they were sold to farmers'.[363] The Court pointed out that 'residue from a product drifting across property lines presented a typical nuisance claim', and all 'parties who substantially contribute to the nuisance are liable'.[364] Moreover, it was stated that the defendants' limited registration of the StarLink corn put them in a position to control the nuisance.[365] Due to these reasons, the Court concluded that a valid claim for private nuisance was stated by the plaintiffs.[366]

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[355] Ibid at 844.
[356] Ibid.
[357] Ibid.
[358] Ibid.
[359] Ibid.
[360] Ibid.
[361] Ibid at 844f.
[362] Ibid at 844.
[363] Ibid at 845.
[364] Ibid at 847.
[365] Ibid.
[366] Ibid.

e) Analysis

This section will examine and discuss the arising liability concerns in the presented cases. With regards to the pure economic loss doctrine, it can be stated, taking into account the 'Hoffman case' in Canada and the 'Sample case' and the 'StarLink litigation' in the United States, that it seems to be unlikely that claims for damages arising from the loss of market access, as well as claims for damages arising from a decision by a farmer to forgo planting a particular crop because of concern about proximity to transgenic crops or market perception about transgenic crops, are legally viable using Common Law causes of action in Canadian and American courts.

Especially with regards to the Monsanto case, it can be stated that there is a broader issue underlying the action; one which has not been put directly in front of the court.

In Canada, higher life forms are not patentable per sé, but in the case Monsanto Canada Inc. v Schmeiser the Canadian Supreme Court ruled in such an expressive manner regarding patents on modified genes and the cells that contain them, that the effective result of the decision was to extend patent rights to higher life forms. Following this decision, all burdens were shifted to the farmer. It is farmers who must monitor their fields for volunteer GM canola plants or spread of the introduced field. If and when the patented genes appear, it is the farmer who must call the company to come and remove the offending plants. If farmers fail to monitor their fields or forget to call the company after noticing GM plants, they could face the threat of patent infringement.[367]

In light of this movement, the presented 'Hoffman case' can be seen as an attempt to also place burdens on the companies, which have developed and released the GM varieties. If a farmer were to be successful with a tortuous allegation, then the biotechnology companies could face liability costs for the consequences of their applicant technology. If companies cannot be held responsible, then the 'Hoffman

[367] Monsanto Canada Inc. v. Schmeiser [2004] 1 S.C.R. 902, 2004 SCC 34.

Case' will build on the precedent set by Schmeiser and add yet another burden onto the list of those that the farmer must bear –the burden of damage. Furthermore, where the courts to refuse a remedy for the unconsented genetic alteration of claimant's produce as a result of cross-pollination from nearby GM crops, this could render the scope of property rights of organic farmers. These farmers may choose to farm organically, but his right to do what he wants on his own land would be affected adversely.

B. Liability and compensation regimes: Germany

This chapter will introduce and examine the German liability law with regards to scenarios where harm has been caused by the application of agricultural GMOs.

1. German Law of Genetic engineering 'Gentechnikgesetz' (GenTG)

a) Introduction

As early as the 1970s, the German Department of Research and Technology provided guidelines in the field of new combined nucleic acid.[368] According to these guidelines, permission had to be obtained in accordance with the German Immission Protection Act [369](BImSchG) for the usage of GMOs in research and development.[370]

Besides the BimSchG, other acts like the Act of Chemicals,[371] the Plant Protection Act[372] and the Act of Drugs[373] focused on the same juristic issue. The splattering settlement in the field of GM related liability law was publicly criticised in the ensuing time.[374] Therefore, an extensive GM liability was demanded.[375] In 1993, for German law to conform to European Community laws,[376] Germany passed the

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[368] Richtlinie BAnz Nr. 109, 7606 of 20.06.1986.
[369] German Immission Protection Act (BimSchG) of 1974 as revised in 2002.
[370] Regelung Nr. 4.11 des Anhangs der 4. BImSchV zu § 4 I BimSchG in der Fassung der Aenderungsverordnung vom 19.05.1988, BGBl I, 608.
[371] German Act of Chemicals of 1980 (Chemikaliengesetz) BGBl. I S. 1718.
[372] German Act of Plant Protection of 1986 (Pflanzenschutzgesetz) BGBl. I S. 1505.
[373] German Act of Drugs of 1976 (Arzneimittelgesetz) BGBl. I S. 2445, 2448.
[374] G Hirsch and A Schmidt-Didczuhn ‚Gentechnik-Gesetz Ein Schritt in gesetzgeberisches Neuland' (1989) 22, in *ZRP* 458.
[375] Ibid.
[376] Directive 90/220 EEC of 1990.

GenTG.[377] The German Law of Genetic Engineering came in force in 1990 and finally settled the problem of law splattering.[378] The GenTG was revised in 1993[379] in order to adapt recent developments in the field of GM engineering to current law.[380] Furthermore, the revised version provided the Transformation Act of the EC directive.[381] A revised version of the GenTG came into force in 2002 and contained measures with regards to the work in GM engineering facilities.[382] The main concern of the revised version of the GenTG in 2004 was to protect the conventional and organic farmers from chip out, incorporation of GMOs and, consequently, to advance the coexistence of both farming methods.[383] As a response to more recent European Union laws[384] relating to agricultural biotechnology, Germany amended its GenTG by adding new provisions regarding legal liability,[385] which are of special relevance for this dissertation. Shortly after the publication of the German government's draft of the main points of the concepts in the field of GM application,[386] the fourth revised GenTG law came into force in 2008, which is presently the applicable law.

b) Goals of the GenTG as amended and revised in 2008

The GenTG mainly contained changes in the research area with the alleviation of the admission procedure.[387] Following this alleviation, only an announcement is required for the work with GM material onto the lowest security level instead of an application procedure.[388] By examining the GenTG of 2008, it can be concluded that the act

[377] German Law of Genetically Engineering of 1990 Gentechnikgesetz (BGBl. I S. 2445, 2448). Major amaendments occurred in December 1993 (BGBl I 1993, 2066ff.), December 2004 (BGBl I 2005, 186 ff.) and March 2006 (BGBl I 2006, 534ff.).
[378] Ibid.
[379] German Revised GenTG of 1993, BGBl I, 2059ff.
[380] Ibid.
[381] Directive 90/219/EEC of 1990; Directive 90/220/EEC of 1990.
[382] German Revised GenTG of 2002, BGBl 2002 I, 3220.
[383] I Wildhaber (note 6) at 77.
[384] Directive 2001/18 EC of 2001.
[385] German Act reforming the GenTG of 2004, BGBl. I at 186.
[386] German Department of Food, Agriculture and Consumer Protection 'Press release: Fairer Ausgleich der Interessen' (2007) available at http://www.bmelv.de/cln_135/SharedDocs/Pressemitteilungen/2007/033-Gentechnik.html [Accessed 28 November 2009].
[387] German Revised GenTG of 2008, BGBl 2002 I, 499, BT-Drs. 16/6557; BT-Drs. 16/6814.
[388] I Wildhaber (note 6) at 78.

generally tries to protect the environment, animals, plants and property from the adverse impact of GM developments and products. This is in accordance with § 1 GenTG which contains provisions for the protection of ethical values and the health of human life. Furthermore, the GenTG tries to achieve precaution with regards to these dangers according to § 1 Number 1 GenTG and to provide that GM products can be introduced into the market according to § 1 Number 2 GenTG. Finally, the GenTG tries to stimulate the research and development of the GM engineering according to § 1 Number 3 GenTG.

c) General Scope of the GenTG

The scope of the GenTG covers GM engineering plants, GM research as well as the release and market introduction of GMOs. A GMO is defined according to § 3 Number 3 GenTG as an organism which is, due to its technical creation, unique in the environment. § 6 GenTG imposes general duty of care with regards to GMO handling. According to § 7 GenTG, GMO development and production in GM engineering plants are classified into four different safety zones. The governmental approval requirement of GM engineering plants is regulated by § 8 GenTG. For that reason, an approval for the release and introduction of GMOs is also required for the manufacturer in accordance with § 14 I 1 GenTG. Additionally, the administration has to provide specific information to the public in cases where potential risks arise due to the application of GMOs.[389]

As a contradiction to the European GMO law,[390] the GenTG also regulates civil liability issues in the field of GMOs which will be discussed and examined hereafter.

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[389] § 28a II GenTG.

[390] Directive 2004/35/CE Originally, it was proposed that the EU Liability Directive would cover private liability.
The drafters of the Environmental Liability White Paper felt it was essential to include private liability within the framework because often private and public damage will result. However due to political pressure private liability was later dropped in the final version of the EU Liability Directive; M Migus *GMO Statutory Liability Regimes: An International Review* (2004) 12.

d) 'Genetic causation' as an interface

A basic requirement for the applicability of the GenTG is the 'genetic causation' between the alleged damage and the presence of a GMO.[391] The decisive test in applying the GenTG is thereby the traditional 'conditio sine qua non' formula, which is not tempered by the exclusion of particularly unlikely events.[392] In a similar vein, research and development risks are not excluded from the ambit of § 32 GenTG.[393]

While claimants bringing a case on the basis of the GenTG will have to prove, usually with the help of experts' opinions and testing, the existence of damage and causation through GM crops, it will be presumed that such damage was specifically caused by its modified characteristics.[394] This limited presumption of causation is refutable if it can be proven that the damage in question was caused by the unmodified genes particular to that GMO.[395] The GenTG, therefore, provides only a limited degree of protection from the typical difficulties of proving causation in such cases.

Some assistance, however, is given by § 35 GenTG.[396] This provision requires the operator of a facility in which the GMOs are developed, tested, produced or otherwise handled to provide information concerning the technical process, including tests on open land, so that victims can better ascertain whether claims based on the GenTG actually exist.[397] In the case of a test on open land, detailed information should also be available from the authority which issued the required permit as such tests must be publicly registered.[398] This register must reveal the exact location and size of the fields.[399] Moreover, additional information has to be disclosed to anyone with a

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[391] I Wildhaber (note 6) at 91.
[392] BA Koch *Economic Loss Caused by Genetically Modified Organisms* (2008) at 215.
[393] Ibid.
[394] § 34 GenTG.
[395] § 34 II GenTG.
[396] BA Koch (note 392) at 216.
[397] Ibid.
[398] In accordance to Directive 2001/18 EC.
[399] § 16a II GenTG.

legitimate interest, such as potential injured parties who can show that their property was subject to interference by GMOs.[400]

As already indicated, there is no reversed burden of proof beyond the scope of § 34 GenTG. Different sources of adventitious presence of GMOs are taken into account within the normal rules of evidence. Thereby, 'prima facie' evidence will often help the injured party. If a particular GM crop is thus developed, tested, produced or otherwise handled in a certain area, and neighbourhood fields are subsequently contaminated with GMOs of this kind, it will be extremely difficult for the operator of the facility in question to assume the typical course of events and simultaneously avoid liability on the basis of § 32 I GenTG. Specific proof of a different cause may be presented to counter the assumption,[401] but will only be available in rare cases as claims based on the GenTG involve, by definition, only contamination by GMOs which have thus far seen little or no circulation. The specific genetic profile of these GMOs will hardly leave room for alternative causes.

The GenTG, as far as it establishes strict liability, does not include special rules on alternative, potential or uncertain causation.[402] In these cases, the general rules of the BGB apply.[403] According to § 830 I Sentence 2 BGB and § 287 of the German Code of Civil Procedure (ZPO),[404] several possible injuring parties will be jointly and separately held responsible for the interference in cases where identification of one injuring party from others is not possible.[405] However, each party has the right to prove that their respective contributions were in fact limited and particular shares can be apportioned.[406]

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[400] § 16a V GenTG.
[401] BGH LM Nr. 3 zu § 823 (J) BGB imprinted in *Neue Juristische Wochenschrift* (NJW) of 1978 2032 at 2032.
[402] BA Koch (note 392) at 216.
[403] Ibid.
[404] German Code of Civil Procedure *Zivilprozessordnung* (ZPO) of 1879.
[405] BA Koch (note 392) at 216.
[406] Ibid.

The same principle is applied in cases where several injuring parties can be safely identified as having caused the damage, but it remains uncertain as to what extent one or the other is actually responsible.[407]

Other than these alternative cases, potential or uncertain causation, and joint and several liability is also expressly established by § 32 II GenTG if the same damage is caused by more than one injurer.[408] The internal distribution of costs will depend on their respective shares of responsibility. § 32 II sentence 2 GenTG and recourse is possible on the basis of § 426 II BGB if one of the responsible parties comes up with the full amount.[409] Moreover, § 32 III GenTG clarifies that the German Civil Code § 254 BGB[410] applies if the party suffering the damage contributed to the occurrence of the damage.

Finally, it can be concluded that only in a case where the 'genetic causation' is established, can the regulations of GenTG be applicable. Therefore, the 'genetic causation' can be seen as an interface between the general liability law and the specific liability law in terms of the GenTG.

e) Scope of civil liability within the GenTG: Overview

§ 32 I GenTG imposes civil liability upon 'operators' for the death, injury, impairment of health, or property damage of other persons resulting from the properties of a GMO. The term 'operator' is specified by § 3 VII GenTG as artificial or natural persons who establish a genetic engineering installation, perform genetic engineering operations, or release or place genetically modified organisms on the market without authorisation under the GenTG. In addition, the damage for which liability exists is, according to

[407] Ibid.
[408] Ibid.
[409] Ibid.
[410] German Civil Code Buergerliches Gesetzbuch (BGB) of 1900 as revised and amended.

§ 32 I, VII GenTG, direct, physical damage to the life, health, or property (including nature and landscape) of another person.[411]

Finally, even when an operator is found liable according to § 32 GenTG, § 33 GenTG regulates an exposure cap of 85 Million Euro for this liability claim.[412]

This exposure cap is conducted by the legislative assumption, according to § 34 GenTG, that if the damage was caused by a GMO, it was caused by the genetically modified features of the organism.[413] However, this assumption is overturned if it is shown probable that the damage was caused by other (non-modified) features of the GMO.[414] Due to the statute assumption, the liability under the GenTG is strict.

f) Civil Liability in cases of GMO chipping out under the GenTG

As mentioned previously, there is a serious legal issue arising from of the chipping out of GM plants. Damage which results from chipping out is generally regulated, in German law, by the field of law concerning the respective interests of neighbours.[415] With regards to this legal issue, § 36a I GenTG provides that civil liability attaches to any person growing GM crops when the characteristics of the transgenic crop transfer to other farm products or when the introduction of transgenic crops impacts other farm products. The acts of transfer or introduction in these cases are statutorily determined to represent a significant damage inside the meaning of § 906 BGB.

§ 36 a II GenTG provides that significant damnification exists particularly if another farm product cannot be placed on the market;[416] another farm product can only be placed on the market with a label indicating that it is genetically modified,[417] and if another farm product cannot be placed on the market with a label legally applicable to

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[411] § 32 VII GenTG provides that liability for damage to property extends to harm of nature or landscape for which the party damaged expends funds in restoration of the prior natural or landscaped state.
[412] The exposure cap is justified due to alleviation of the insurability. I Wildhaber (note 6) at Fn 373.
[413] I Wildhaber (note 6) at 92.
[414] § 34 II GenTG.
[415] I Wildhaber (note 6) at 94.
[416] § 36 a II number 1 GenTG
[417] Ibid number 2.

the production method used to produce that farm product.[418] The civil liability standard of § 36a I GenTG is, firstly, strengthened by the already mentioned and applicable cause assumption of § 34 GenTG. Secondly, § 36a IV GenTG establishes joint and several liability for those neighbours of the person who is claiming damages. If several neighbours could be considered the cause of the significant impairment and if the person claiming damages from the transfer or other introduction of transgenic characteristics finds it impossible to establish which of the neighbours caused the impairment, then all neighbours who grow GM crops have to bear the liability according to § 36a I GenTG. However, according to § 36a IV GenTG, the neighbours can avoid joint and several liability titles when one neighbour or all can establish who caused what portion of the significant impairment so that the court can properly allocate damages to individual.

Finally, according to § 33 GenTG, cap of damage does not apply to liability under § 36a GenTG. Due to its statutory language, § 33 GenTG only applies to the liability claim under § 32 GenTG.

In summary, the consequence of these three strengthened statutes is that a person can argue minimal facts, which supports the damage claim under § 36a I GenTG liability against several neighbouring farmers growing GM crops and win the lawsuit based on the presumptions created by §§ 34 and 36a IV GenTG for uncapped damages.

The contrast between the civil liability under § 32 GenTG and § 36a GenTG is remarkably important. On the one hand, § 32 GenTG generates liability for operators as already mentioned. On the other hand, § 36a GenTG obviously applies to operators as well as transgenic farmers. Furthermore, § 36a GenTG decisively focuses on transgenic farmers as being subject to civil liability and explicitly allows farmer versus farmer lawsuits.[419] Additionally, § 36a GenTG generates assertive liability titles for authorised GM crops (explicitly GM crops which are fully approved for market introduction) while

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[418] Ibid number 3.

[419] Biotechnology Programme of Friends of the Earth Europe 'German law on co-existence – improved' (2004) in *Biotech Mailout* 6 at 8. Online at http://www.gmo-free-regions.org/Downloads/foe_Biotech_Danish_law.pdf [Accessed 1 December 2009].

§ 32 GenTG liability only applies for those transgenic organisms which are not authorised for market access. § 36a II highlights liability for authorised transgenic crops by imposing the obligation of compliance with good agricultural practices, as specified in § 16 b II, III GenTG. However, the allegation to be compliant with good farming practices is not a successful plea to impose civil liability under § 36a GenTG.

The practical function of the GenTG in cases of agricultural GMO liability will be explained by applying it to the five possible scenarios previously discussed under Canadian and US law. Due to the lack of any agricultural GMO related case in Germany, these scenarios cannot be presented in this section.

(1) Scenario one: Unapproved transgenic crop mixing with commercial agricultural crops

In the first scenario, a claim could be brought to court for damages arising out of an unapproved transgenic crop mixing with commercial agricultural crops.

Due to its wording, § 36a I Number 1 GenTG explicitly imposes civil liability when transgenic crop products, which are not authorised for introduction onto market, commingle with a neighbour's commercial crops. Concerning § 36a GenTG, the presence of any unauthorised-for-full-commercial-release transgenic crop product in a commercial crop results in civil liability for economic damage because the commercial crop must be withheld or recalled from the market.

(2) Scenario two: Approved transgenic crops mixing with non-transgenic crops (loss of premium)

Furthermore, it seems possible that damage arises from an approved transgenic crop which is mixing with non-transgenic crops resulting in a loss of premium for a person who intended to sell a non-transgenic commodity or food product. With regards to this scenario,§ 36a II number 2 GenTG clearly imposes civil liability if, 'according to the provisions of the present Act or according to other acts',[420] the non-GM farmer's products may only be placed on the market with a label indicating the genetic

[420] § 36a I number 2 GenTG.

modification.[421] In the light of the statutory language of § 36a I number 2 GenTG, the German law unmistakably establishes civil liability claims for the economic loss of a premium when the person who lost the premium intended to produce a non-transgenic crop. Accordingly, if a non-transgenic crop farmer produced a crop that had to be labelled under community law[422] because it had above 0.9 per cent adventitious presence of GM content, the non-GM farmer would have a civil liability claim against neighbouring transgenic farmers.

(3) Scenario three: Approved transgenic crops mixing with organic crops (loss of organic label)

Moreover, claims are imaginable for damages arising from an approved transgenic crop which mixes with organic crops resulting in a loss of the organic label for the specific organic crop or of organic certification for the organic farmer's farm. § 36a I number 3 GenTG clearly initiates civil liability adverse to GM farmers if an organic or conventional farmer is not able to place a crop on the market with an organic label which would have otherwise been possible according to the respective regulations legally applicable for the production method.

If § 36a I number 3 of GenTG's language, 'the respective regulations legally applicable', referred exclusively to European Community law about organic production, German GM farmers should have little concern about civil liability. EC organic regulations prohibit the use of transgenic seeds or transgenic materials due to the fact that the regulations focus on production standards.[423]

However, the European Commission ("EC") organic regulations do not set an exact minimum level for the adventitious presence of GM material in crops.[424] Although not without dispute about the correct legal interpretation of the organic regulations, the EC has advised that organic farmers do not lose the organic label for products unless the farmer intentionally uses transgenic seeds or materials or unless the

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[421] Ibid.
[422] Regulation 1829/2003 EC Art. 12 2.
[423] Regulation 1804/1999, 1999 O.J. (L 222) 1 EC.
[424] Ibid.

product is above the 0.9 per cent labelling requirement generally applicable to agricultural products.[425] The EC has given this interpretation, due to the absence of a specific threshold for GM content being set forth in the organic policy, the general boundary value applies.[426]

Nevertheless, the language of § 36a I number 3 GenTG, 'the respective regulations legally applicable', is a clear reference to the German Regulation of Ecological Labeling (ÖkoKennzV) which authorises, but does not require, organic producers to voluntarily label their products with 'without genetic engineering'.[427] As a result of European law-making in 2008, a new minimum standard for Organic labelling was set in the EC member states.[428] With the direct effect of the EC Regulation No. 1829/2003 and EC Regulation No. 834/2007 EC, 0.9 per cent as the maximum amount of transgenic material is allowed before a German organic farmer loses the voluntary organic 'without genetic engineering' label.[429]

Consequently, section § 36a I number 3 GenTG also imposes civil liability upon GM farmers for standards and labels adopted by the European Community.

According to § 36a I number 3 GenTG, GM farmers in Germany have acquired the legal obligation to ensure that organic farmers meet organic standards and labels that were introduced recently.

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[425] Irish Department of Agriculture, Fisheries and Food 'Coexistence of GM and non-GM Crops in Ireland' (2005) 96. Available at http://www.agriculture.gov.ie/media/migration/publications/2005/coexistenceofgmandnon-gmcropsinireland/report.pdf [Accessed 3 December 2009].
[426] Ibid.
[427] German Regulation of Ecological Labeling (ÖkoKennzV) 2002 (BGBl. I S. 589) as revised in 2005. § 3.
[428] Regulation No. 1829/2003 EC and Regulation No. 834/2007 EC.
[429] BMLEV 'Hintergrundinformationen zur "Ohne-Gentechnik"- Kennzeichnung' (2009). Available at http://www.bmelv.de/cln_137/SharedDocs/Standardartikel/Ernaehrung/SichereLebensmittel/Kennzeichnung/OhneGentechnikKennzeichnungHG_Informationen.html?nn=309986#doc620850bodyText3 [Accessed December 3th 2009]

(4) Scenario four: Damages arising from the loss of market access

Claims for damages could arise from the loss of market access in cases where a buyer decides against buying a farmer's crop even though there is no proof of transgenic material or the evidence of GM material was below lawfully set boundary value.

With regards to this scenario, § 36a I number 1-3 GenTG does not fit in this case. Therefore, it is important to have a closer look into the statutory language of § 36a I GenTG. The word 'insbesondere' (translated 'in particular') generally broadens the application of this paragraph.[430] Furthermore, the specific legislative purpose of the phrase 'in particular' is to extend the conditions triggering liability to other types of interference which qualify as essential from the organic farmer's perspective.[431] This assumption is possible due to the amendments of the GenTG in 2004 which added the wording 'giving regard to ethical values' to § 1 number 1 GenTG. This amendment opened the door for possible claims based on ethical values, in cases of impairment of usage, for which § 36a GenTG establishes civil liability.[432] Such a significant ethical value could be seen in the violation of natural organisms or by tampering with nature by mixing genes among species.

Moreover, this modification of the initial wording injects a high dose of legal uncertainty into the liability regime. As a consequence, liability risks appear incalculable and unpredictable and also unpreventable unless one ensures that one's neighbours all farm non-GM. Consequently, it seems as possible that German courts may examine the words 'in particular' as demonstrated to impose civil liability upon GM farmers in cases of damage due to lost market access for organic or conventional famers. This is noteworthy due to the reason that the German civil law is generally based *'on the principle that the person entitled to a legal interest is the person to sue for damage to it. If the interest in question is the most general of all, namely economic*

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[430] § 36a I GenTG.
[431] M Herdegen 'The Coexistence of Genetically Modified Crops with Other Forms of Farming: The Regulation by EU Members States in Light of EC Law' (2005) 2 *Journal of International Biotechnology Law* 89 at 96.
[432] German Genetic Engineering Reform Act of 2004 BGBl. I S. 2066.

well-being, some special reason is required for transferring the loss to someone else.'[433] This axiom is deduced from the fact that § 252 BGB, as a rule of the general civil law for economic loss, is only applicable within a contractual relationship. Furthermore, an examination of § 823 I BGB shows that economic loss is also not covered under general tort law due to the fact that it is not a part of property. Therefore, it can be concluded that '*primary economic loss calls for a special relationship of the party causing the harm to the economic interest infringed. This is met in cases of contract and some special torts. In other cases, however, negative economic effects are part of the risks of life which the person has to bear.'*[434] Under deviance from a general juristic principle within the German civil law, § 36a GenTG specifically creates claims in cases of impairment of usage – protections for impairments arising from consumer perception, market perception, and ethical values – so as to give a statutory basis in German law for a greatly expanded recovery for pure economic loss. § 36a GenTG singles out GM agriculture to create specific torts for which GM operators, as well as farmers, would be held liable and for which pure economic loss would be recoverable.

(5) Scenario five: Farmer resigns to plant a specific crop

Finally, this section examines how § 36a GenTG deals with claims for damages arising from a decision by a farmer to resign to use a particular crop because of concern about proximity to transgenic crops or market perception about transgenic crops. This scenario regarding pure economic loss damage, is similar to the discussed scenario four. Therefore, the already presented explanations under scenario four can be referred to. Consequently, § 36a I GenTG also imposes liability for the pure economic loss under the situation of scenario four as opposed to general German civil liability rules.

g) Summary

In cases where an unapproved transgenic crop is commingling with commercial agricultural crops, it was shown that the German GenTG imposes liability under § 36a I Number 1 GenTG. The German GenTG also imposes liability, according to §

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[433] E Deutsch 'Compensation for Pure Economic Loss in German Law' in Banakas *Civil Liability for Pure Economic Loss* (1994) 55 at 71.
[434] Ibid.

36a II Number 2 GenTG, in cases when an approved transgenic crop mixing with non-transgenic crops causes a loss of premium with regards to the 0.9 per cent rule within the EC. Furthermore, the case was examined when an approved transgenic crop mixing with organic crops causes loss of organic label.

It has been illustrated that the GenTG offers a promising liability claim under § 36a I Number 3, since 'Ecological Labeling' was introduced. Moving forward with regards to possible damages arising from the loss of market access, it can be stated that due to its open statutory language, the GenTG can cover these kinds of damages. Due to this open statutory language, it is not surprising that the law also offers a promising claim in cases where a farmer resigns to plant a special crop due to his personal concerns.

In summary, it can be stated that the German GenTG provides an ultimate cover for all examined damage scenarios in this dissertation.

h) Comparison to North American Liability Law

In this section, a comparison will demonstrate the similarities and differences between the North American and the German Genetic Liability law.

With regards to scenario one, the analysis has shown that § 36a I Number 1 GenTG evidently creates civil liability in the same circumstances as existed in the United States in the StarLink™ litigation.[435] However, § 36a I number 1 GenTG also places emphasis on a broader civil liability standard beyond the StarLink™ litigation.

On the one hand, § 36a I number 1 GenTG focuses on authorised field trials as the most likely fact pattern to which § 36a I number 1 GenTG applies. On the other hand, the StarLink™ litigation did not involve any field trials, but involved the intermingling of a GM crop, which was approved for commercial release only for animal feed, with the food supply.[436] Moreover, the StarLink™ litigation issued no

[435] Supra chapter IV.
[436] Ibid.

ruling about civil liability arising from properly authorised and properly conducted field trials.[437] § 36a I number 1 GenTG, in contrast, imposes civil liability on any mixing from a field trial with a commercial agricultural crop even if the operator conducting the field trial has fully complied with required field trial protocols.[438]

Referring back to scenario two, it is most likely that § 36a I number 2 GenTG will lead to numerous law suits.[439] On the contrary, the Canadian and US law does not offer, due to the absence of any GM labelling rules, promising liability claims in cases of loss of premium.[440] Therefore, it can be stated that the liability systems are completely different with regards to scenario two.

In the third scenario, how the liability systems deal with a case of loss of organic labels for farmers was examined. It was shown that the introducing of an official organic label in 2008 under European Community lead liability expansion according to § 36a I number 3 GenTG.[441] The Hoffman and Beaudoin v Monsanto Canada Inc and Bayer CropScience case study has demonstrated that promising liability claims are only possible with regards to the tort of nuisance. Due to the already mentioned insufficient pleading, it seems difficult to justify such a claim under common law. Therefore, it can be concluded that liability under German GenTG law is much broader and promising than the liability rules according to Canadian or US law.

Furthermore, it was examined that § 36a GenTG imposes liability for pure economic loss in the situation of scenario four and five. On the contrary, it was pointed out that, taking into account the Canadian 'Hoffman case 'and 'Sample case' as well as the US 'StarLink litigation', it seems as unlikely that claims for damages arising from the loss of market access, as well as claims for damages arising from a decision by a farmer to forgo planting a particular crop, are promising in these jurisdictions.

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[437] Ibid.
[438] Supra chapter IV.
[439] Ibid.
[440] Ibid.
[441] Ibid.

Therefore, the German jurisprudence is much broader than the North American civil liability. More significantly, in light of the broad imposition of civil liability under section § 36a I GenTG, the German liability dispensed to require any allegation of physical harm or inability to market a particular crop. Therefore, the German liability rejected the important limitation in the form of the pure economic loss doctrine under Canadian and American tort law. Due to the fact that the majority of European consumers, including Germans, regard gene technology in agriculture and food products with some skepticism, it seems that consumer protections have been the leading reason for the German legislature to step aside from such a limitation.[442]

Hence, it can be alleged that in the practice of singling out GM agriculture for special torts, German law presents a stark contrast to the North American jurisprudence about civil liability for GM crops.

2. General Liability under § 823 I BGB

a) Introduction

Farmers raising crops from GM seed which has been authorised/licensed for general circulation will be subject to the rules of the BGB and, more specifically, to the provisions protecting property interest according to § 823 ff. BGB. [443] The analysis of § 823 I BGB probably represents the most conceivable provision among the general liability system. A detailed analysis of all conceivable bases of claims, however, is beyond the scope of this thesis.

b) Objects of legal protection under § 823 I BGB

The liability, according to § 823 I BGB, is limited to specific subjective and objective legal rights such as property and health.[444] As already pointed out, health and property protecting interests are one of the most important concerns in the field of agricultural

[442] GMO Compass ´Opposition decreasing or acceptance increasing?´ (2009) Available at http://www.gmo-compass.org/eng/news/stories/415.an_overview_european_consumer_polls_attitudes_gmos.html [Accessed 31 January 2010].
[443] § 37 III GenTG.
[444] I Wildhaber (note 6) at 111.

GMO liability.[445] With regards to these issues, it can be stated that § 823 I BGB is protecting health as well as property due to its clear statutory. Yet, ecological damages are not covered by § 823 BGB due to the reason that environment rights are not associated with one right holder. The German Law of Delict protects only individual rights.[446]

c) Duty of Care

With regards to the protection of legal objects under § 823 I BGB, the harm of duties of care 'Verkehrspflicht' seems to be suitable. With regards to § 823 BGB, the judges developed the rule that the person who creates a danger for other people is obligated to undertake appropriate measures to avoid the occurring damage.[447] The duties of care protect the entity with regards to the objects of legal protections under § 823 I BGB in respect of every active harming or harming by omission. Apart from the GenTG certain duty of cares may arise with regards to every GM working, market and field introduction.[448] This scenario is regulated by § 823 I BGB. As a consequence, researchers and GM farmers have the duty of care to comply with the rules set out by the GenTG.[449] This is where the standard of care established by the § 16b GenTG needs to be taken into consideration. A GM farmer has to comply with the comprehensive safety measures designed to prevent contamination of neighbouring crops and farmland. Consequently, a GM farmer will be obliged to compensate equitably, but as long as he can show compliance with the good professional practice (gute fachliche Praxis), as defined in § 16 b GenTG, the farmer is safe from claims out of § 823 I BGB. The general rules will apply insofar as the standards established by the GenTG were not met due to the breach of duty of care.

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[445] Supra chapter II.
[446] Ibid.
[447] RGZ 54, 55; 58, 334; BGHZ 9, 379; 70, 363; 84, 143.
[448] BS Kang *Haftungsprobleme in der Gentechnologie* (2001) 156.
[449] Ibid.

d) Fault

An essential requirement of § 823 BGB, is a fault-based harming.[450] Consequently, if there is no fault; there is no promising claim. In any case, the injuring party may prove to be compliant the duty of cares set by the GenTG. This is the objective requirement of duty of care according to § 276 I sentence 2 BGB. In cases where this requirement is fulfilled, it means the injuring party successfully proved to be compliant with the existing duty of care and the success of a claim is not likely.

However, in cases where an operator or a GM farmer breached the duty of care, it has to be further assessed whether or not it was possible for the injuring party to foresee the need of precautionary measures due to duty of care. If this assessment results in the conclusion that it had, indeed, been possible to foresee that precautionary measures were required, the caused harm was fault based, according to § 823 I BGB.

e) Causation

The causation requirement was previously introduced in chapter IV, with regards to the GenTG. Therefore, this section can be referred to, due to the similarity of the causation requirement to the liability provisions under the GenTG.[451]

[450] Ibid 132.
[451] Supra chapter IV.

f) Civil Liability in cases of the chipping out of genes under § 823 I BGB

(1) Scenario one: Unapproved transgenic crops mixing with commercial agricultural crops

Under § 823 I BGB, only damages that are connected with an individual right are covered.

Scenario one could be seen as an economic damage due to the fact that it is no longer possible to sell the crops on the market. Economical damages, however, are not covered under § 823 I BGB. Therefore, this exclusion could be used as an argument in support of the idea that the damage alleged in scenario one is not claimable under § 823 I BGB.

The German highest civil court (Bundesgerichtshof) has ruled, in the past, that the legal property right as an individual has to be widened.

In the famous 'Kondensator Judgement' of 1993, the court had left it open as to whether the connection of an exact part with a defective part could constitute property damage for the whole object when either the object was not destroyed or the exact part was damaged.[452] In the 'Transistor Case' in 1998, the Bundesgerichtshof assumed property damage with regards to the initially exact parts of a transistor which had later been assembled with defective supply units and as result led to a loss of value.[453]

Due to the specific characteristics of a GMO, it seems as possible that assembling according to § 947 BGB, commingling according to § 948 BGB and processing according to § 950 BGB will lead to property damage if one applies the transistor case rule. In this regard, it is conceivable that, for example, a case could occur where defective plasmids have been put into an organism and multiplied. Storing them with other goods could then lead to a loss of value of the newly created unit. In cases where GM crops are mixed with commercial, agricultural crops which are meant for the

[452] BGHZ 117, 183.
[453] BGH NJW 1988, 1942.

market, this leads to property damage according to § 823 I BGB under the Transistor judgment.

(2) Scenario two: Approved transgenic crops mixing with non-transgenic crops (loss of premium)

The loss of premium in cases of GM crops mixing is also characterised as a case of economical damage. Therefore, compensation is also conceivable as a property damage under the transistor judgment as already mentioned in scenario one.

(3) Scenario three: Approved transgenic crops mixing with organic crops (loss of organic label)

In scenario three, the loss of an organic label also leads to the unassailability of the contaminated organic crops. However, the loss of the 'organic label' is neither a direct property damage nor connected to the transistor case. Therefore, it is not possible to have a promising claim for scenario three under § 823 I BGB.

(4) Scenario four and five: Damages arising from the loss of market access/ Farmer resigns to plant a specific crop

In another ruling, the German ´Bundesgerichtshof´ pointed out that physical harm is not required to constitute a property damage under § 823 I BGB.[454] Therefore, property damage should exist in cases where an organic field is invaded by GM seed which leads to the genetic altering of other non-GM plants. Cases of loss of market access and farmers' personal decisions are too imprecise to fit into either the property definition or the transistor case exception. Therefore, a liability claim is not possible under § 823 I BGB in cases of scenario four and five.

g) Comparison to North American Liability Law

With regards to scenario one, the examination has pointed out that § 823 I BGB obviously imposes civil liability in cases of commingling. However, the claim is narrowed by the standard of care established by § 16b GenTG. Therefore, it can be

[454] BGH NJW 1994, 518.

stated that the general liability claim under the BGB is also limited as under the US StarLink™ litigation.[455]

With regards to the second scenario, it can be stated that the standard of duty of care somehow serves as a liability constraint. However, such a scenario is not conceivable in the USA and Canada due to the absence of any governmental labelling system.

The third scenario revealed that the special ruling in the transistor case only applies to liability claims which are not too broad. Due to the inapplicability of § 823 I BGB in cases of loss of organic labels, the German general liability provision is much narrower than the US and Canadian causes of action which offer at least hardly attainable nuisance claims.

Due to the lack of a liability claim under § 823 I BGB, in cases of scenario four and five, the German liability rule achieves the same result as the US and Canadian courts considering the 'pure economic loss' doctrine.

[455] Supra chapter IV.

V. Conclusion

This thesis has demonstrated the difficulties surrounding the issue of GMO-caused liability claims. The application of GMOs in agriculture has several potential implications for environmental, social and economic interest. Generally speaking, these potential implications provide a good illustration of the principles of sustainable development law.[456] More specifically, the three examined cases have demonstrated the need to balance the principle of integration and inter-relation of social, economic and environmental objectives in order to find a satisfying solution.

Traditional farming practices, and the seeds that farmers plant, have evolved over a long period of time. The introduction and rapid spread of GM canola and their introduced genes have already brought significant changes to North American fields in the thirteen years they have been in use. Moreover, changes of farming practice are more than likely in Europe in the next decade. Furthermore, it can be stated that GM crops create new problems such as unforeseen gene transfer possibilities or labelling requirements which are not found in the conventional farming sector. Therefore, it can be concluded that a strong liability regime will be of utmost importance in the future. It can be alleged that GM crops will have continuous application throughout the world due to reasons of food shortage and profit maximisation. Consequently, the special role of these crops has to be taken into consideration in any liability regime. For organic farmers to successfully defend their claims in court, much has to change. GM crops raise new problems for current legal systems which are not taking their lead from conventional technology.

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[456] There are six principles of sustainable development law: the principle of integration and interrelationship in relation to social, economic and environmental objectives; the duty of states to ensure sustainable use of natural resources; the principle of equity and the eradication of poverty; the principle of common but differentiated responsibilities; precaution regarding human health, natural resources and ecosystems; the principle of public participation and access to information and justice; and the principle of good governance; International Law Association, Resolution 3/2002, New Delhi Declaration of Principles of International Law Relating to Sustainable Development, International Law Association. Available at http://www.cisdl.org/pdf/brief3.pdf [Accessed 11 December 2009].

With regards to North America, it can be noted that under current law, the interests of organic and conventional farmers are largely unrecognised; whereas in Germany, the GenTG has led to an unjustified widening of liability for operators and potential GM farmers.

By taking into account the outcome of the analysed cases, a fault based liability regime might not provide the best solution since the requirement of fault places an evidential burden on the plaintiff to show that a defendant breached a duty of care that was owed to the plaintiff. Due to the limited risk assessment in the field of GMOs, such a burden may hinder the ability to efficiently compensate victims. Furthermore, most of the information about the facts is in the hands of the plaintiffs, which leads to huge practical proof problems for the defendant.

Consequently, it is not surprising that neither the North American regime nor the German liability law recognises a promising fault-based liability claim within their jurisdiction.

For that reason, a strict liability regime might provide a more promising solution. The presentation of the aims of tort law has shown that such a regime should balance the affected interests. This balance could be achieved under avoidance of a fault-based regime with the application of a strict liability law.

However, the examination of the common law system in North America has shown that the strict liability rule in Rylands v Fletcher is not capable of adequately covering agricultural GMO liability cases. The German statutory liability regime approach with the introduction of the GenTG seems to be more appropriate due to the fact that the German government recognised the unique character of GM technology in comparison with conventional farming. As a result of this adaptation, development liability claims seem to be more promising. However, with regards to the rule of strict liability, the German movement went overextended itself, as already illustrated.

Taking these considerations into account, a strict liability regime should, with regards to the rule of stricter liability under common law, treat the commercial release and sale of GM agricultural products as an “escape” of a substance which is dangerous;

and secondly, as used in the common law system, the pure economic loss doctrine should be consequently implemented as a liability cap.

With respect to the requirement of reasonable foreseeability in the tort of nuisance, it has been proven that the risk assessment of GMOs presently exists only in an early development stage. Furthermore, it was shown that the risk assessment is connected to the requirement of reasonable foreseeability in the tort of negligence. With regards to the poorly conceived risk assessment, it can be concluded that the reasonable foreseeability requirement is more likely, in the face of uncertainty, to mainly shield the biotechnology industry and farmers from liability in the tort of negligence, rather than serve as a means to encourage them to research and reduce risks.

The examination of the North American cases and litigation has also shown that the chances for a conventional or organic farmer to have a promising claim for economical damages are relatively marginal due to matters of reasoning or the consistent consideration of the pure economic loss doctrine. Taking into account the aims of tort law, it seems as unreasonable to shift the burden of damage to a small amount of organic and conventional farmers without any promising liability options. However, with regard to the 'pure economic loss' doctrine, it seems as accurate to prohibit endless and exclamatory liability claims under common law.

On the other hand, the thesis has shown that the German GenTG offers a decisive liability basis for claims with regard to all five types of economic damages. In particular, the German special liability law resigns completely to use the pure economic loss doctrine in cases of agricultural GMO damage. Consequently, it is not surprising that the liability resulting out of the application of § 36 a GenTG can be described as incalculable and unpredictable. The fact that the civil liability for pure economic loss is often incalculable and unpredictable substantially explains why Canadian and American courts have used the pure economic loss doctrine to exclude liability for the fourth and fifth scenario. However, the German general liability basis of claims in § 823 I BGB, prohibits such extending claims due to its conception.

Therefore, the German GenTG seems to be susceptible to the limitations of possible liability claims. The aims of tort law demand a balanced risk and damage allocation. It seems, due to current technological achievements in the field of storing and transport, impossible to prohibit the mixing of GM seed with non-GM seed which may lead to the loss of an organic label as a result. Furthermore, the decision of a farmer to resign to plant organic plants in the future is a personal choice and consequently hard to be proven. That is why both scenarios should not lead to any liability.

In summary, the comparison has shown that North American law, as well as German law, have weaknesses in sufficiently addressing the problems arising out of the agricultural application of GMOs. It was further shown that GMOs have a rising impact on society and farming. Due to the relationship of this GMO issue to many people and its high economic interests, it is an accurate assessment that the legislature, as the representative of the citizen, has to take the occurring problems into consideration and create applicable, consistent rules.

Jeremy Rifkin, one of the first GMO opponents in the US, stated in 1999 that *'liability is going to be the Achilles' heel of the biotechnology industry. Foreign genes are a smoking gun. They are going to flow all over the place. Claims for damages could come from gardeners or organic farmers who find they are unable to sell their crops. All that has to happen is for a gene to turn up that you did not want. The overall claims for damages could make the recent litigation associated with smoking pale in comparison*'.[457] If the above scenario manifests, any liability regime will be more appropriately able to deal with these matters if the recommended changes in this thesis were implemented into current law.

[457] J Rifkin 'Industry critic warns that damages claims 'could run into millions' (1999) 398 *Nature* 656.

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