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Genetic Engineering and Organic Farming

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<p>Consumer protection laws around the world prohibit organic farmers from using genetically modified organisms (GMOs) in food production. In Europe, however, the EU Organic Regulation and the Seed Directives all lack provisions which could be used as a basis for stipulating protective measures to prevent introgression into organically grown plants.</p> <p>Analysis of the new Deliberate Release Directive reveals that this directive would allow, as part of the consent process used to place new GMOs on the market, inclusion of measures to protect against property damages due to GMO introgression in the form of "specific conditions of use and handling" of a GMO.</p> <p>Genetic-engineering-free ('GE-free') zones and prescribed distances between fields with GMO plants and organic crops are two approaches currently under discussion as potential measures to prevent such property damages. Analysis of the available data for defining minimum prescribed distances reveals a number of gaps in the empirical basis, meaning further research is urgently needed. However, some practical insights into minimum distances are given. GE-free zones or closed cultivation areas are proposed for seed production.</p> <p>Hitherto in Germany, civil law has offered the sole means of privately settling the conflicting interests of organic farmers and conventional farmers using transgenic varieties. § 906 of the German Civil Code is the central norm in private environmental law. It represents a very complex system of injunctive relief and compensation claims and is thus of little real help in establishing peaceful coexistence. One possible solution would involve voluntary self-organisation by the branch of the seed industry which produces transgenic plants and markets the seed. Another solution would involve regulation by public law. Elements of the latter solution could include establishment of a public register of production sites, introduction of good production practice (GPP) for GMO cultivation, mandatory instructions on seed packaging and special protective measures for organic seed production.</p>		
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List of abbreviations

Abl.	Amtsblatt [Official Journal]
AgrarR	Agrarrecht [Agricultural Law]
Art.	Article
Az.	Aktenzeichen [File number]
BaySchlG	Bayrisches Schlichtungsgesetz [Bavarian Arbitration Law]
BBA	Biologische Bundesanstalt für Land- und Forstwirtschaft [Federal Biological Research Centre for Agriculture and Forestry]
BBodSchG	Bundesbodenschutzgesetz [Federal Soil Protection Act]
BGB	Bürgerliches Gesetzbuch [German Civil Code]
BGBI.	Bundesgesetzblatt [Federal Law Journal]
BGH	Bundesgerichtshof [Federal Supreme Court of Justice]
BGHZ	Entscheidungen des Bundesgerichtshofs in Zivilsachen [Supreme Court of Justice rulings on civil matters]
BNatSchG	Bundesnaturschutzgesetz [Federal Nature Conservation Act]
BR-Drs.	Bundesrats-Drucksache [Bundesrat publication]
BT-Drs.	Bundestags-Drucksache [Bundestag publication]
BVerfG	Bundesverfassungsgericht [Federal Constitutional Court]
DMG	Düngemittelgesetz [Fertiliser Act]
DWW	Deutsche Wohnungswirtschaft [German housing industry]
EC	European Community
EEC	European Economic Community
EGBGB	Einführungsgesetz zum Bürgerlichen Gesetzbuch [Law Introducing the German Civil Code]
EGZPO	Einführungsgesetz zur Zivilprozessordnung [Law Introducing the Code of Civil Procedure]
EU	European Union
EuGH	Europäischer Gerichtshof [European Court of Justice]
ECJ	European Court of Justice
EuGH Slg. I, II	Amtliche Sammlung der Entscheidungen des Gerichtshofs (Band I) und des Gerichts erster Instanz (Band II) [Official collection of rulings by the Court of Justice (vol. I) and Trial Court (vol. II)]
EUV	Vertrag über die EU [EU Treaty]
EVD	Eidgenössisches Volkswirtschaftsdepartement [Swiss Federal Department of Economic Affairs]
EEC	European Economic Community
GenTG	Gentechnikgesetz [Genetic Engineering Act]
GEO	Genetically engineered organism
GG	Grundgesetz [Basic Law]
GHH	Gute-Hoffnungs-Entscheidung [Properties/expectations rulings]
GM	Genetically modified

GMHP	Genetically modified higher plant
GMO	Genetically modified organism
GMP	Genetically modified plant
GVBl	Gesetzes- und Verordnungsblatt [Law and Official Journal]
HdUVP	Handbuch der Umweltverträglichkeitsprüfung [Handbook of the Environmental Impacts Assessment Act]
Hess. NachbarrechtsG	Hessisches Nachbarrechtsgesetz [Hessian Act on Neighbour Law]
IFOAM	International Federation of Organic Agriculture Movements
COM	Official Commission Documents
LG	Landgericht [District court]
LM	Das Nachschlagewerk des Bundesgerichtshofs in Zivilsachen (hrsg. von Lindenmaier und Möhring) [Reference work of the Federal Supreme Court of Justice on civil matters (published by Lindenmaier und Möhring)]
MDR	Monatszeitschrift des deutschen Rechts [Monthly journal of German law
NJW	Neue Juristische Wochenschrift [New weekly legal journal]
NJW-RR	Neue Juristische Wochenschrift-Rechtsprechungsreport [New weekly legal journal – Legal rulings report]
NuR	Natur und Recht [Nature and law]
NVwZ	Neue Zeitschrift für das Verwaltungsrecht [New journal of administrative law]
NZV	Neue Zeitschrift für Verkehrsrecht [New journal of traffic law]
NZZ	Neue Züricher Zeitung [New Zürich newspaper]
OECD	Organisation for Economic Co-operation and Development
OJ	Official Journal
OLG	Oberlandesgericht [Regional appeal court]
OLGZ	Entscheidungen der Oberlandesgerichte in Zivilsachen [Rulings of the regional appeal court on civil matters]
Para.	Paragraph
PCR	Polymerase chain reaction
PflSchG	Pflanzenschutzgesetz [Plant Protection Act]
RdL	Recht der Landwirtschaft [Agriculture law]
RegEGenTG	Government draft of the Genetic Engineering Act
RGBI.	Reichsgesetzblatt [Reich Law Journal]
RGZ	Entscheidungen des Reichsgerichts in Zivilsachen [Rulings of the Supreme Court of the German Reich on civil matters]
SaatG	Saatgutverkehrsgesetz [Seed Commerce Act]
UmweltHG	Umwelthaftungsgesetz [Environmental Liability Act]
UVPG	Gesetz über die Umweltverträglichkeitsprüfung [Environmental Impacts Assessment Act]

VersR	Versicherungsrecht [Insurance Act]
V ZR	Zitierweise von BGH-Urteilen: Senatsnummer (hier: 5. Senat), Zivilrecht [Citation practice for BGH rulings: Senate number (here, 5 th Senate), civil law)]
WHG	Wasserhaushaltsgesetz [Federal Water Law]
WM	Wertpapiermitteilungen (Zeitschrift für Wirtschafts- und Bankrecht) [Securities bulletin]
ZPO	Zivilprozessordnung [Code of Civil Procedure]

0 Introduction

0.1 Current situation

The use of genetic engineering in agriculture is expected to become increasingly prevalent in Germany on the medium term. Although consumer purchasing tendencies for foodstuffs are currently working to hinder large-scale planting of genetically modified higher plants (GMHPs), an increase in cultivation area is possible due to industrial usage of genetically modified self-regenerating raw materials.

For the 2002 growing season, the German Federal Office for Plant Varieties authorised the companies Syngenta, Pioneer, Monsanto and Aventis to market about 50 tons of transgenic maize seed in Germany. In mid-March, the Federal Office approved, with limitations, ten varieties of transgenic maize, including Bt plants (which produce the insect toxin of *Bacillus thuringiensis*) and plants that tolerate the herbicide broad-spectrum BASTA. German law does not currently require special designation of the roughly 2,000 hectares of land where these transgenic crops are planted. At the present time it is not clear when approval of transgenic plants for general agricultural usage will be taken up again in the European Union. However, it is expected that the *de facto* moratorium on the approval of genetically modified seed will not continue on the long term. France, Denmark, Greece, Luxembourg and Austria are currently jointly blocking new approvals. With its Deliberate Release Directive 2001/18/EC¹ requiring Member States to disclose all transgenic plants in an all-encompassing public register went into force by 17 October 2002 as well as two draft regulations proposed in 2001 on the labelling and traceability of products containing or consisting of genetically modified organisms (GMOs), the European Commission sees a way

¹ Directive 2001/18/EC of the European Parliament and of the Council on the deliberate release into the environment of genetically modified organisms and repealing Council Directive 90/220/EEC, Official Journal No. L 106 of 17 April 2001, p. 1.

to politically legitimise the end of the moratorium². When the moratorium is lifted, increasing cultivation of transgenic varieties can be expected in Germany as well.

Pollen drift and introgression of genetically modified pollen are fundamentally possible over large distances in agriculture. This will make it difficult to ensure absolute (100%) purity of organic and conventional crops from genetically modified genetic information in the future.

In December 2000, the German Federal Environmental Agency held a professional conference on the subject of “Green genetic engineering and organic farming”. During this conference, possible approaches for protecting organic production sites as the use of genetically modified plants increases in conventional agricultural production were discussed with persons representing organic farming from the research, production and administrative sectors.

The experts participating in the conference agreed that the only way to minimise contamination due to introgression from genetically modified plants is to use suitable prescribed distances between organic farming areas and fields containing genetically modified plants. Additionally, the establishment of zones that are free of GMOs should be considered within protected areas.

At the present time, there are no basic legal stipulations in Germany or in Europe with regard to these calls for minimum prescribed distances and GMO-free protected areas.

The objective of the “Green genetic engineering and organic farming” project is thus to present different legal scenarios for establishing regulations on minimum prescribed distances between organic farming areas and fields containing genetically modified plants within the German and European legal systems³.

² http://europa.eu.int/comm/dgs/health_consumer/library/press/press208_de.pdf

³ Although the following paper focuses specifically on the neighbour relationship between organic farmers and transgenic crops, it also applies accordingly to the relationship between transgenic crops

0.2 Relevant issues

Current discussion in New Zealand has suggested that separating the production and financial interests of organic farmers and farmers who use transgenic seed is “*about as simple as getting just a little bit pregnant*”.⁴ How does German law determine the boundary between the spheres of these two neighbours? What are the respective rights accorded to organic farmers and the owners of transgenic cultivations? Who in Germany today is responsible according to the current legal situation (*de lege lata*) for damages caused by genetic modifications of crops and who is not responsible? Who should be responsible (*de lege feranda*)? To what extent are operators of transgenic cultivations required to pay heed to neighbouring organic farmers? How could governments improve the current legal situation? These questions are being asked around the world, e.g. in the final report of the “Royal Commission on Genetic Modification”⁵ dated July 2001 from New Zealand. The Royal Commission’s report differentiates between damages that are caused by non-compliance with legal requirements and damages that occur despite due caution, being nearly unavoidable in case of proximity of organic and transgenic crops.

This report focuses on liability for the usual damages to be expected as a result of the transfer of pollen from legal transgenic plants into neighbouring organic crops and on the obligation to avoid such pollen transfer. Liability for misconduct, e.g. for the consequences of illegal planting of unapproved transgenic plants, is only a secondary consideration. Criminal law of damages applies to illegal planting of transgenic crops, and such law is of secondary importance in this report due to the focus on legal consequences of legal planting of transgenic varieties. For the sake of completeness, however, this

and types of agriculture in which the products elicit higher prices because they are labelled “No genetic engineering” (based on the provisions of foodstuffs legislation) or because they are not subject to foodstuffs labelling requirements indicating the presence of GMOs. These products will also lose value if they undergo genetic modification due to the influx of transgenic pollen. Translator’s note: Wherever it is used in this paper, the pronoun “he” should be interpreted as gender-neutral (= “s/he”).

⁴ Clifton, New Zealand Listener, 3 November 2001, p. 16.

subject matter is also covered in the following table of defence measures for organic farmers in the domain of private law.

Defence measure under private law	Application to the influx of genetic modifications into organic crops due to transgenic pollen
Claims arising from the good faith community relationship under Neighbour Law according to §§ 1004, 906 German Civil Code ⁶ to defend against and obtain compensation for disturbances that are not otherwise basically prohibited by the legal system.	Planting of a transgenic variety that is generally approved for agricultural production. Loss in commercial value in neighbouring crops due to incorporation of the genetically modified construct as a consequence of the interference of transgenic pollen and non-negligent planting of an unapproved transgenic variety with ensuing consequences.
Quasi-negatory claims according to §§ 1004, 823 Para. 2 German Civil Code to defend against disturbances which are already prohibited by a specific protective law.	Wrongful planting of an unapproved transgenic variety, whether deliberate or negligent, through purchase of seed from a recognisably and avoidably unreliable source, and having as a consequence the presence of a genetic construct that is not approved for commerce in a neighbouring cultivation.
Tort claim according to § 823 Para. 1 German Civil Code for culpable (since avoidable) infringement of property subject to legal protection since such infringement is always unlawful unless the legal system considers the interference to be justified exceptionally.	Wrongful planting of an unapproved transgenic variety, whether deliberate or negligent, through purchase of seed containing a genetic construct that is not approved for commerce, in a neighbouring cultivation, from a recognisably and avoidably unreliable source.

The following does not consider how the German legal system would treat the planting of a transgenic variety which takes place unlawfully because it has not been approved for planting. Instead, the intent is to show how damages in neighbouring organic cultivations as a result of the planting of a generally approved transgenic crop and the threatened imposition of such damages would likely be treated according to current German law.

⁵ http://www.gmcommission.govt.nz/RCGM/rcgm_report.html (page 312 = chapter 12, page 3)

⁶ German Civil Code of 18 August 1896, Reich Law Journal 1896, p. 195, revised in publication of 02 January 2002, Federal Law Journal I, p. 42; last modified by Art. 1 Act of 09 April 2002, Federal Law Journal I, p. 1239

Controversy over liability for consequences

The Royal Commission in New Zealand has rejected the model of liability for consequences without any consideration of fault, i.e. “the imposition of a strict liability approach”, since this is deemed to be a hindrance of “innovation and progress”. The United States, the United Kingdom and Japan would not provide any “strict liability” such that the weight of international precedence is against liability for consequences of damages caused by approved transgenic plants. According to information available to the Royal Commission, Germany and Austria are the only major countries with a “strict liability regime”.⁷ The question is now whether this is true, i.e. whether German law actually provides (as indicated in the report from New Zealand) very strict liability for consequences, not dependent on fault, for users of transgenic plants for damages to neighbouring organic farmers. Another question is what this special type of liability could contribute to ensuring mutual co-existence.

0.3 Content of the specialist report

The present specialist report entitled “Green genetic engineering and organic farming” was prepared on behalf of the (German) Federal Environmental Agency by the Forschungsinstitut für biologischen Landbau Berlin e.V. and the Öko-Institut e.V. in the time between June 2001 and August 2002. The report includes the results of two workshops held on 29 October 2001 and 16 January 2002 in Berlin during which the initial results were discussed with various experts.

⁷ Cf. footnote 5.

The report is organised as follows:

- **Chapter 1** (Hanspeter Schmidt) describes the problems that arise for organic agriculture due to the planting of GMOs.
- **Chapter 2** (Andreas Hermann, Regine Barth) discusses ways to protect organic farming at the level of European Community law.
- **Chapter 3** (3.1 + 3.2 Andreas Hermann, Regine Barth; 3.3 Hanspeter Schmidt) presents the possible means of protection provided by German law. Here, the focus is on discussion of § 906 of the German Civil Code as an instrument for settling claims between neighbours.
- **Chapter 4** (Ruth Brauner, Karin Nowack, Beatrix Tappeser) describes the necessary protective measures. Here, the focus is on the extent to which prescribed distances can be generally stipulated.
- Building upon the concept of prescribed distances, **Chapter 5** (5.1 - 5.3 Andreas Hermann, Regine Barth; 5.4 + 5.5 Hanspeter Schmidt) develops legal proposals for implementing these prescribed distances in practice.
- In **Chapter 6** (6.1 - 6.3 Andreas Hermann, Regine Barth; 6.4 Hanspeter Schmidt), these proposals are considered in terms of their real-world viability.

1 Organic agriculture and transgenic crops

1.1 World-wide consensus on the non-usage of genetic engineering in organic farming

Through world-wide consensus, organic farmers fundamentally reject the use of genetically modified organisms (GMOs). Reasons cited by their umbrella organisation “International Federation of Organic Agriculture Movements” (IFOAM) in its Mar del Plata Declaration from 1998 include “negative and irreversible environmental impacts”, “practices which are incompatible with the principle of sustainable agriculture” and “release of (genetically modified) organisms of an unrecallable nature”.⁸ The standard developed by organic farmers as part of their own guidelines prohibits the use of GMOs in organic farming, and this has become the legal standard in all relevant consumer protection laws, particularly in the US, Japan and European Union. The Codex Alimentarius also stipulates that “products produced from genetically engineered / modified organisms (GEO / GMO) are not compatible with the principles of organic production (either the growing, manufacturing or processing)”.⁹ The Codex Alimentarius is a mechanism under international law on agreements which allows participating countries (practically all of the countries involved in international trade of agricultural products) to document their mutual understanding of requirements for foodstuffs. It is thus clear that non-usage of genetic engineering is a principle agreed on world-wide by organic farmers and required of organic farmers by national governments. Likewise, organic farmers are prohibited from using transgenic organisms in their cultivations by the EU Organic Regulation 2092/91/EEC¹⁰, which has the same validity as a national law in all of the Member States of the European Union.

⁸ <http://www.ifoam.org/press/1998marp.html>

⁹ Guidelines for the Production, Processing, Marketing and Labelling of Organically Produced Food, Section 1.5, ftp://ftp.fao.org/codex/standard/booklets/Organics/gl01_32e.pdf.

¹⁰ Council Regulation (EC) No 2092/91 of 24 June 1991 (“Organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs”), Official Journal No. L 198

1.2 World-wide consensus on the need for co-existence as a prerequisite for sustainability

The standard of not using transgenic plants in organic farming has its origin in how organic farmers define themselves. As part of the discussion on the legality and ethics of the approval of transgenic plants for production of foodstuffs, this definition has assumed a value of its own independent of the considerations of organic farmers, i.e. legitimisation of the approval of genetic modifications in foodstuffs by upholding the consumer's right to decide for or against genetically modified foodstuffs.

As different plant varieties are approved, the conventional neighbours of organic farmers are now allowed to use transgenic plants. Due to the proximity of a transgenic cultivation with an organic cultivation, the latter being sensitive to the influx of transgenic pollen, a conflict arises which needs to be managed. Maintaining the consumer's right to choose as an instrument for legitimising the approval of transgenic varieties immediately subjects these varieties to certain limits in terms of their usage since organically raised plants and transgenic ones have to be able to exist in one another's proximity, i.e. co-existence is critical. Without the co-existence of organic farmers who renounce genetic engineering with farmers who use transgenic plants, consumers will have no options. Truly, the individual consumer should be able to walk the aisles of the supermarket and choose a non-genetically modified product as opposed to a genetically modified product (or vice versa). If consumers do not have this freedom of choice for or against genetically modified foodstuffs in their local store, then the government's approval of genetically modified plants is deprived of a part of its ethical legitimisation. Consumers should not be forced to purchase genetically modified products due to alternative, GM-free products being driven from the marketplace. Opponents and supporters of genetic engineering in agriculture both agree on this concept. At the OECD conference on genetically modified

of 22 July 1991, p. 1, last amended by Regulation (EC) No. 2491/2001 of the Commission of 19 December 2001, Official Journal No. L 337 of 20 December 2001, p. 9.
cf. Art. 5; <http://home.prolink.de/~hps/organic/consolid-de.html>

foodstuffs in February 2000 in Edinburgh, the opposing interest groups managed to achieve almost full consensus on the notion that “consumers in all parts of the world should (where possible) have the opportunity to exercise choice on whether or not to consume GM foods”.¹¹ Legitimation of government approval of genetic engineering in agriculture by guaranteeing the consumer’s freedom of choice thus seems as important as minimisation of unpredictable risks from new transgenic plants according to the best possible current research.

1.3 International discussion

Just what needs to be clarified in legal terms in order to facilitate this co-existence is now under discussion internationally and covers a large number of possible approaches. A law enacted in June 2001 in the American state of *Maine* stipulates for the sale of transgenic seed that farmers must be instructed in writing how to handle the seed and how to plant it so as to minimise the risk of possible pollination of non-genetically modified plants in the vicinity.¹² In December 2001 the government of the Australian state of *Victoria* concluded a lengthy public hearing with the decision to not establish any genetic engineering-free zones for the time being. Instead, the seed industry will be monitored to see if its own initiatives for planting, processing and marketing genetically modified products will be satisfactory to ensure that all types of agriculture can co-exist¹³.

1.4 No usage of genetically modified organisms according to the EU Organic Regulation

¹¹ The Chairman's Report, <http://www1.oecd.org/subject/biotech/edinburgh.htm>

¹² H.P. 952 - L.L. 1266, <http://www.mofga.org/news20010531.html>

¹³ See: “Genetic Engineering-Free Zones Report” on the website of the Department of Natural Resources and Environment of the Ministry of Agriculture of the state of Victoria, Australia, <http://www.nre.vic.gov.au/4A25676D0028043F/BCView/B318D44E33A1705E4A256B21007FC372?OpenDocument>

Organic farmers can satisfy their legal obligations according to Council Regulation (EEC) No. 2092/91 of 24 June 1991¹⁴ by not using any genetically modified organisms and/or any products derived from such organisms. In particular, organic farmers must ensure that seed used in organic production does not contain any genetic modifications. However, organic farmers must also pay heed to the consumer's underlying belief that organic farmers will work to minimise the probability of genetic modifications in their crop, i.e. that organic products do not contain any genetic modifications. Organic farmers are thus concerned with protecting the integrity of their harvest from the influx of genetic modifications due to pollen drift from neighbouring conventional farms.

1.5 Commercial practice: Requirements of purchasers and mandatory labelling

The expectation on the part of consumers that organic products do not contain genetic modifications has consequences for commercial practice: Basically, this expectation results in a warranty liability for organic farmers with respect to their purchasers (and not just that they themselves do not use transgenic organisms or products based thereupon). Instead, purchasers of organic products are guaranteed the absence of genetic modifications in general, i.e. those modifications resulting from the influx of transgenic pollen. Until the Law of Obligations was reformed at the end of 2001, this guarantee was considered an assurance of the absence of genetic modifications. The result is that the supplier is liable for the consequences of genetic modifications in the delivered goods, particularly blending and processing damages, even if it is not responsible for them itself. For example, in the autumn of 2001 organic farmers commonly received this notice from mills purchasing their organic harvest: "Dear Madam or Sir: We have been using the purchase confirmation of mills for domestic goods for some time now. It is regularly published by the Verband Deutscher Mühlen [Association of German mills]. The Association has proposed

¹⁴ Cf. footnote 10.

a new version for the upcoming harvest".¹⁵ In the "Goods and quality" section of these general purchasing conditions, there are the following statements: "The grain may not be genetically modified" and "This requirement is considered a guaranteed property within the meaning of § 459 Para. 2 German Civil Code. Please note these changes for our future purchases". Thirty large organic grain dealers in Germany decided in March 2002 to develop a sale note for organic grain with a corresponding warranty liability. This is a particular feature of the organic market in Germany.

If traders decide to no longer require a guarantee of the absence of genetic modifications, then mandatory foodstuffs labelling would be the decisive standard also for relations between neighbours. The current standard¹⁶ as well as the one expected in the future under Community law (cf. with regard to the future legal situation, the press release issued by the EU Commission on 27 July 2001¹⁷) provides as follows for traces of approved transgenic constructs: If more than 1% of the genetic information in the organic crop is genetically modified, then the so-called organic product must include a consumer label on the packaging indicating it is "genetically modified". Of course, this would render it essentially unmarketable as an organic product, and the higher price normally accorded to organic products would not be obtained. Organic farmers would lose the calculated basis for their crops. Organic farmers' sensitivity to damages would be more precisely defined with the 1% limit. However, this changes nothing with regard to the potential scope, but only decreases somewhat the number of cases where this is realised.

1.6 Chain of damages due to warranty liability

¹⁵ Mills and mixed feed 2001, p. 470.

¹⁶ EC Regulation 258/97 of the European Parliament and of the Council of 27 January 1997 concerning novel foods and novel food ingredients; EC Regulation No 1139/98 of 26 May 1998 concerning the compulsory indication of the labelling of certain foodstuffs produced from genetically modified organisms, and EC Regulations No. 49/2000 and No. 50/2000 concerning the compulsory indication on the labelling of certain foodstuffs produced from genetically modified organisms.

¹⁷ http://europa.eu.int/comm/dgs/health_consumer/library/press/press172_de.pdf

There are two contrasting systems of contractual liability in the world. Anglo-American law is based on warranty liability of parties entering into an agreement in which their fault, i.e. their ability to avoid bad performance, is not in question. “In contrast, continental legal systems – including the German Civil Code – regularly make use of the principle of fault. In exceptional cases, however, they admit a warranty liability that is independent of fault”¹⁸. According to German law, the seller is liable without a special warranty only if he does not exercise the due care required in trade (§ 276 Para. 2 German Civil Code). If an organic farmer who delivers a crop having the supposed property of containing no genetic modifications has not recognised (and was not able to recognise by diligent efforts) that genetic modifications have been incorporated into his crop, then he is not responsible for consequential damages. If he provided a warranty or assurance of this property, then he is liable for consequential damages even under the new Law of Obligations¹⁹. This greatly increases the organic farmer’s interest in preventing the influx of transgenic pollen into his crops. As a result of such pollen influx, the farmer risks not only the loss of increased sales price for organic crops, but also the obligation to compensate for damages multiplied many times by a chain reaction of blending and refining effects associated with further processing of his grain. All of this is true without there ever having been a question of whether the farmer should have recognised that the shipment contained genetic modifications and could have avoided the problem. Does the great susceptibility of organic farmers to damages have significance for legal issues relating to relations between neighbours? The answer is yes: It does have an influence on the number of damage cases arising due to pollen drift into organic cultivations and on the amount of the damages to be expected.

¹⁸ Bundestag publication 14/60040, p. 131.

¹⁹ Haas, BB 2001, p. 1313, 1317; Müller, NJW 2002, p. 1026.

2 The current legal situation within Community law

The present chapter examines the question of whether the currently valid Community law already provides legal instruments which can be used to prevent or at least minimise the introgression of legally commercialised GMOs into organic crops. The circumstances are being investigated which as a result of the approval for commercialisation of GMO seed have led to large-scale cultivation of GMO plants in Germany and thus to introgression of GMOs into organic cultivations. At the EU level, all of the following must be considered in this context: the Deliberate Release Directive 2001/18/EC²⁰, the EU Organic Regulation 2092/91/EEC²¹ and the Seed Directives.²² GMO introgression into organic cultivations can also result from trial release studies involving GMO plants. This problem is not considered.

²⁰ Cf. footnote 1. This is referred to hereafter as the “Deliberate Release Directive”.

²¹ Cf. footnote 10.

²² Directive 66/400/EEC of 14 June 1966 on the marketing of beet seed, OJ L 125 of 11 June 1966, p. 2290/66, last amended by Directive 98/96/EC, OJ L 25, 01 February 1999;
Directive 66/401/EEC of 14 June 1966 on the marketing of fodder plant seed, OJ L 125 of 11 June 1966, p. 2298/66, last amended by Directive 2001/64/EC, OJ L 234 of 01 September 2001, p. 62;
Directive 66/402/EEC on the marketing of cereal seed of 14 June 1966, OJ L 125 of 11 June 1966, p. 2309/66, last amended by Directive 2001/64/EC, OJ L 234 of 01 September 2001, p. 62;
Directive 66/403/EEC on the marketing of seed potatoes of 14 June 1966, OJ L 125 of 01 June 1966, last modified by Commission Decision 1999/742/EC, OJ L 297 of 18 November 1999, p. 39;
Directive 69/208/EEC on the marketing of seed of oil and fibre plants of 30 June 1969, OJ L 169 of 10 July 1969, p. 3, last amended by Directive 98/96/EC, OJ L 25, 01 February 1999;
Directive 70/458/EEC on the marketing of vegetable seed of 29 September 1970, OJ L 225 of 12 October 1970, p. 7, last amended by Directive 98/96/EC, OJ L 25, 01 February 1999.

2.1 Protective measures according to the Deliberate Release Directive 2001/18/EC

The previous Deliberate Release Directive 90/220/EEC was replaced in February 2001 by the new Deliberate Release Directive 2001/18/EC.²³ Member States are required to implement the requirements of the new Deliberate Release Directive in their national legislation by 17 October 2002. The EU's Deliberate Release Directive is concerned with deliberate release and commercialisation of GMOs. The Directive covers provision of GMOs to third parties whether for compensation or not for compensation. This also includes the commercialisation of genetically modified seed.

Before GMO seed may be commercialised in all Member States, the approval of a national authority is required according to § 13 Para. 1 Sentence 1 Deliberate Release Directive. The subsequent approval is valid for the whole EU and not just a single Member State. In Germany, the Robert Koch Institut (RKI) is responsible for approval of commercialisation. According to Art. 14 Deliberate Release Directive, the national authority shall check within 90 days of receipt of the application whether it meets the material approval requirements of the Deliberate Release Directive. The authority must prepare an evaluation report in this process. If the application is rejected, the applicant is informed accordingly. In case of rejection, the national authority does not inform the European authorities, and the rejection does not carry any transnational weight. In such a case, the Commission does not have any special authorisation to inform other Member States²⁴. If the national authority decides to approve the application, than it forwards its report with the required documents within 90 days to the Commission. According to Art. 14 Para. 2 Sentence 3 Deliberate Release Directive, the Commission forwards this application and the decision of the national authority to the individual Member States (star-shaped network), and

²³ All citations hereafter refer to the new Deliberate Release Directive 2001/18/EC.

they then have 60 days to justify any objections to the initiating authority according to Art. 15 Para. 3 Deliberate Release Directive in writing. The Commission is not provided with an opportunity to state its position at this stage in the process, but according to Art. 15 Para. 3 Deliberate Release Directive, the Commission is granted a co-determination right. The Commission can influence the approval process for a GMO product by raising a justified objection. If the Member States or the Commission do not raise any objections within 60 days, then the initiating authority grants its approval for commercialisation of the seed across the entire Community.

If at least one Member State or the Commission raises a justified objection which cannot be resolved through negotiations with the initiating authority within 60 days, then according to Art. 18 Para. 1 Deliberate Release Directive, the Commission must make a decision with 120 days. The Commission must make this decision according to Art. 18 Para. 1 and Art. 30 Deliberate Release Directive in consultation with a Regulatory Committee and the Council. The basic principles of the Regulatory Committee are laid down in Art. 5 of Directive 1999/468/EC.²⁵ They stipulate that the representative of the Commission must distribute a draft of the decision to be made to the Regulatory Committee consisting of representatives of the Member States and a Commission representative. A qualified majority is then required as the Regulatory Committee decides on its position on the draft decision. The weighting of the votes of the individual representatives in the Regulatory Committee is given in Art. 205 Para. 2 EU Treaty. If the Regulatory Committee agrees with the Commission's proposal, then the Commission makes the corresponding decision on the approval of the GMO seed which is binding for the national authority. If the Regulatory Committee rejects the proposed decision of the Commission, then the Commission submits a decision proposal to the Council.

²⁴ Lienhard, U., Der mehrstufige gemeinschaftliche Verwaltungsakt am Beispiel der Freisetzungsrichtlinie [The multistage community administrative act based on the example of the Deliberate Release Directive], NuR 2002, p. 13, 14.

²⁵ Council Decision of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission, 1999/468/EC, OJ of the EC No. L 184, p. 23 of 17 July 1999.

According to Art. 5 Para. 6 of Directive 1999/468/EC, the Council can make a binding decision based on a qualified majority. If the Council does not decide within three months, then the Commission's proposal is enacted. In both cases, the Commission forwards the decision to the national authority which is bound by it. Based on the process described above, the Member States can exert their influence on whether genetically modified seed is commercialised and on the conditions that are associated with its commercialisation. Inter alia, this means that the Member States can require more stringent conditions for the commercialisation of GMO seed and can also prevent them. For this purpose, a qualified majority of Member States is required in the Regulatory Committee or in the Council.

Part C of the Deliberate Release Directive governs the requirements relating to GMO applications and the conditions under which GMOs may be approved. As a prerequisite to the application, the applicant must perform an environmental risk assessment according to Art. 13 Para. 2 lit. b Deliberate Release Directive. With regard to the environmental risk assessment, Annex II of the Deliberate Release Directive describes the objectives, general principles, methodology and derivation of conclusions. The objective of an environmental risk assessment is to identify and evaluate potential adverse effects of the GMO, either direct and indirect, immediate or delayed, on human health and the environment which the deliberate release or the placing on the market of GMOs may have. In addition, a plan for monitoring must be developed according to Art. 13 Para. 2 lit. e Deliberate Release Directive. Annex VII of the Deliberate Release Directive describes the objectives and general principles to be followed in creating the monitoring plan. The objective of a monitoring plan is to confirm that any assumptions regarding the occurrence and impact of potential adverse effects of the GMO in the environmental risk assessment are correct. The monitoring plan is also intended to identify the occurrence of adverse effects of the GMO or its use on human health or the environment which were not anticipated in the environmental risk assessment. Finally, according to Art. 13 Para. 2 lit. c

Deliberate Release Directive, the applicant must submit “the conditions for the placing on the market of the product, including specific conditions of use and handling” with the application.

According to Art. 19 Para. 1 Deliberate Release Directive, only after a GMO is approved for placing on the market or is subject to a positive decision by the Commission may it be used without further notification throughout the Community in so far as the specific conditions of use and the environments and/or geographical areas stipulated in these conditions are strictly adhered to. In Art. 19 Para. 2 and Para. 3 Deliberate Release Directive, the applicant is obligated to adhere to all of the specific conditions stipulated in the approval. Art. 19 Para. 3 Deliberate Release Directive specifies what the written consent for placing on the market must explicitly state. According to Art. 19 Para. 3 lit. c Deliberate Release Directive, these are some of the requirements:

- “Conditions for the placing on the market of the product, including any specific condition of use, handling and packaging of the GMO(s) as or in products”
- “Conditions for the protection of particular ecosystems/environments and/or geographical areas”

Clearly, the written consent for placing GMOs on the market as a product according to Art. 19 Para. 3 lit. c Deliberate Release Directive can specify measures to prevent GMO introgression into other plants if it was determined in deliberate release trials that actual or potential hazards exist for human health and the environment due to the GMO in question. Through the deliberate release of GMOs into the environment, experience should be gained regarding mutual interactions between the GMO and the environment as well as potential hazards for human health and the environment. The consent process for the deliberate release of GMOs is described in Part B of the Deliberate Release Directive. According to Art. 6 Para. 2 and Art. 7 Para. 3 Deliberate Release Directive, the applicant must provide information as stipulated in Annex III which

is needed to carry out an environmental risk assessment according to Annex II of the Deliberate Release Directive. According to Annex III B, Part D of the Deliberate Release Directive, information must be provided about the GMO plant, particularly concerning any toxic, allergenic or other harmful effects on human or animal health as well as mechanisms of interaction between the genetically modified plant and target organisms (cf. Annex III B, Part D, Nos. 7 to 10).²⁶ Moreover, the application must include information about the place of release according to Annex III B, Part E of the Deliberate Release Directive, including the “presence of sexually compatible wild relatives or cultivated plant varieties” (Part E No. 3) as well as the “proximity to officially recognised biotopes or protected areas which may be affected” (Part E No. 4). Finally, according to Annex III B, Part G, No. 1 lit. a and lit. b Deliberate Release Directive, the applicant must provide information about any precautions taken with regard to distance(s) from sexually compatible plant varieties, both wild relatives and crops and b) any measures to minimise/prevent dispersal of any reproductive organ of the GM plant (e.g. pollen, seeds, tuber). The citations show that there are no specific regulations to protect against potential property infringement of neighbouring organic farming areas in case of deliberate release. However, information must be provided about potential toxic or allergenic effects on human or animal health as well as the presence of sexually compatible wild relatives or cultivated plant variety and also officially recognised biotopes or protected areas. Although information must be provided about precautions taken to prevent or minimise problems with transgenic pollen, it remains uncertain whether property infringement of organic farms is to be prevented or minimised through such measures.

One must now ask whether the conditions required for placing on the market and using GMOs as a product according to Art. 19 Para. 3 lit. c Deliberate Release Directive also cover measures to protect the property of the resulting

²⁶ Annex III A of the Deliberate Release Directive is irrelevant with regard to the subject of GMO introgression into organic crops discussed in this paper since Annex III A applies to the release of GMOs which are not higher plants.

organic crops. Property infringement occurs if a thing is interfered with so as to produce an adequate damage.²⁷ Due to introgression of GMOs into the genetic material of the organic plants, damage to the organic farmer's material assets (plants) could be presumed to occur. Due to introgression of GMOs into the genetic material of the plant, the plant is modified as a whole (the corporeal object); it assumes other properties reflecting the hybrid genetic material. Upon harvest of the plants (separation from the piece of land), a movable thing within the meaning of § 90 German Civil Code exists. Court rulings in Germany have established different case groups for the question of property infringement. With regard to introgression of GMOs into plants, the following case groups are relevant: "Detrimental interference with the physical material of a thing" and "Interference with a thing which prevents or impedes its use".²⁸

Detrimental interference with the physical material of a thing encompasses the destruction, damage or disfigurement of a thing in terms of its physical material.²⁹ Whilst there may be doubt whether the genetic material of a plant itself has physical substance, a plant modified through GMO introgression has physical substance. The fact that the modification makes its first appearance in the product of the introgression is irrelevant since the property of an organic farmer continues with the harvested plants according to §§ 953, 99 BGB .

Moreover, there is property infringement if the plant is interfered with such that its use is prevented or impeded. Property infringement with respect to plants is to be seen as any physical interference with the thing which reduces the usability according to the objective of the property owner.³⁰ As a limiting condition, the market value must be reduced by the interference on the thing. This occurs in any case if the organic farmer loses the added premium of his organic products. A loss of premium can be based on the following situation: According to Art. 21 Para. 2 Deliberate Release Directive, thresholds can be

²⁷ Thomas, in: Palandt, Bürgerliches Gesetzbuch [German Civil Code], § 823, margin number 7.

²⁸ Wellkamp, Haftung in der Gentechnologie [Liability in genetic engineering], NuR 2001, p. 188, 190.

²⁹ Mertens, in: Münchner Kommentar, German Civil Code, § 823 margin number 78.

³⁰ Mertens in: Münchner Kommentar, German Civil Code, § 823 margin number 90.

stipulated for products in which adventitious, technically unavoidable traces of approved GMOs cannot be excluded. Below these thresholds, the products do not have to be labelled according to the provisions of Art. 21 Para. 1 Deliberate Release Directive. According to Art. 21 Para. 1 and Art. 19 Para. 3 lit. e Deliberate Release Directive, products which contain GMOs must be clearly identified either on the label or in an accompanying document with the following statement: "This product contains genetically modified organisms". This means that products from an organic crop must be labelled if they contain a proportion of GMOs above a specified limit or, lacking a limit, exhibit the presence of any amount of GMOs. According to Art. 2 Para. 2 lit. b of Regulation (EC) No. 1139/98 concerning the compulsory indication of the labelling of certain foodstuffs produced from genetically modified organisms,³¹ the mandatory labelling limit is currently 1% for the adventitious presence of genetically modified material. This limit also applies to material which may be placed on the market according to Regulation (EC) No. 258/97 on novel foods and novel food ingredients.³² At the same time, according to EU Organic Regulation 2092/91/EEC, no GMOs or products based on GMOs may be used in organic farming. This also corresponds to the consumer expectation that organic products will be free of GMOs. An organic product labelled "Contains GMO" could not be sold at the premium price normally accorded to organic products.³³ Due to the loss of this organic premium, the organic farmer is limited in the usage of this property (plants).

Due to introgression of GMOs into organic crops, the property of organic farmers can be infringed.

To avoid such property infringement, it must be checked whether according to the Deliberate Release Directive measures can be enacted to provide protection against any GMO introgression into organic plants or at least prevent

³¹ Regulation (EC) No. 1139/98, OJ of the EC No. L 33 of 08 February 1999, p. 1, last amended by Regulation (EC) No. 49/2000 of 10 January 2000, OJ of the EC No. L 6 of 11 January 2000, p. 13.

³² Regulation of 27 January 1997, OJ of the EC No. L 43 of 12 February 1997, p. 1.

³³ Cf. section 1.5 above.

introgression of more than 1% GMO into the organic crops. In conjunction with the approval for commercialisation of GMOs, the wording according to Art. 19 Para. 3 lit. c Deliberate Release Directive (“special conditions for the use and handling” as a product) does not exclude the possibility of measures to prevent property infringement due to introgression of GMOs into organic crops. Compliance with minimum prescribed distances or other protective measures when planting GMOs would be one possible case of such a special condition for the use and handling of GMOs placed on the market.

This result could be in conflict with the interpretation of Art. 13 Para. 2 lit. c and Art. 19 Deliberate Release Directive based on the meaning and purpose of the Regulation. The meaning and purpose of a regulation are essentially determined by the objective of the law. The objective of the Deliberate Release Directive is, according to Art. 1 and in accordance with the precautionary principle, to approximate the laws, regulations and administrative provisions of the Member States and to protect human health and the environment when carrying out the deliberate release into the environment of genetically modified organisms for any other purposes than placing on the market within the Community or placing on the market genetically modified organisms as or in products within the Community

Accordingly, Art. 4 Deliberate Release Directive requires that Member States “ensure that all appropriate measures are taken to avoid adverse effects on human health and the environment which might arise from the deliberate release or the placing on the market of GMOs”. According to Art. 1 and Art. 4 Deliberate Release Directive, when placing GMOs on the market, precautionary measures shall be taken against potential hazards to the objects of legal protection “health” and “environment”. According to the meaning and purpose of the Deliberate Release Directive, the applicants must specify any special “conditions of use and handling” when placing GMOs on the market that are required as precautionary measures to protect human health and the environment. According to Art. 1 Deliberate Release Directive, the prevention of

property infringement due to introgression of any legally commercialised GMO is not within the meaning and purpose of the Deliberate Release Directive. According to the meaning and purpose of the Deliberate Release Directive, therefore when placing GVO seed on the market, no measures to prevent GMO introgression can be undertaken in the aim of preventing any GMO introgression.

Taking into account the 16th recital basis of the Deliberate Release Directive could lead to a different result. It stipulates that Community legislation in the area of environmental liability needs to be “complemented by rules covering liability for different types of environmental damage“. For this purpose, the Commission has developed a legislative proposal concerning environmental liability which also covers damages due to GMOs. According to Art. 1 of the proposed directive on environmental liability,³⁴ the objective of the planned environmental liability directive is to create “suitable conditions for environmental liability with regard to the prevention and restoration of environmental damage“. According to Art. 3 No. 1 in conjunction with Annex I, last indent, the application area of the proposed directive covers environmental damage caused by the pursuit of any of the occupational activities listed in Annex I, and to any imminent threat of such damage occurring by reason of any of those activities according to the scope of validity of the Deliberate Release Directive. Damages resulting from GMOs placed on the market are not covered by the proposed directive. Moreover, according to Art. 3 No. 1 in conjunction with Art. 2 No. 18 of the proposed directive, only those environmental damages are covered which have serious adverse effects on the conservation status of biodiversity or water damage or land damage. Moreover, according to Art. 3 No. 2 in conjunction with Art. 2 No. 2 of the proposed directive, the liability shall apply only to biodiversity damage in bird sanctuaries or areas of protection or conservation. The proposed directive does not cover liability for property

³⁴ Directive of the European Parliament and the Council on environmental liability with regard to the prevention and restoration of environmental damage, COM (2002) 17, finalized as of 23 January 2002.

infringement due to GMO introgression resulting from commercialised GMOs into organic crops. Therefore, the proposed directive does not allow any conclusions to be drawn on the question of whether according to the Deliberate Release Directive protective measures can also be enacted to prevent property infringement resulting from GMO introgression.

If potential negative consequences for human health or the environment are not noticed until after commercialisation, a Member State can, according to Art. 23 Deliberate Release Directive, “provisionally restrict or prohibit the use and/or sale of that GMO as or in a product on its territory”. According to Art. 23 Para. 1 Sentence 1 Deliberate Release Directive, if a Member State has, as a result of new or additional information made available since the date of the consent and affecting the environmental risk assessment or reassessment of existing information on the basis of new or additional scientific knowledge, detailed grounds for considering that a GMO as or in a product which has been properly notified and has received written consent under this Directive constitutes a risk to human health or the environment, that Member State may provisionally restrict or prohibit the use and/or sale of that GMO as or in a product on its territory. According to Art. 23 Para. 1 Sentence 1 Deliberate Release Directive, the subsequent prohibition or restriction on the commercialisation of a GMO in a Member State is linked to the presence of a “risk to human health or the environment”. According to Art. 23 Para. 1 Sentence 3 Deliberate Release Directive, the Member State “shall immediately inform the Commission and the other Member States of actions taken under this Article and give reasons for its decision, supplying its review of the environmental risk assessment, indicating whether and how the conditions of the consent should be amended or the consent should be terminated, and, where appropriate, the new or additional information on which its decision is based”. According to Art. 23 Para. 2 Deliberate Release Directive, a decision shall be taken on the matter within 60 days in accordance with the procedure laid down in Art. 30 Para. 2.

Possible subsequent restrictions on the consent for placing a GMO on the market in a Member State, e.g. the prevention of GMO introgression through specification of minimum prescribed distances to other fields, are also linked according to Art. 23 Para. 1 Sentence 1 Deliberate Release Directive to a risk to human health or the environment. The subsequent enactment of protective measures to prevent property infringement of organic farmers is not provided according to Art. 23 Deliberate Release Directive.

Measures for use when placing GMOs on the market to protect against property infringement of organic farmers can be enacted based on usage of the European precautionary principle.³⁵ Application of the European precautionary principle does not presume a concrete risk;³⁶ however, the potential negative consequences of a phenomenon, a product or a process must have been determined.³⁷ If we follow this assessment of the precautionary principle, then according to the Deliberate Release Directive, precaution against GMO introgression can be demanded only if potential negative consequences of a GMO are determined to exist for the health of humans or the environment. According to Art. 6 Deliberate Release Directive *inter alia*, such potential negative consequences are investigated through field trials prior to placing a GMO on the market. If, during the field trials or based on the investigations, no negative consequences for human health or the environment are discovered, then no protective measures to prevent property infringement due to GMO introgression can be enacted as part of the approval for commercialisation.

³⁵ Mentioned expressly in Art. 1 and Art. 4 Para. 1 Deliberate Release Directive, but not defined. The precautionary principle is also named on the primary level of Community law in Art. 174 Para. 2 Sentence 2 of the European Union Treaty, where it is also not defined. Through its “Communication from the Commission on application of the precautionary principle”, Neue Zeitschrift für das Verwaltungsrecht 2001, Supplement No. IV, the Commission has created a non-legally binding orientation aid for the precautionary principle.

³⁶ In its ruling, the ECJ based its export ban on British beef on the precautionary principle. According to the ECJ, Community measures are justified even if a concrete risk cannot be verified, ECJ Slg. 1998 I, p. 2211, 2259.

³⁷ Communication from the Commission on application of the precautionary principle, COM (2000) 1 of 02 February 2000, printed in: Neue Zeitschrift für das Verwaltungsrecht 2001, Supplement No. IV, p. 7.

The preceding interpretation result is countered by the fact that the intent of a law is determined by the intent-means rationale in law. As a trait of the constitutional state, this intent-means rationale is oriented not only towards the intent of the law but also towards the systematic relationship between a given regulation or law and other regulations or laws. Therefore, the final orientation of a law does not have to be identical to the purposes of the historical legislation since the determination of the respective standard meaning of a law is subject to the altered background conditions. The standard meaning can be liberated from the motives and objectives related to the history of its creation. Moreover, a law must be seen within the context of the entire legal system and also fulfils the immanent purposes of the legal system such as keeping the peace, settling conflicting interests, protecting objects of legal protection and maintaining objectivity.³⁸ Consideration of this scenario and the possible protective measures according to the Deliberate Release Directive along with the provision of the EU Organic Regulation 2092/91/EEC raises significant doubts regarding the previous interpretation result that when placing GMOs on the market protective measures to prevent property infringement of organic crops due to GMO introgression could not be permissible. The European lawmaker has recognised the growing significance to the consumer of foods produced through organic farming and is giving organic farming a role in the re-orientation of the joint agricultural policy.³⁹ In order to create uniform prerequisites at the European level for the production of organic products, the EU Organic Regulation 2092/91/EEC specifies in Art. 6 Para. 1 d that “genetically modified organisms and/or any product derived from such organisms must not be used” in production of products through organic farming. For seeds, the Regulation requires in Art. 6 Para. 2 a that “the mother plant in the case of seeds and the parent plant(s) in the case of vegetative propagating material have been

³⁸ Cf. Vitzthum/ Geddert-Steinacker, “Der Zweck im Gentechnikrecht - Zur Schutz- und Förderfunktion von Umwelt- und Technikgesetzen” [The concept of intent in genetic engineering law – The protective and developmental functions of environmental and technology laws]. *Tübinger Schriften zum Staats- und Verwaltungsrecht*, Vol. 4, p. 42.

³⁹ Cf. the recitals of the EU Organic Regulation 2092/91/EEC, at location quoted.

produced without the use of genetically modified organisms”. According to Art. 10 in conjunction with Art. 5 EU Organic Regulation, the labelling and advertising for an organic product may refer to organic production methods only where the prerequisites for the use of GMOs are met according to Art. 6 *inter alia*. Otherwise stated, the European lawmaker requires that GMOs may not be used for the production and marketing of products using organic production methods. At the same time, commercialisation of GMOs is allowed under certain conditions. As a result, infringement of the property associated with organic cultivations can occur which threatens the existence of organic farming and impairs the consumer’s freedom of choice. In order to settle the resulting conflict between organic farming and farmers who choose to use GMOs, European lawmakers must find a way to settle the conflicts of interest and keep the peace between the different forms of agriculture. To do this, the Member States can prescribe measures for marketers and users of GMOs to protect against property infringement which organic farmers can suffer in their crops due to GMO introgression. The Member States can specify protective measures as part of “the conditions for the placing on the market of the product, including specific conditions of use and handling” to be specified or already established according to Art. 13 Para. 2 c or rather Art. 19 Para. 3 lit. c Deliberate Release Directive.

Consideration of Art. 13 Para. 2 lit. c and Art. 19 Para. 3 lit. c Deliberate Release Directive with Art. 21 Deliberate Release Directive does not stand in the way of this result, but it also does nothing to support it. Thus, GMO products must be labelled according to Art. 21 Para. 1 Deliberate Release Directive corresponding to the requirements of the consent to place on the market, i.e. the conditions according to Art. 19 Para. 3 lit. c Deliberate Release Directive must also be indicated on the packaging. In Art. 21 Para. 2 Deliberate Release Directive, it is additionally assumed that “for products where adventitious or technically unavoidable traces of authorised GMOs cannot be excluded”, a minimum threshold can be established. Below this minimum threshold, the

products do not have to be labelled according to Art. 21 Para. 1 in conjunction with Art. 19 Para. 3 lit. e Deliberate Release Directive. The European lawmaker has thus recognised the potential for adventitious GMO introgression into other plants and has responded with mandatory labelling of the products involved. Based on the decision to establish thresholds, it is not possible to infer an obligation to undertake measures to protect against property infringement due to GMO introgressions according to the Deliberate Release Directive. However, by establishing thresholds it could be inferred that protective measures to prevent property infringement due to GMO introgression below the labelling threshold do not have to be taken.

As the result, it is to be maintained that according to the Deliberate Release Directive, measures to protect against property infringement due to GMO introgression can also be stipulated in the consent for commercialisation as “special conditions for use and handling” of a GMO as a product. This follows from a systematic consideration of the provisions of the Deliberate Release Directive in conjunction with the provisions of the EU Organic Regulation. The only way to achieve a balance between the interests of organic farmers and users of GMO plants is by taking into account the objectives of the EU Organic Regulation in the Deliberate Release Directive.

So far we have considered whether protective measures to prevent property infringement due to GMO introgression into organic crops can be stipulated according to the Deliberate Release Directive for the commercialisation of GMOs. It remains to be clarified whether the Member States can enact further protective measures to avoid any sort of GMO introgression besides the regulations in the Deliberate Release Directive. They could be prevented from doing this by Art. 22 Deliberate Release Directive. According to Art. 22 Deliberate Release Directive, without prejudice to Art. 23 of the Deliberate Release, Member States may not prohibit, restrict or impede the placing on the market of GMOs, as or in products, which comply with the requirements of the Directive. According to Art. 23 Para. 1 Deliberate Release Directive, only if a

Member State, as a result of new or additional information made available since the date of the consent and affecting the environmental risk assessment or reassessment of existing information on the basis of new or additional scientific knowledge, has detailed grounds for considering that a GMO as or in a product which has been properly notified and has received written consent under the Directive constitutes a risk to human health or the environment, that Member State may provisionally restrict or prohibit the use and/or sale of that GMO as or in a product on its territory. The question now is whether measures to protect against GMO introgression which are not related to the placing on the market but rather are stipulated for the planting of GMOs fall under the prohibitions, restrictions and impediments within the meaning of Art. 22 and Art. 23 Para. 1 Deliberate Release Directive. What is important here is the actions for which the Member States may not stipulate any prohibitions, restrictions and impediments. According to Art. 22 Deliberate Release Directive, the prohibitions, restrictions and impediments relate to the placing on the market of GMOs. The intent is to protect “free circulation”, as follows from the heading of Art. 22 Deliberate Release Directive. Moreover, the old Deliberate Release Directive 90/220/EEC and the new Deliberate Release Directive 2001/18/EC are both based on Art. 95 EU Treaty (Art. 100 a, old version), thus aiding in the realisation of the internal market.⁴⁰ Protective measures to prevent GMO introgression are permissible according to other regulations besides the Deliberate Release Directive if they do not impede free circulation with GMOs. If the European Union has enacted a certain range of regulations in the aim of harmonising the internal market as has occurred for the placing on the market of GMOs with the Deliberate Release Directive, then deviations from these regulations are possible only according to the requirements stipulated in Art. 95 EU Treaty.⁴¹ If a Member State deems it necessary according to Art. 95

⁴⁰ Cf. the 4th recital of Directive 90/220/EEC, OJ L 117 of 08 May 1990, p. 15; Lienhard, U. (2002): Der mehrstufige gemeinschaftliche Verwaltungsakt am Beispiel der Freisetzungsrichtlinie [The multistage community administrative act based on the example of the Deliberate Release Directive], *Natur und Recht*, p. 13, 17.

⁴¹ Geiger, EU Treaty – Treaty on EU and Treaty establishing the EU, Art. 30 EU Treaty, margin no. 1.

Para. 4 EU Treaty to maintain national provisions after the Council or the Commission has enacted a harmonisation which are justified by important requirements within the meaning of Art. 30 EU Treaty or with regard to protection of the occupational environment or the environment in general, then the Member State must inform the Commission of these provisions as well as reasons for maintaining them. According to Art. 28 EU Treaty, “quantitative restrictions on imports and all measures having equivalent effect” are prohibited between Member States. If Germany allows the planting of GMO seeds only under the restriction that safety measures must be complied with which are intended to protect against property infringement due to GMO introgression into organic fields, then these safety measures could fall under the category of “measures having equivalent effect” within the meaning of Art. 28 EU Treaty. Restrictions on free circulation of goods using measures having equivalent effect can be circumvented under the conditions of Art. 30 EU Treaty. According to Art. 30 EU Treaty, the “provisions of Articles 28 and 29 shall not preclude prohibitions or restrictions on imports, exports or goods in transit justified on grounds of public morality, public policy or public security; the protection of health and life of humans, animals or plants; ... or the protection of industrial and commercial property.” According to the wording of Art. 95 Para. 4 EU Treaty, only national provisions may be maintained. The question now is whether the introduction of new national regulations is prohibited according to Art. 95 Para. 4 EU Treaty. This would include the introduction of measures to protect against property infringement due to GMO introgression into organic plants. According to the wording of the old Regulation’s Art. 100 a Para. 4 EEC, the Member State could use only such provisions as are justified on grounds of major needs within the meaning of Art. 36 EEC (old version). The term “use” is construed so that even after harmonisation is complete, the Member States would have possibility of more stringent protective regulations.⁴² What is

⁴² Pernice, “Auswirkungen des europäischen Binnenmarktes auf das Umweltrecht – Gemeinschafts(verfassungs-) rechtliche Grundlagen” [Consequences of the European internal market on environmental law – Community (constitutional) legal fundamentals], *Neue Zeitschrift für das Verwaltungsrecht* 1990, p. 201, 207.

uncertain is whether this interpretation would change due to the new wording in Art. 95 Para. 4 EU Treaty with “maintain”. If one considers only the new wording, then Art. 95 Para. 4 EU Treaty covers only such national provisions that existed prior to the enactment of a harmonisation directive. New protective measures could not be introduced according to Art. 95 Para. 4 EU Treaty. The question of whether according to Art. 95 Para. 4 the relevant provision of the Member State is justified or represents a “disguised restriction on trade between Member States” must be decided by the Commission according to the procedure described in Art. 95 Para. 6 EU Treaty.

Art. 95 Para. 5 EU Treaty is valid without prejudice to Art. 95 Para. 4 EU Treaty. According to this provision, if, after the adoption of a harmonisation measure, a Member State deems it necessary to introduce national provisions based on new scientific evidence relating to the protection of the environment or the working environment on grounds of a problem specific to that Member State arising after the adoption of the harmonisation measure, it shall notify the Commission of the envisaged provisions as well as the grounds for introducing them according to Art. 95 Para. 5 EU Treaty. According to Art. 95 Para. 6 EU Treaty, the “Commission shall ... approve or reject the national provisions involved after having verified whether or not they are a means of arbitrary discrimination or a disguised restriction on trade between Member States.”⁴³

The introduction of stricter protective measures in Germany which are intended to prevent any possible GMO introgression is thus basically possible according to Art. 95 EU Treaty. The basis could be a further approach of the German legislature as a precaution against as yet undetected risks of transgenic plants. However, even with such a precautionary approach, the protective measures can not be arbitrarily established. The protective measures must be at least part of a well founded protective and precautionary concept by the Member State.

⁴³ Cf. also Geiger, EU Treaty – Treaty on EU and Treaty establishing the EU, Art. 95 EU Treaty, margin no. 9 ff

On the one hand, the object of such a concept could be the consumer's freedom of choice. The consumer retains the freedom to purchase GMO-free foods only if measures are enacted to prevent GMO introgression. Consideration of the current 1% minimum threshold for labelling as "GMO-free" cannot guarantee the freedom of choice on the long term. The minimum threshold does not provide any protection against introgression. If no protective measures to prevent or minimise GMO introgression are enacted, then there is a risk that the introgression rate of transgenic genetic information into organic crops will increase. This would endanger the freedom of consumers to opt for GMO-free foods.

On the other hand, promotion of organic farming in German could be part of the concept. One of the fundamental pillars of organic farming is the wholesale rejection of active use of genetic engineering, e.g. in seeds. According to Art. 6 Para. 1 of the EU Organic Regulation 2092/91/EEC, GMOs may not be used and seeds must be produced without the use of GMOs in organic farming. Organic farming is thus an alternative form of agriculture in comparison to farming with GMOs and it offers the potential to react to development failures that occur in conventional agriculture. The feasibility of not using any transgenic seed is becoming restricted due to the proliferation of transgenic plants.

Further aspects of a protective concept could encompass the protection and preservation of biological diversity in Germany.

2.2 The EU Organic Regulation and the Seed Directives

Neither the EU Organic Regulation⁴⁴ nor the Seed Directives⁴⁵ contain provisions which can be used as a basis for protective measures to impede or prevent GMO introgressions.

⁴⁴ Cf. footnote 10.

⁴⁵ Cf. footnote 22.

Art. 5 of the EU Organic Regulation provides that advertising for a product may make reference to organic production only if the product is produced without the use of GMOs and compliance with the production provisions in Art. 6 of the EU Organic Regulation 2092/91/EEC is ensured. Except for this usage prohibition, the EU Organic Regulation provides no means stipulating protective measures for preventing GMO introgression for organic farmers or users of GMO seed.

Nor do the Seed Directives contain any regulations concerning specific protective measures to prevent GMO introgression when planting seeds or during later usage of GMO seed. For GMO seeds, there exists only a mandatory labelling requirement on “any label or document, official or otherwise, which is affixed to or accompanies the seed lot”.⁴⁶ A draft directive of 29 January 2002 amending the Seed Directives⁴⁷ provides for compliance with protective measures for seed production. If there is a possibility that transgenic pollen from a neighbouring GMO farming area will cross-pollinate with the seed, a specific minimum prescribed distance⁴⁸ must be upheld according to the draft directive when planting seed according to the respective Seed Directives. Moreover, suitable measures must be undertaken to reduce foreign pollen influx, particularly through physical barriers or pollen barriers.⁴⁹ The draft directive also proposes “good production practice for seed production” in order to minimise GMO introgression and blending during planting and post-harvest handling. Finally, limits are proposed for the individual plant varieties in the Seed Directives beyond which labelling for adventitious or technically unavoidable GMO introgression is necessary.⁵⁰ The protective measures

⁴⁶ Cf. substituting for the other Seed Directives, Art. 12 a Directive 66/400/EEC, at location quoted.

⁴⁷ Draft – Commission Directive .../EC of amending Council Directives 66/400/EEC, 66/401/EEC, 66/402/EEC, 66/403/EEC, 69/208/EEC and 70/458/EEC on the marketing of beed seed, fodder plant seed, cereal seed, seed-potatoes, seed of oil and fibre plants and vegetable seed and Decision 95/232/EC on the organisation of a temporary experiment in order to establish conditions to be satisfied by the seed of hybrids and varietal associations of swede rape and turnip rape, 29 January 2002.

⁴⁸ For planting of beet seed, e.g. 2,000 m.

⁴⁹ Cf. the possible protective measures in section 4.1: Measures against vertical gene transfer – Overview and discussion.

⁵⁰ For beet seed according to Directive 66/400/EEC, at location quoted, the limit should be 0.5% GMO according to the draft directive.

proposed in the draft directive do not offer a point of approach for introducing protective measures against GMO introgression into organic crops. According to the draft, protective measures cannot be imposed on users of GMOs, and protection against GMO introgression outside of seed production is not guaranteed.

2.3 Summary

As part of the consent for placing GMOs on the market according to Art. 19 Deliberate Release Directive, compliance with special conditions for the use and handling of GMOs as a product within the meaning of Art. 19 Para. 3 lit. c Deliberate Release Directive can be prescribed to prevent GMO introgression into organic crops raised by organic farmers. On the one hand, these protective measures are intended to prevent and defend against hazards to human health and the environment. On the other hand, the Member States can also prescribe measures which help to prevent property infringement of organic farmers due to introgression of more than 1% GMO into the organic crops. This is a way of easing the conflict between the ban on actively using GMOs in organic farming and the consent for placing GMOs on the market. The Member States can also enact measures to protect against any sort of GMO introgression if the provisions from Art. 95 EU Treaty are fulfilled. The fulfilment of the conditions of Art. 95 EU Treaty could be legitimised through a further reaching precautionary approach of the Member State. The Commission of the European Union must receive notification of this and subsequently approve it.

3 The current legal situation under German law

This chapter will consider the question of whether any measures exist, when GMO usage is encountered, to protect organic fields from the influx of transgenic genetic material. Other regulations are also studied which contain minimum prescribed distances (in the broadest sense) in relation to agriculture in order to determine whether these regulations can be used as a basis for measures to protect against the influx of transgenic genetic material. Finally, the framework under civil law for possible co-existence between organic farming and conventional GMO-based farming is presented.

3.1 Protective obligations under public law to protect against GMO introgression according to the Genetic Engineering Act

Approval of transgenic seed in Germany takes place in two stages. First, the transgenic seed must be approved for commercialisation according to the German Genetic Engineering Act (GenTG).⁵¹ Then, the transgenic seed variety must be approved according to the Seed Commerce Act (SaatG). In the sections which follow, the Genetic Engineering Act is examined for possible measures to prevent GMO introgression. Before GMHPs are placed on the market, approval must be granted according to § 16 Para. 2 GenTG. According to § 19 GenTG, the approval for placing on the market can include additional provisions if necessary in order to ensure the protective purpose described in § 1 No. 1 GenTG. Accordingly, possible protective measures to prevent GMO introgression could be enacted according to § 19 GenTG as additional provisions to the commercialisation process according to § 16 Para. 2 GenTG. The necessary prerequisites are examined hereafter. According to § 16 Para. 2 GenTG, commercialisation consent shall be granted if no harmful interference is to be expected to the objects of legal protection named in § 1 No. 1 GenTG,

⁵¹ Genetic Engineering Act (Gentechnikgesetz – GenTG), in the published version of 16 December 1993, Federal Law Journal I, p. 2066, last amended on 29 October 2001, Federal Law Journal I, p. 2785.

namely the health of humans, animals and plants as well as the remaining environment in terms of its nature and objects of legal protection, or if such consequences are to be expected but are not unjustifiable according to the current state of science in relation to the purpose of the commercialisation.⁵² In other words, when placing GMOs on the market, risk prevention as well as precautions against actual or suspected risks associated with GMOs must all be examined.

3.1.1. Objects of legal protection in the Genetic Engineering Act

In order to answer the question of whether the Genetic Engineering Act protects against the influx of transgenic genetic information into previously genetically unmodified plants, it is necessary to examine the extent of protection accorded to the objects of legal protection. According to § 1 No. 1 GenTG, the Genetic Engineering Act protects “plants” and “material assets”.

Object of legal protection: “Plants”

Let us first consider the object of legal protection “plants”. It is unclear whether protection of a plant against GMO introgression counts only if the health of the plant is threatened or whether the integrity of the plant in its existing form is also protected. The term “plants” is not defined in the Genetic Engineering Act. Since it is assumed by the Genetic Engineering Act, it is necessary to examine existing definitions in other legislation. According to § 20 a Para. 1 No. 2 of the Federal Nature Conservation Act (BNatSchG)⁵³, plants are considered to be “any species of wild or artificially propagated plants as well as dead plants of any species” and also “seeds, fruits or any other forms of development of wild flora species”. In § 2 Para. 1 PflSchG (PflSchG)⁵⁴, plants are defined as “living

⁵² Hirsch/ Schmidt-Didczuhn, Genetic Engineering Act (GenTG), § 16 margin no. 29.

⁵³ Federal Nature Conservation Act (Bundesnaturschutzgesetz – BNatSchG), in the published version of of 21 September 1998, Federal Law Journal I p. 2994, last amended on 29 October 2001, Federal Law Journal I, p. 2785.

⁵⁴ Plant Preservation Act (Pflanzenschutzgesetz = PflSchG), in the published version of of 14 May 1998, Federal Law Journal I p. 971, reported p. 1527, last amended on 25 June 2001, Federal Law Journal I, p. 1215.

plants” as well as “plant parts, including fruit and seed, which are intended for planting”. In accordance with the protective intent of GenTG, the term “plants” as used in GenTG must encompass both wild and cultivated plants since all plants carry out the critical function of photosynthesis and are thus necessary for the preservation or restoration of habitats and living conditions.⁵⁵ However, the present definition of the term “plant” does not provide a clear indication of whether plants are protected against introgression of transgenic genetic information.

The protective intent according to § 1 No. 1 GenTG is to protect plants against potential risks associated with genetically engineered products and to take precautions against the arising of such risks. The protective intent according to the ministerial draft of the Genetic Engineering Act⁵⁶ (RegEGenTG) is essentially identical to the protective intent of the currently valid Genetic Engineering Act. Accordingly, the provisions of the ministerial draft are used hereafter. The legal intent in § 1 No. 1 RegEGenTG (§ 1 No. 1 GenTG) was to protect plants, material assets and the natural environment against possible risks associated with genetically engineered products and to proceed in a precautionary manner. In the explanatory memorandum of the ministerial draft, the fundamental features of the Act are described as measures to limit and reduce the risk when dealing with GMOs due to diverse interactions with the environment that are not always predictable in advance.⁵⁷ The explanatory memorandum for § 1 RegEGenTG essentially repeats the stated fundamental features but without individually describing the scope of the protected items (plants, material assets, environment).⁵⁸ The committees of the Bundesrat had recommended many amendments to the ministerial draft⁵⁹, but the Bundesrat

⁵⁵ Koch/ Ibelgaufts, Genetic Engineering Act, Commentary with legal regulations and EC Directives, § 1 margin no. 32ff.; Hirsch/ Schmidt-Didczuhn, Genetic Engineering Act, § 1 margin no. 18.

⁵⁶ Bundestag publication 11/5622, p. 1 ff.

⁵⁷ Bundestag publication 11/5622, p. 1, 21.

⁵⁸ Bundestag publication 11/5622, p. 1, 22.

⁵⁹ Recommendations of the committees, Bundesrat publication 387/1/89.

wanted to consider benchmark figures⁶⁰ only during further legislative work. The benchmark figures do not contain any frame of reference for the question of whether the Genetic Engineering Act is also intended to protect the integrity of plants. The recommendations made by the committees of the Bundesrat on the legal intent in § 1 RegEGenTG confirm the orientation towards risk prevention and precautionary measures, but they do not elaborate on the extent of the terms “plant” and “material assets”. The ministerial draft essentially corresponds in its content to the recommendations of the inquiry commission of the German Bundestag in the publication “Chancen und Risiken der Gentechnologie” [Prospects and risks of genetic engineering]⁶¹. With regard to the question of plant production, the commission believes that potential negative environmental consequences should be avoided. However, in the opinion of the commission, there are only small risks associated with deliberate introduction of individual genes using recombinant DNA technology compared to other conventional propagation techniques. In the final summary of its position, the commission recommends assessing the need for protected areas for preserving wild plants and implementing the related protective measures as required.⁶² The legislative process does not offer any frame of reference for the question of whether the Genetic Engineering Act is intended to protect the integrity of genetically unmodified “plants”.

Harmful interference to “plants”

We will now consider the question of whether it is within the meaning and intent of genetic engineering legislation to protect the integrity of genetically unmodified plants. According to § 16 Para. 2 GenTG, no unjustifiable harmful interference to the object of protection “plants” should be expected when a GMO is placed on the market. According to the literature, harmful interference is

⁶⁰ Bundestag publication 11/5622, p. 40.

⁶¹ Bundestag publication 10/6775, p. 1 ff.; Vitzthum/ Geddert-Steinacker, Der Zweck im Gentechnikrecht - Zur Schutz- und Förderfunktion von Umwelt- und Technikgesetzen [The concept of intent in genetic engineering law – The protective and developmental functions of environmental and technology laws]. Tübinger Schriften zum Staats- und Verwaltungsrecht, vol. 4, footnote 3.

⁶² Bundestag publication 10/6775, p. VIII, recommendation no. 11.

only GE-specific damaging events.⁶³ Harmful interference includes, in particular, toxic effects, pathogenic effects on other organisms besides the target organism, changes in energy and material equilibrium, displacement of other species, transference of GE-passed negative traits or similarly grave interventions in the natural evolutionary interaction of genes.⁶⁴ Introgression of a GMO into non-genetically modified plants due to which no harmful interference of the type described above threatens the plants therefore does not fall under the protective intent of the Genetic Engineering Act. However, scientists disagree on the question of whether GMOs placed on the market can result in harmful interference to other plants.⁶⁵ However, according to §§ 19 in conjunction with 16 Para. 2 GenTG, the approving authority may not enact any measures to protect against GMO introgression into other plants so long as the harmful interference of a GMO on other plants has not been “verified”.

A different result is not reached even if one considers plants as part of the “remaining natural environment” also protected in § 1 No. 1 GenTG. Environmental protection also includes preservation of the diversity of species of plants and animals, preservation of the natural and cultivated landscape in terms of its structure and diversity and the intactness of the natural fundamentals of life (e.g. soil fertility) for humans, animals and plants.⁶⁶ Protection of the remaining natural environment extends into the future. It should be protected for existing plants and also for future plants. The critical factor here is that plants are protected as species *per se* and as a part of or factor in the environment.⁶⁷ This means that protection of plants can extend only so far in that the plant species is not destroyed or endangered or due to GMO introgression into the plant the natural equilibrium of its natural environment is

⁶³ Hirsch/ Schmidt-Didczuhn, Genetic Engineering Act, §13 margin no. 27.

⁶⁴ Vgl. Hirsch/ Schmidt-Didczuhn, Genetic Engineering Act, § 16 margin no. 15 und § 13 margin no. 23.

⁶⁵ Inter alia Klinger, Variability and Uncertainty in Crop-to-Wild Hybridization, p. 1-16.

⁶⁶ Hirsch/ Schmidt-Didczuhn, Genetic Engineering Act, § 1 margin no. 19.

⁶⁷ Koch/ Ibelgaufts, Genetic Engineering Act, Commentary with legal regulations and EC Directives, § 1 margin no. 38; Hirsch/ Schmidt-Didczuhn, Genetic Engineering Act, § 1 margin no. 19; Wahl, R. in: Landmann/ Rohmer, Commentar y on environmental law, § 1 GenTG margin no. 17.

not disturbed as can happen due to, say, intervention into the food chain, symbioses or control loops. The integrity of individual plants is therefore not covered by the protective intent under “remaining natural environment” as long as no detrimental consequences for the environment occur due to GMO introgression.

Object of legal protection: “Material assets”

The integrity of the respective plants could also be achieved through protection as “material assets”. According to § 1 No. 1 GenTG, the intent of the Genetic Engineering Act covers risk prevention and precautionary measures for plants and also for material assets. The term “material assets” is intended to imply those things that are not already covered by the environmental term. The term “material assets” corresponds to that found in § 2 Para. 1 No. 2 UVPG⁶⁸ (Environmental Impacts Assessment Act).⁶⁹ § 2 Para. 1 No. 2 UVPG refers to “other material assets” and thereby implies all physical objects within the meaning of § 90 BGB.⁷⁰ Infringement of property in the “plant” material asset can occur due to GMO introgression into the plant.⁷¹

As an interim result, it can be maintained that infringement of property rights with regard to cultivated plants which occurs as a result of GMO introgression is covered by the protective intent of the Genetic Engineering Act.⁷²

⁶⁸ Environmental Impacts Assessment Act [Gesetz über die Umweltverträglichkeitsprüfung] in the published version of 05 September 2001, Federal Law Journal I, p. 2350.

⁶⁹ Wahl, in: Landmann/ Rohmer, Kommentar zum Umweltrecht [Commentary on environmental law], § 1 GenTG margin no. 26.

⁷⁰ Storm/ Bunge, Handbuch der Umweltverträglichkeitsprüfung [Handbook on environmental impacts assessment], § 2 margin no. 78.

⁷¹ Cf. the comment on property infringement in section 2.1.

⁷² In contrast, the liability provisions of §§ 32 ff. GenTG do not provide any compensation in case of pure property damages, cf. in this context: Hirsch/ Schmidt-Didczuhn, Gentechnikgesetz [Genetic Engineering Act], § 32 margin no. 22 and 25.

Harmful interference to “material assets”

Likewise for protecting “material assets”, the approving authority can enact protective measures in the form of additional provisions only if harmful interference to “material assets” is to be expected due to the approval for commercialisation. What is harmful interference to “material assets”? As was discussed in section 2.1, infringement of the “plants” material asset occurs if a infringement of the material of the plant occurs due to GMO introgression into the organic crop. In order to avoid such property infringement, the authority is authorised to enact protective measures as an additional provision as part of the approval for commercialisation.

This result could be in conflict with the fact that according to § 16 Para. 2 GenTG, “harmful interference” to material assets should not arise. “Harmful interference” to the “plants” object of protection would include any interference which entails a risk to the health of plants.⁷³ Not just any GMO introgression could be interpreted as harmful interference to material assets, but rather only introgressions which represent a risk to the health of plants. Such a restriction has to be rejected since the health risks for plants are already covered through a separate object of legal protection. In this case, the object of protection “material assets” cited in § 1 Para. 1 No. 1 GenTG would not acquire an independent significance with respect to plants. For the harmful interference to “material assets” within the meaning of § 16 Para. 2 GenTG, this has to be a matter of GE-specific events, but it is not necessary for the GMO introgression to signify additionally a risk for the plants.

⁷³ Cf. section 3.1.1. object of protection “plants”

3.1.2 Addressee of protective measures

Since the approval is granted to the commercialiser, protective measures such as indication of minimum prescribed distances on the packaging of seed placed on the market can only be addressed to the commercialiser. The protective measures stipulated in conjunction with the commercialisation can influence the legal situation in terms of the neighbour relationship between an organic farmer and a user of genetically modified plants.⁷⁴

3.2 Comparable protective obligations according to other legislation

In the following, we consider regulations relating to minimum prescribed distances (in the broadest sense) in conjunction with planting of crops in order to see whether minimum prescribed distances can be enacted to avoid GMO introgression.

3.2.1 Plant Protection Act

The aim of the Plant Protection Act (PflSchG) is, *inter alia*, to protect plants, and particularly crops, against harmful organisms and non-parasitic infringement, particularly damaging immissions according to § 1 No. 1 PflSchG.⁷⁵ Moreover, according to § 1 No. 4 PflSchG, risks should be prevented that can arise due to the use of pesticides or due to measures related to plant protection (pest control), in particular, for the health of humans and animals and for the natural equilibrium. To achieve the ecological objectives in § 1 No. 4 PflSchG, the Act contains provisions governing the commercialisation of pesticides, §§ 11 to 23 PflSchG, as well as provisions for the use of pesticides in §§ 6 to 10 PflSchG. According to § 6 Para. 1 PflSchG, the use of pesticides must be in accordance with good production practice (GPP). Just what GPP means is not defined, except for the incorporation of integrated plant protection. Integrated plant

⁷⁴ Cf. section 3.3.

protection comprises verification of extensive avoidance of chemical pesticides and ground water protection according to § 2 a Sentence 3 PflSchG. Compliance with GPP is oriented towards formal approval of a certain pesticide, provisions of commercialisation and there particularly §§ 11 and 15 PflSchG.⁷⁵ Guidelines for compliance with GPP by a farmer in the area of plant protection include the instructions for the pesticides and special warning sheets issued by authorities in the main application time frame of the pesticides, e.g. for sowing. According to § 15 Para. 2 PflSchG, the Federal Biological Research Centre for Agriculture and Forestry can stipulate as part of the approval process for a pesticide the usage area as well as certain usage provisions, *inter alia*, for protecting the natural equilibrium. The usage provisions can include minimum prescribed distances to surface waters and also delay times, § 15 Para. 2 No. 2 lit. c and lit. b PflSchG.

The arrangement of minimum prescribed distances to prevent GMO introgression on the basis of the provisions of the Plant Protection Act is assessed as follows:

Direct application of the Plant Protection Act in the aim of establishing minimum prescribed distances for planting GMOs is not possible. The Plant Protection Act cannot be legally applied to legally commercialised GMOs based on the intent to guarantee risk prevention for human health and for the natural equilibrium. According to § 41 No. 5 PflSchG, the provisions of the Genetic Engineering Act are not affected. The lawmaker assumes according to § 16 Para. 2 in conjunction with § 1 No. 1 GenTG that when placing GMOs on the market, no risk to human health and the natural equilibrium is generally to be expected.

When placing GMOs on the market according to §§ 14 ff GenTG, specific planting provisions, e.g. requiring adherence to certain minimum prescribed

⁷⁵ Cf. footnote 44.

⁷⁶ Schiwy, Deutsches Pflanzenschutzrecht [German Plant Protection Act], Commentary, Vol. I, § 6 margin no. 4.

distances, could be prescribed for each plant species, similar to the provisions of §§ 11 to 23 PflSchG. These provisions could then be stipulated within the framework of a “good production practice for GMO cultivation” (cf. section 5.2.3).

3.2.2 Neighbour Laws in the different Länder (the community relationship under Neighbour Law)

The community relationship under Neighbour Law is an instance of the principle of good faith stipulated in § 242 BGB. It applies to the special area of co-existence between owners of neighbouring property and includes the requirement for mutual consideration. Obligations ensuing from the community relationship under Neighbour Law are governed by the Neighbour Laws of the Länder. The Neighbour Laws of the Länder also include provisions for compliance with prescribed separations for plants. A good example of this is given by §§ 38 ff of the Hessian Neighbour Law (Hess. NachbarrechtsG).⁷⁷ According to §§ 38 and 39 Hess. NachbarrechtsG, real estate owners and authorised users of real estate must comply with specific separation limits from the neighbouring property when planting trees, bushes, individual vines and hedges depending on the plant type or rather maximum height of growth. The respective distance to be maintained is doubled according to § 40 Hess. NachbarrechtsG if the neighbouring land is used for cultivation of grape vines, for agriculture and lies in the outlying area or is reserved in the development plan for agriculture or for-profit gardening. The question now is whether these separation provisions according to the Neighbour Laws are also applicable to a separation provision related to the introgression issue or whether separation regulations to prevent GMO introgression can be introduced into the Neighbour Laws. Application of the separation provisions to the introgression issue is not possible since the primary meaning and intent of the provisions is to protect

⁷⁷ Hessian Neighbour Law of 24 September 1962, Gesetz- und Verordnungsblatt I [Law and Official Journal I], p. 417, last amended on 25 September 1990, GVBl I, p. 563.

neighbours against unacceptable casting of shadows.⁷⁸ With regard to the introduction of a new separation provision into the Neighbour Laws to protect against GMO introgression, it should be noted that according to Art. 124 of the Law Introducing to the German Civil Code (EGBGB) that Land law can introduce further restrictions on property but cannot amend the BGB.⁷⁹ In ruling on the community relationship under Neighbour Law as part of the Civil Code, the Federal Government has a claim to concurrent legislative powers according to Art. 74 Para. 1 No. 1 Basic Law (GG)⁸⁰, i.e. the Federal legislature leaves only those areas under Neighbour Law which are not covered by the BGB to the individual Land legislatures and thus to provisions under Land law. In § 906 BGB, the BGB provides a provision for the conveyance of unweighable substances on to a neighbouring piece of land (immissions), and this also includes immissions of genetically modified pollen. In § 906 BGB it is a question of a concluding provision for the conveyance of unweighable substances. Therefore, § 124 EGBGB does not provide any authorising basis for the introduction of a separation provision in the aim of regulating the conveyance of unweighable substances.

⁷⁸ Cf. in this context, representing the Länder legislation, the explanatory memorandum of the Saxon Neighbour Law of 16 December 1992, Sächs. GVBl, p. 571.

⁷⁹ Bassenge, in: Palandt, German Civil Code, § 124 EGBGB margin no. 1.

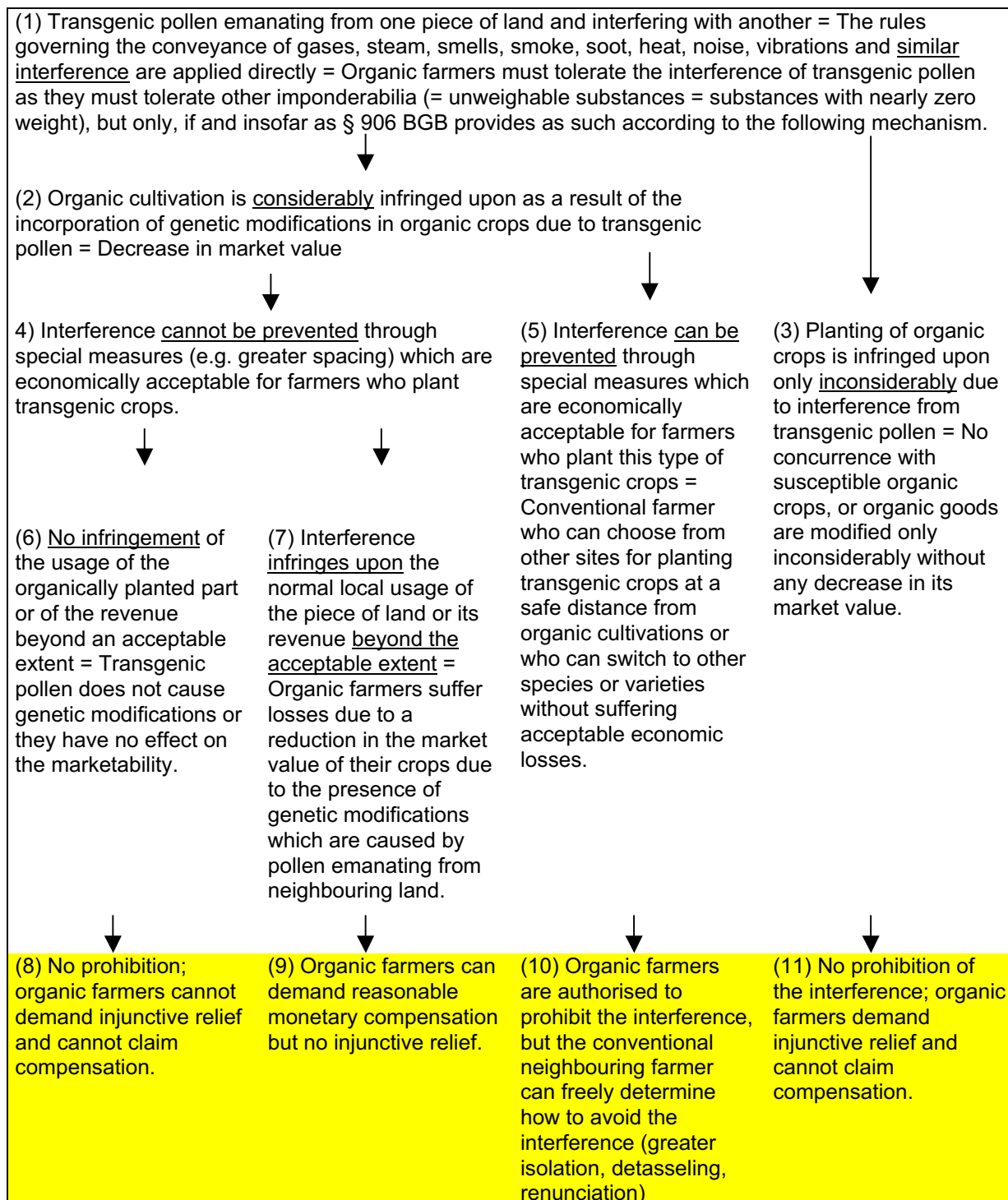
⁸⁰ Basic Law of the Federal Republic of Germany of 23 May 1949, Federal Law Journal I, p. 1, last amended by the law of 19 December 2000, Federal Law Journal I, p. 1755.

3.3 The basis for co-existence under private law

3.3.1 § 906 BGB as the central norm in private environmental law

§ 903 BGB states that the owner of a thing, i.e. also the owner of a piece of land, can do as he wishes with it and “exclude others from any interference” as long as the law or rights of third parties are not in conflict. This could be a way for organic farmers to “exclude” their neighbours. If infringement occurred nonetheless, as in the case of transfer of transgenic pollen, this infringement would be unlawful unless a legal norm requires organic farmers to tolerate the influx of transgenic pollen. If and insofar as such a norm does not exist, organic farmers can request injunctive relief since, according to § 1004 Para. 1 BGB, a party whose property is unlawfully infringed upon can require the disturber to eliminate the infringement and sue for future injunction. § 906 BGB obliges organic farmers to tolerate the influx of transgenic pollen within specific defined limits and regularly in exchange for compensation.

Fig. 1: The regulatory model according to § 906 BGB



§ 903 BGB is based on the concept that a land owner may prevent all other parties as he sees fit from interfering with his land. If another party does this notwithstanding, the land owner may sue the other party for injunctive relief according to § 1004 BGB. The land owner must tolerate only that interference for which the law demands tolerance. How does § 906 BGB stand on the subject of transgenic pollen?⁸¹

§ 903 BGB Extent of ownership

The owner of a thing may so far as the law and the rights of others do not oppose, manage the thing according to his pleasure, and may exclude others from any interference ("Einwirkung"). The owner of an animal must heed the special guidelines for protection of animals when exercising his rights.

§ 906 BGB Transfer of unweighable substances

(1) The owner of a piece of land cannot prohibit the incoming of gases, steam, odours, smoke, soot, heat, noises, shocks and similar interference coming from another piece of land in so far as the interference does not, or only inconsiderably, affect the use of his land. Inconsiderable infringement is generally the case if the limits or guidelines stipulated in laws or legal regulations were not exceeded by interference determined and evaluated according to these standards.

The same is true of values in general administrative guidelines which have been enacted according to § 48 Federal Immissions Control Act and which reflect the state of the art.

(2) The same holds true in so far as considerable interference is caused by a use of the other piece of land, which under the local practice is usual with land in such situation and cannot be prevented by measures which are economically acceptable for users of this type. If the owner must tolerate some interference according to this principle, then he can demand suitable monetary compensation from the owner of the other piece of land if the interference infringes upon usage under local practices or its revenue beyond the acceptable amount.

(3) The introduction through a special channel is not permissible.

§ 907 Dangerous establishments

(1) The owner of a piece of land may demand that on the neighbouring lots there be no establishments erected or kept, of which it is to be foreseen with certainty that their permanence or their use will result in an inadmissible interference with his land. If an establishment complies with the provisions of the Land, which prescribe a certain distance from the boundary or other protective measures, the removal of the establishment cannot be demanded until the inadmissible interference actually occurs.

(2) Trees and bushes are not establishments in the sense of these provisions.

§1004 BGB Removal and injunctive relief

⁸¹ Due to the special position granted to plants such as trees and bushes in § 907 Para. 2 BGB, § 907 BGB on a claim for removal of dangerous establishments cannot be applied to transgenic crops (cf. BGH NJW-RR 2001, 1208 f. in the case of the mildew emanating from vines of a vineyard no longer in use: "The suit cannot succeed even taking into account the issue of the maintenance of a dangerous establishment (§ 907 I BGB), §§ 823 II, 907 BGB. Regardless of whether there is a lack of findings – and they also could hardly be claimed – that it could be "foreseen with certainty" that the defendant's vineyard would have the effects on the plaintiff's land established in the specific case, the vineyard does not represent an establishment within the meaning of the norm; it is granted a special position under Para. 2 (cf. Staudinger/Roth, BGB, 13th edition [1995], § 907 margin no. 18)").

(1) If the ownership is prejudiced otherwise than by withdrawal or detention of the possession, the owner can demand from the disturber the removal of the infringement ("Beeinträchtigung"). If other infringements are to be apprehended, the owner may sue for injunction.
 (2) This claim is barred if the owner is under obligation to permit the infringement.

A legal system can mutually permit neighbours very much or very little: "If a legal system permits very much or everything, then the formal principle of reciprocity actually results in inequalities since in concrete cases generally only one of the neighbours has the opportunity to use his land in the critical manner".⁸² In Roman law, Ulpian's opinion permits practically no interference by a neighbour.⁸³

During preliminary work on the German Civil Code (BGB) at the end of the 19th century, it quickly became apparent that such a strict limitation on land usage would prevent the development of the new industries. Accordingly, legislation was passed that allow the disturbing party very much and without compensation. When the German Civil Code took effect in 1900, this was the initial version:

§ 906 BGB

"The owner of a piece of land cannot prohibit the incoming of gases, steam, odours, smoke, soot, heat, noises, shocks and similar interference coming from another piece of land in so far as the interference does not, or only inconsiderably, affect the use of his land, or so far as it is caused by a use of the other piece of land, which under the local practice is usual with land in such situation. The introduction through a special channel is not permissible."⁸⁴

Today, the same paragraph of § 906 BGB is written to given the neighbour who is interfered with a much stronger legal position and allow the disturbing party much less. The negatively impacted neighbour now has (a) injunctive relief oriented towards the neighbour's practical capacity to circumvent the problem and (b) compensation that is not dependent on fault.

⁸² Liebs, Römische Recht [Roman law], 5th edition, p. 155.

⁸³ Ulpian, Kommentar zum Prätorischen Ediktbuch 17 [Commentary on Praetorian edict book 17], Title: On building easements, in: Liebs, p. 156.

⁸⁴ Beck, Bürgerliches Gesetzbuch für das Deutsche Reich [German Civil Code for the German Reich].

3.3.2 The system of § 906 BGB

If a land owner plants a flowering transgenic cultivation, this usage is necessarily associated with the release of transgenic pollen. The neighbouring organic farmers could prohibit the influx of this pollen according to §§ 903, 1004 BGB, i.e. exclude the owner of the transgenic cultivation from the corresponding interference. They would only have to leave it to the discretion of the owner of the transgenic cultivation how to halt the interference of transgenic pollen on the neighbouring cultivations, e.g. by stopping the use of transgenic cultivations or detasselling transgenic maize plants. If, however, § 906 BGB is applicable, this would be the law within the meaning of § 903 BGB, which stands in conflict with the organic farmers' right to prohibit.

3.3.2.1 Transgenic pollen as "similar interference"

It is thus not the case that a legal interpretation which includes the influx of transgenic pollen among the interferences according to § 906 BGB can be important to organic farmers since it is through this classification in the first place that their obligation to tolerate is justified. Court rulings classifying types of "similar interference" show that pollen, even and even free genetic information combined with dust particles, belongs to such "similar interference". Transgenic pollen is interference within the meaning of § 906 BGB, and therefore it must be tolerated by organic farmers if and insofar as this is provided by § 906 BGB.

“Similar interference” within the meaning of § 906 Para. 1 BGB
Free transgenic genetic information combined with dust particles ⁸⁵
Weed seeds from organic gardens ⁸⁶
Liquid manure not comparable to pollen ⁸⁷
Bees which pollinate flowers ⁸⁸
Toxins used in fighting pests ⁸⁹
Swarms of flies in sheep raising or compost piles not comparable to pollen ⁹⁰
Faeces droppings from a railway bridge ⁹¹
Rooks surrounding dumps not comparable to pollen ⁹²
Flight of sand ⁹³

3.3.2.2 The considerability of the infringement

Organic farmers must tolerate the influx of transgenic pollen into their cultivations if it does not affect or only inconsiderably impairs the usage of their land. The influx of transgenic pollen which does not pollinate any plants within the organic cultivation could be inconsiderable since it does not affect the usage of the organically operated piece of land since the sale of the crop as an organic product is not endangered.

Many organic farmers are defending against the influx of genetically modified genetic information into their fields with the argument that simply knowing that a disturbance of the organic cultivation could occur in another way, say, through horizontal gene transfer, e.g. due to a disruption of the soil fertility as a result of a change to the performance of the edaphon (the aggregate of organisms in the soil) suffices for a considerable infringement. According to current insight, such

⁸⁵ LG Stuttgart of 09 May 1997 - 2 O 15/97, NJW 1997, p. 1860; OLG Stuttgart of 24 August 1999 – 14 U 57/97, NuR 2000, p. 357.

⁸⁶ OLG Düsseldorf NJW-RR 1995, p. 1231 and OLGZ 1993, p. 45; LG Stuttgart RdL 1965, p. 22.

⁸⁷ OLG Düsseldorf, NJW-RR 1995, p. 1482.

⁸⁸ BGHZ 117, p. 110, 112.

⁸⁹ BGHZ 16, p. 374.

⁹⁰ 160, p. 381; LG Munich in: NJW-RR 1988, p. 205, 206.

⁹¹ LG Itzehoe in: NZV 1993, p. 73.

⁹² OLG Zweibrücken AgrarR 1986, p. 81; BGH NJW 1980, p. 770.

⁹³ RGZ 60, p. 140.

an approach has no practical relevance, and accordingly, the present report will focus on the interference by transgenic pollen with compatible organic cultivations.⁹⁴ According to the current state of scientific insight, the German civil courts would consider the influx of transgenic pollen, i.e. the influx of genetically modified genetic information, as an inconsiderable infringement if the pollen did not result in pollination.

The property of organic farmers consisting of the resulting crops would be disturbed by the incorporation of transgenic genetic information. The incorporation of foreign genetic information is to be seen as a material violation which thwarts usage of the crops according to the intended use⁹⁵, i.e. sale as goods without genetic modifications. Material modifications which produce a loss in commercial value are considerable. The incorporation of the transgenic genetic information into the fruit interferes with the material of the new organism and simultaneously reduces its market value.

The threshold for mandatory labelling under foodstuffs laws (see section 1.5.4) is not a limit value or guideline for interference within the meaning of § 906 Para. 1 BGB. Its purpose is to provide consumer information based on the threshold of relevancy under consumer protection law. Today, this threshold has no practical significance since foodstuffs commercialisers do everything in their power to ensure that no genetic modifications at all are found in their products. This controls the market price for guaranteed GE-free products. In practical terms today, a violation of the zero-tolerance principle results in a loss of marketability.

It would be possible to consider stipulating under public law a new limit value or guideline for transgenic pollen within the meaning of § 906 Para. 1 Sentence 2. Naturally, this could not be based on a certain quantity of pollen emitted per area or per time interval; instead, it would have to be oriented towards easily

⁹⁴ Cf. LG Stuttgart, ruling of 09 May 1997, at location quoted

⁹⁵ BGH NJW-RR 1990, p. 1172; OLG Stuttgart - 24 August 1999 - 14 U 57/97.

measurable parameters. One possibility is stipulation of a system of minimum prescribed distances which, if complied with, would qualify interference by transgenic pollen over a greater distance as inconsiderable under Neighbour Law within the meaning § 906 Para. 1 BGB. Also worthy of consideration is a threshold for influx of transgenic genetic information into neighbouring target cultivations to be deemed inconsiderable, i.e. a result-oriented value. This would result in the compensation and obligation system being shifted in favour of growers of transgenic cultivations to the detriment of neighbouring organic farmers, and at the same time would shift the familiar compensation and avoidance problem from zero to threshold X.

The problem would be eliminated only through a value that was so high that organic farmers would have to tolerate practically any influx as inconsiderable. Such a radical solution to the detriment of the organic farmers would run into issues relating to constitutional law. A limit which subjected organic crops to practical any interference due to the transgenic pollen would be associated with a significant intrusion into their property sphere (and likewise into that of leaseholders) protected by Art. 14 Para. 1 GG⁹⁶ since dedication of land to food production without genetic modifications would be rendered impossible and since they would be obligated to accept material modifications in the resulting crops due to transgenic pollination. Finally, there would be disproportionate intrusion to the detriment of the organic farmers into their exercise of profession, the right to which is protected under Art. 12 GG.

A legal threshold governing the compensation relationship under Neighbour Law should therefore not be so high as to take away all legal recourse from organic farmers with regard to their desired exclusion of genetic engineering from their crops. What is conceivable is only a value which shifts the limit somewhat in favour of owners of transgenic cultivations. The higher this limit is set, the more the principle of causal responsibility would be suppressed since

⁹⁶ Basic Law of the Federal Republic of Germany of 23 May 1949, Federal Law Journal 1949, p. 1, last amended by Art. 1 Law of 26 November 2001, Federal Law Journal I, p.3219.

the damaging consequences of the influx of genetic modifications below the threshold would be shifted to the organic farmers and their customers.

3.3.2.3 Usual local practice

According to the first sentence of § 906 Para. 2 BGB, organic farmers must also tolerate considerable infringement due to transgenic pollen if the responsible party can prove that his cultivations fall under usual local practice and the introgressions cannot be prevented through measures which are economically acceptable to him. Planting of generally approved transgenic varieties will be considered as usual local practice everywhere in Germany without there being a question of whether other transgenic cultivations are already present in the region. As varieties are approved, their planting becomes part of the generally permissible agricultural practice.⁹⁷ The argument that an organic farmer would have to do more to prevent nuisances than is otherwise conventional in organic farming, e.g. suppress the flight of weed seed, due to his presence in an area where there are no or only few organic farmers is without grounds like the argument that transgenic cultivations in areas with few or no transgenic cultivations would inadmissibly disturb organic farmers due to the lack of usual local practice. The “usual local practice” relating to transgenic cultivations offers organic farmers no protection against the influx of transgenic pollen if the planted transgenic variety is generally approved.

⁹⁷ Cf.: Gebietscharakter schon durch entsprechende Nutzung determiniert [Character of area already determined by corresponding usage]: BGHZ 15, p. 146; 30, p. 273 (factory); BGH NJW 1980, p. 770 (landfill).

3.3.2.4 Economically acceptable prevention

Organic farmers can, however, demand a halt to the influx of transgenic pollen on to their land if this pollen “considerably” infringes upon the use of their cultivations and if the transfer of transgenic pollen can be prevented by the neighbour using economically acceptable measures. Here, it is not a question of the personal capacity of the neighbour but rather whether one can expect typically and generally such prevention from a user of transgenic seed. The general standard is the economic, technical and organisational capacity of an average, comparable user.⁹⁸ Possible preventive measures could be compliance with a sufficient isolation distance, detasseling and renunciation of transgenic agriculture.

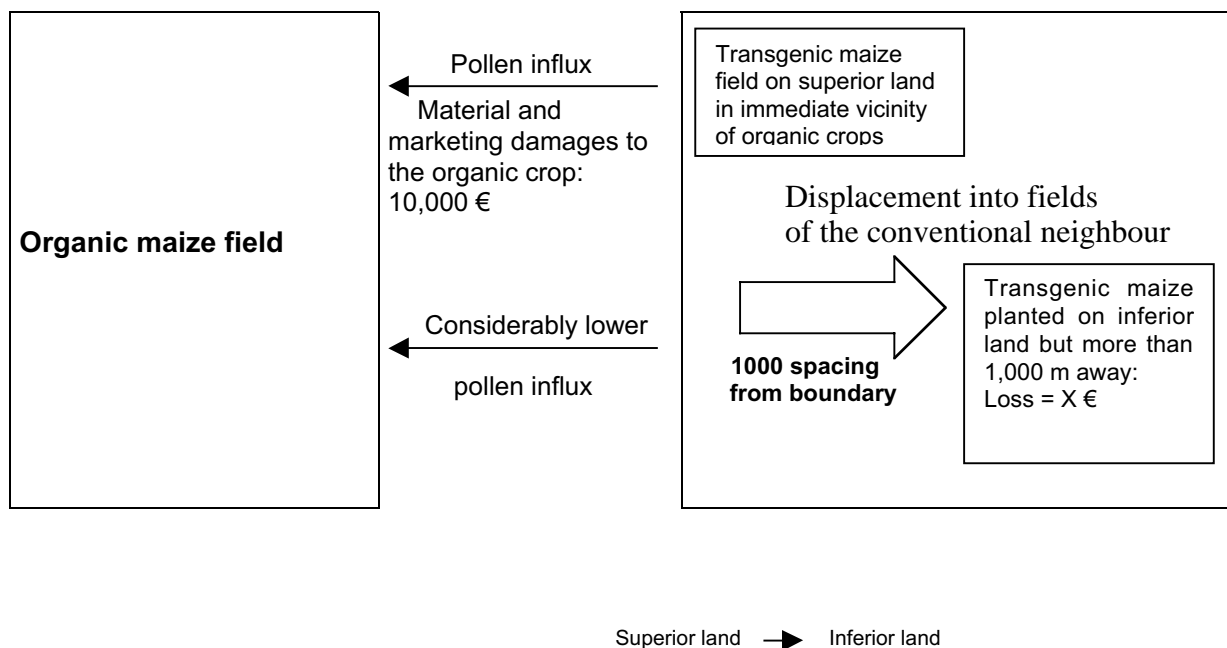
What economic disadvantages are acceptable to the users of transgenic cultivations to avoid the transfer of transgenic pollen?

The economic acceptability is decisive in terms of the obligation to avoid the transfer of transgenic pollen into neighbouring organic cultivations. It thus determines the neighbouring organic farmer’s ability to claim injunctive relief. Here, the amount of the compensation claim under Neighbour Law which would have to be satisfied in the event of non-prevention of the influx of transgenic pollen into the neighbouring organic cultivations becomes significant. The details relating to its basis and amount are examined in section 3.3.2.5. For examination purposes, it is of interest to note that it could not be brought into accord with the ruling by the Federal Supreme Court of Justice on the significance of good faith in the community relationship under Neighbour Law (cf. section 3.3.4.1) to permit the owner of the transgenic cultivation to allow the disruptive influx of transgenic pollen into the neighbouring organic cultivation if in so doing he gives rise to a compensation claim by the organic farmer which is greater than or equal to the cost of preventing the transfer of transgenic pollen.

⁹⁸ OLG Karlsruhe in: BB 1965, p. 690; OLG Düsseldorf OLGZ 1980, p. 16.

If the maintenance of prescribed distances or the renunciation of transgenic agriculture cause lower losses than the compensation to be paid under Neighbour Law, then the avoidance of damage to the neighbouring organic culture takes precedence. According to the standard set by this ruling, owners of transgenic cultivations cannot blithely “infringe and pay the ensuing damages”. Instead, they can infringe only if the costs of preventing damages are significantly higher than the compensation to be paid to the neighbour.

Fig. 2: Interplay between damages to an organic farmer due to a transgenic maize field in the immediate vicinity and losses suffered by a conventional farmer when planting transgenic maize on further removed but inferior land.



The further the loss X lies below the loss in commercial value of the organic harvest which is threatened as a result of pollination by transgenic pollen and subsequent genetic modification of the organic crop, the clearer the obligation of the owner of the transgenic cultivation to back his plants away from the neighbouring organic cultivations. In the example shown here, the limit of this prevent obligation lies at the point where the backing away is possible only on to inferior soil and the lower fertility of the displaced site would result in

disproportionately higher losses of revenue. This example simplifies the actual reality of conflicts between neighbours since in most cases there are many more factors which come into play. However, the chart does illustrate the measures which owners of transgenic cultivations are basically required to comply with: Back away, if possible. If there is a field containing transgenic crops situated in the vicinity of an organic farmer, then the owner of the transgenic plants would have to, insofar as this is feasible, back away from the organic cultivation until his loss would exceed the compensation claim which the organic farmer is entitled to as a result of closer proximity of his organic culture to the transgenic pollen source.

Accordingly, the owner of the transgenic cultivation would have to check whether the transgenic plants offered an economic benefit which is greater than the expected compensation payments to his neighbours. There are several standards in terms of the extent to which owners of transgenic cultivations must undertake preventive measures:

One standard is the amount of the compensation claim to be expected under Neighbour Law according to § 906 Para. 2 Sentence 2 BGB, i.e. the expected charge.	Preventive measures up to the amount of the compensation payment which would have to be paid if the marketing damages to the neighbouring organic farmer of X are economically acceptable. Thus, preventive measures with a cost in any case of up to X are legally required.
The amount of the economic benefits Y associated with the usage of the transgenic variety offer another approach.	Preventive measures with costs ranging up to Y.

The owner of the transgenic cultivation must, assuming he wishes to defend against the organic farmer's injunctive claim to prevent the influx of transgenic pollen, set forth and prove that prevention is not possible at an economically acceptable cost. If it is true, as set forth here, that the economic disadvantage threatening the organic farmer, particularly the loss in commercial value of the organic goods due to genetic modifications, is one of the standards for the economic acceptability of the preventive measures ranging all the way through to renunciation of transgenic agriculture, then the organic farmer will have to

demonstrate to the owner of the transgenic cultivation the essential calculations underlying the injunctive claim showing the extent of the expected loss in commercial value and the liability for consequential damages. These data are necessary to allow the owner of the transgenic cultivation to estimate the amount of the expected compensation claim and the amount for which he must consider preventive costs or disadvantages. Unilaterally, the owners of transgenic cultivations can generally not estimate, without information about the potential damage situation of the neighbouring organic farmers, whether they are actually subject to an injunctive claim. This forms a link between compensation and injunctive claims in an initially surprising manner.

The following table illustrates the distribution of the burden of proof associated with the injunctive claim:

Burden of proof in asserting a claim for suppression of the transfer of transgenic pollen into organic cultivations	Owner of transgenic cultivations	Organic farmer
Emission = Immission = Infringement; Pollen release = Pollen interference = Pollination = Genetic modification (causation) ⁹⁹		+
Usual local practice = General approval of varieties used in transgenic agriculture ¹⁰⁰	+	
Inconsiderability of infringement = Irrelevancy due to genetic modification already existing, no economic disadvantage	+	
Unavoidability through economically acceptable measures ¹⁰¹	+	

3.3.2.5 The compensation claim under Neighbour Law

If organic farmers are required to tolerate the infringement, then they can demand reasonable monetary compensation from the user of the other piece of land if the interference infringes upon usage of their organic cultivation according to usual local practice or reduces revenues over the acceptable amount.

⁹⁹ BGHZ 70, p. 102.

¹⁰⁰ BGHZ 111, p. 63 (69); 120, p. 239, 257.

¹⁰¹ BGH WM 1990, p. 1074.

The compensation claim is not allowed if the infringement is acceptable. Considerable interference generally infringes upon the usage of the disturbed land beyond the acceptable amount. If the market value of the organic goods drops, then the disturbance is considerable and generally not acceptable without compensation. Infringement beyond the acceptable extent within the meaning of § 906 Para. 2 Sentence 2 BGB is determined according to the following rules:

<u>Normal case</u> : “Infringements whose considerability has been affirmed” will “in the normal case” also exceed the “acceptable amount”. ¹⁰²	Considerability and infringement are always indicated in case of loss in commercial value of the organic goods.
The <u>standard</u> is the judicious, average user of the affected land according to his local condition, organisation and objective. ¹⁰³	According to the opinion of Community legislation in EU Organic Regulation 2092/91/EEC, organic agriculture is always judicious usage.
It is <u>not</u> required for the “economic advancement” of the affected neighbour to be “severely affected” (in contrast to an earlier legal ruling). ¹⁰⁴	A noticeable market price reduction or analytic expense for preparing the marketing is sufficient.
<u>Differentiated – Objective standard</u> : Personal circumstances of the affected neighbour are not conclusive, but rather the “the circumstances of each individual case”. ¹⁰⁵	The “sensitivity” of the market for organic goods and the general consumer expectation of free choice both belong to the circumstances to be considered.

The amount of the compensation claim is influenced by fairness considerations. The standard is based on the loss of commercial value occurring as a result of the incorporation of genetic modifications in organic crops as a result of the influx of transgenic pollen, and possibly also consequential damages due to the warranty liability of organic farmers. A reduction comes into question if the damage could have been avoided or reduced through greater attention on the part of the organic farmer. The legal ruling emphasises justice as it concerns the particular case in question.

¹⁰² Roth, in: Staudinger, Kommentar zum Bürgerlichen Gesetzbuch [Commentary on the German Civil Code], third book, law of chattels, §§ 903-924, § 906 margin no. 218.

¹⁰³ OLG Düsseldorf VersR 1979, p. 578.

¹⁰⁴ BGHZ 49, p. 148, 154.

¹⁰⁵ BGHZ 49, p. 148, 153.

The amount of the compensation claim according to § 906 Para. 2 Sentence 2 BGB is determined in the legal ruling based on the following considerations:

Reasonable monetary compensation (§ 906 Para. 2 Sentence 2 BGB)	Crops produced through organic agriculture are rendered unsaleable or saleable only at reduced prices as conventional goods by the presence of a genetically modified construct in their genetic information.
No damage compensation according to § 249 ff. BGB ¹⁰⁶	Only a part of the lost revenue?
Dependence on basic principles of compensation for expropriated property under public law ¹⁰⁷	Only partial restitution?
But then practically full indemnification according to §§ 249 ff. BGB ¹⁰⁸	In the legal ruling, complete restitution regularly of the marketing damages
Equitable decision ¹⁰⁹	Possibly taking into account burdens and advantages in the reciprocal relationship between the neighbours
Oriented towards the market value ¹¹⁰	General market value of the organic goods, not particularly favourable contracts?
Lost revenue of the land ¹¹¹	Full restitution of rent decreases due to construction noise
Loss in commercial value ¹¹²	
Missed profit ¹¹³	Full restitution of the individual loss even in case of a particularly favourable sales contract
Material damages ¹¹⁴	Compensation claim can go entirely for full damages
The difference between the market value reduced due to the infringement and the imaginary market value without the infringement must be compensated. ¹¹⁵	Reduced of the loss in commercial value
The circumstances of each individual case are decisive. ¹¹⁶	Contributory fault of the affected neighbour reduces the claim.

The scope of the injunctive and compensation claims under Neighbour Law was determined by the 5th Senate of the Federal Supreme Court of Justice in BGHZ

¹⁰⁶ BGHZ 285, p. 375, 386.

¹⁰⁷ Hager, Umweltschäden - ein Prüfstein für die Handlungs- und Leistungsfähigkeit des Deliktsrechts [Environmental damages – A touchstone for the legal capacity and efficiency of tort law], NJW 1986, p. 1961, 1964.

¹⁰⁸ OLG Oldenburg, AgrarR 1979, p. 199.

¹⁰⁹ LG Baden-Baden, DWW 1989, p. 168, 169.

¹¹⁰ BGHZ 62, p. 361, 371.

¹¹¹ BGHZ 257, p. 359, 368; BGH NJW-RR 1988, p. 1291, 1292.

¹¹² BGH NJW 1981, p. 1663.

¹¹³ BGH MDR 1968, p. 912.

¹¹⁴ BGH, ruling of 11 June 1999 - V ZR 377/98; Senate ruling of 04 July 1997, V ZR 48/96, NJW-RR 1997, p. 1374.

¹¹⁵ BGHZ 62, p. 361, 371.

62, p. 361, 370 in reference to the notions of reconciliation of interests in the community relationship of neighbours. The Court explained that the delimitation of property under Neighbour Law should be handled according to each individual case and the conflict of interests should be solved in an equitable manner. Unlike the case of damages, compensation should not always be oriented towards all past and future losses. The amount is to be determined by taking into account all of the circumstances. This ruling relies on the wording of the legislation, the legal materials and the legal intent, which is seen as striving to find a balance within a community between multiple usage types under usual local practice. In this manner, proper consideration of all of the circumstances of each individual case based on the principle of fairness is facilitated. This should make it possible to take into account a damage-prone state of the affected property or the contributory fault in some other manner of the affected owner in a manner which reduces the claim.¹¹⁷ According to the ruling, this is largely impossible in a damages claim.

A significant question in this context is whether and if so, to what extent, the costs that organic farmers must pay to take samples and analyse them for the presence of genetic modifications can be taken into account in determining the compensation claim.

The costs paid by organic farmers for preventive monitoring of damages would be fully or partially compensated if the usage of the neighbouring fields gave sufficient cause. For organic farmers, the preservation of evidence described in section 3.3.5.1 through analysis, particularly, of their crops prior to harvest is associated with high costs. In the system of § 906 BGB, they are awarded compensation if the occurrence of damaging pollen influx is to be expected with high probability and the responsible party or parties can be clearly identified. This would be the case in the presence of transgenic cultivations in the close proximity to their correspondingly sensitive cultivations. They are reimbursed for

¹¹⁶ BGH, NJW-RR 1988, p. 136, 138.

¹¹⁷ BGH NJW-RR 1988, p. 136.

the costs if they can expect with high probability that concrete interference, i.e. genetic modification of their crops, has occurred. Naturally, this also holds true in the case where analysis verifies the influx. The standard for determining whether or not the monitoring costs are compensated is similar to the standard which was developed for the costs of monitoring possible damages in the case of contamination of surface water used to provide drinking water.

“The following principles apply when assessing the question of adequate causation of damage to surface water”:

The strict liability statement of facts from § 22 WHG¹¹⁸ does not require – as stated – the violation of a specific object of legal protection; instead, damage to the financial position is sufficient insofar as such damage is adequately caused by a disadvantageous change to the condition of a body of water.¹¹⁹

In the case of ground water contamination, the toxic substances do not have to have been introduced directly into the ground water; instead, it suffices if they were conveyed into another body of water and as an adequate consequence of this process they reached into the ground water from there.¹²⁰

It also lies within the framework of adequate causation if the pollutants introduced into the body of water undergo transformation processes and do not cause damage until after they become the resulting “final product”.¹²¹

The obligation based on § 22 WHG to compensate for damages caused by the change in the water condition encompasses according to its protective intent – within limits to be rewritten in greater detail below – also the obligation to defray the expenditures which an authorised water or ground water user must pay out to avert such damages after the water is polluted within the meaning of § 22 I WHG.¹²²

According to this ruling, in case of liability for consequences the cost of damage ascertainment must be compensated if the occurrence of the damage is to be expected with good probability and the damage cannot be ascertained in any other manner. This decision refers to the fact that a waterworks situated on a slope may investigate the river water it draws for traces of a chemical accident at the expense of the company which provoked the accident if it cannot

¹¹⁸ Water Resources Act [Wasserhaushaltsgesetz = WasserhaushaltsG] of 27 July 1957, Federal Law Journal I 1957, p.1110, 1386; revised in the publication of 12 November 1996, Federal Law Journal I, p.1695; last amended by the law of 09 September 2001, Federal Law Journal I, p.2331.

¹¹⁹ BGHZ 47, p. 1 (12 f.) = NJW 1967, p. 1131; Gieseke-Wiedemann-Czychowski, § 22 margin no. 29.

¹²⁰ BGHZ 57, p. 170 (173) = NJW 1972, p. 204; cf. also BGHZ 62, p. 351 (353) = NJW 1974, p. 1770; Gieseke-Wiedemann-Czychowski, § 22 margin no. 27.

¹²¹ Senat, NJW 1975, p. 2012 = LM § 22 WasserhaushaltsG No. 11; Sieder-Zeitler, § 22 margin no. 22; Gieseke-Wiedemann-Czychowski, at location quoted

¹²² Senat, LM § 22 WasserhaushaltsG No. 4; cf. also BGHZ 47, p. 1 (11) = NJW 1967, p. 1131; see also Breuer, at location quoted, margin no. 803; Gieseke-Wiedemann-Czychowski, § 22 margin no. 30)“ (BGH NJW 1988, p. 1593 BCBE-Monitoring).

promptly request suitable analysis results from the authorities. Similarly, the costs of damage-assessment analysis must be compensated within the framework of the compensation claim by the owner of the cultivation causing the genetic modifications in the organic cultivation if the damage cannot be assessed in any other manner and the occurrence of the damage is probable.

The simple investigation of soil and crops for residues cannot, however, prevent an immission in and of itself. Instead, the requested investigations shall primarily be of use to the plaintiff in guiding his purchaser with respect to verification of lack of "damages". "The claims made in connection with the suit would be considered accordingly in any case if the occurrence of immissions could be concretely expected which exceed the standard to be accepted according to § 906 BGB, e.g. if it was presented in a substantiated manner that concrete interference is imminent for which the standard of allowed risk is exceeded"¹²³. This is lacking here. According to the notice of approval of 18 March 1996, the transfer of such unweighable substances is not to be feared."¹²⁴

As such, claims by the plaintiffs for carrying out investigative measures, eliminating infringement or halting threatening infringement due to the transfer of genetically modified material from §§ 1004 Para. 1, 823, 862 Para. 1 BGB are unjustified. They assume, namely, that the defendant as a disturber illegally interferes with the property of the plaintiff item 1 or with other interests or objects of legal protection, here ownership or the rights of the plaintiffs items 2 and 3, subject to absolute legal protection at the established and exercised industrial operation or directly and concretely threatens illegal interference of this sort. Whether there is any interference with the property in the first place is governed by § 903 BGB which covers the rights of the property owner. He can fundamentally exclude undesired interference to his property, it being incumbent upon him to verify the occurrence and extent of the objectionable interference.¹²⁵ Assistant professor Dr. Simon, an expert in the field, convincingly excluded before the Senate the transfer of bacterial resistance genes in into the crops of the plaintiffs under natural conditions through indication of the natural barriers between varieties. The statements he made in this context were not challenged by the plaintiffs.¹²⁶

The organic farmer bears the burden of proof for causation and for the considerability and unacceptability of genetic modifications in his organic crops.

¹²³ Cf. Staudinger, Kommentar zum BGB [Commentary on the German Civil Code], 13th edition, margin no. 119 on § 1 UmweltHG; the statements made there apply also to strict liability according to § 23 GenTG.

¹²⁴ LG Stuttgart, ruling of 09 May 1997 - 2 O 15/97 - NJW 1997, p. 1860.

¹²⁵ Cf. in this context particularly Baumgärtel, G (1999): Handbuch der Beweislast im Privatrecht [Handbook on the burden of proof in private law], 2nd edition on § 1004 margin no. 4.

¹²⁶ OLG Stuttgart, ruling of 24 August 1999 -14 U 57/97 - NuR 2000, p. 357.

Burden of proof for the assertion of a compensation claim under Neighbour Law	Owner of transgenic cultivations	Organic farmer
Emission = Genetic modification as a result of the influx of pollen from a neighbouring transgenic cultivation (causation) ¹²⁷		+
Usual local practice of affected property = General usual local practice of organic farming ¹²⁸		+
Considerability of the infringement of the organic cultivation ¹²⁹		+
Unacceptability of tolerance of the infringement without compensation ¹³⁰		+

The considerability of the genetic modification of the crops and the unacceptability without payment of compensation can be proven using contractual offers, price levels and delivery agreements. It is often difficult to prove the chain of causation shown here:

Emission	Immission	Infringement	Material violation
Pollen release	Pollen influx	Pollination	Genetic modification

3.3.3 Cornerstones of legal discourse as orientation points

It is not simple to clarify how this judge-oriented system of compensation under Neighbour Law will be applied in the context of the neighbour relationship between organic farmers and the owners of transgenic cultivations. In order to obtain a better estimation of the practice to be expected from the courts and the presumed reaction of specialist legal literature, we will now attempt to clarify the particular position of the Neighbour Law system of § 906 BGB, particularly for non-jurist readers.

¹²⁷ BGHZ 70, p. 102; 117, p. 111.

¹²⁸ BGHZ 117, p. 111.

¹²⁹ BGH NJW 1978, p. 373.

¹³⁰ BGH NJW 1978, p. 373.

3.3.3.1 Exclusion of the principle of causal responsibility through fault liability (“Verschuldenshaftung”)

The organisation of the standards by which a society provides liability for damages is of great importance in ensuring fair settlement of conflicting interests. In Germany, fault liability is considered to be basic and routine. In fault liability, anyone who causes someone unlawful damages through his own actions, whether through acts or omission, must pay suitable restitution, but only if he does this intentionally or negligently. This is in contrast to the model of liability for consequences. According to this model, it is not just the conduct which someone must answer for when conduct obligations are violated which obliges the violator to compensate for any damages which occurred. An adequate causal connection between the conduct of the damaging party (cause) and the detriment suffered by the other party (damages) triggers the obligation to provide compensation. The prerequisite for such liability is that the damaged party must always prove causation: He must prove that the concrete damage was triggered by the conduct of the other party. If this conduct is related to the operation of a construct such as a vehicle or factory, then liability for consequences (“Kausalitätshaftung”) is also known as strict liability (“Gefährdungshaftung”).

Interference liability (“Einwirkungshaftung”) goes one step further by eliminating the need for sure verification of causation. According to such liability, simple contact with certain damage sources and the proven occurrence of a damage is sufficient to trigger an obligation to pay damages for the party who initiated the source of the damages. Such damage sources can include certain substances which were made accessible or mobile or stationary equipment. In more precise terms, this system of interference liability provides solidary liability for consequences for all parties who initiated similar damages sources.

Fault liability excludes the principle of causal responsibility for causal damages, but not for damages caused contrary to one’s duty. The risk is socialised. Fault

liability assigns the endurance obligation for damages not caused negligently to the damaged parties or their insurers, i.e. to a solidary community of damage victims establishment through insurance payments.

The notion of interference liability is attacked as a public overburdening of liability law as well as the last stage of an overall negative development which emanates from the advance of liability for consequences.¹³¹

3.3.3.2 The compensation claim under Neighbour Law as a foreign body and instrument of a strict principle of causal responsibility

Court rulings by the Supreme Court of the German Reich and the Federal Supreme Court of Justice have worked to continuously develop the compensation relationship system under Neighbour Law since the 1920s. In order to properly estimate how the courts will handle the co-existence of organic farmers and transgenic cultivations, some of the cornerstones of this thoroughly controversial and sometimes polemical discussion in Germany are of interest.

The compensation claim under Neighbour Law provides organic farmers with a claim for compensation of detriments suffered which is oriented towards economic acceptability without it ever coming into question whether their conventionally operating neighbours acted contrary to their duty in any way when using transgenic varieties. The compensation claim under Neighbour Law has thus been maligned as an “institution for land-based general causation liability”¹³², “a hidden form of strict liability” and “quasi strict liability”.¹³³ None of these labels are meant in a friendly manner, but are intended to portray this compensation system under Neighbour Law developed through court rulings as being foreign to German law and ideally send it out to pasture.

¹³¹ Spühler, NZZ, 21 March 2002, p. 27.

¹³² Karsten, *Der nachbarrechtliche Ausgleichsanspruch gemäß § 906 Para. 2 Sentence 2 BGB analog im System der Ausgleichsansprüche* [The compensation claim under Neighbour Law according to § 906 Para. 2 Sentence 2 BGB analogous to the system of compensation claims], p. 15 with further citations.; p. 170.

¹³³ Salje, *Environmental Liability Act*, Intro. margin no. 10; §§ 1, 3 margin no. 9.

"Institution for land-based general causation liability" ¹³⁴
"Liability similar to strict liability" ¹³⁵
"A hidden form of strict liability" ¹³⁶
"Quasi strict liability" ¹³⁷

The compensation claim under Neighbour Law according to § 906 Para. 2 Sentence 2 BGB is attacked by part of the literature particularly in its application in the legal rulings of the Federal Supreme Court of Justice as being foreign to German law:

"Through the no-fault, general, no longer delimitable compensation claim creating by the court ruling, the fault requirement which is otherwise the standard for damage attribution in the area of liability of land owners is invalidated and the law of chattels is conveyed a function which is to be implemented systematically by tort law or by specially regulated strict liability statements of fact." ¹³⁸
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The principle of being liable only when at fault is breached in German law only at certain points and only based on explicit legal ruling. One example of this is the strict liability for operation of technical equipment such as motor vehicles, railways or aeroplanes. One is liable for damages caused by the operation even if the persons who are responsible for the operation conducted themselves in the best possible manner according to the state of the art, i.e. they cannot be blamed for violating their obligation and having caused the damage through the same violation of obligation . The other important example of no-fault liability is the compensation claim under Neighbour Law according to § 906 Para. 2 Sentence 2 BGB, which substantially contributes to the central control function of § 906 BGB.¹³⁹

¹³⁴ Karsten, at location quoted

¹³⁵ Karsten, at location quoted

¹³⁶ Salje, at location quoted

¹³⁷ Salje, at location quoted

¹³⁸ Karsten, at location quoted, citing Bicker, p. 36, 49 ff.

¹³⁹ Cf. Staudinger, Kommentar zum BGB [Commentary on the German Civil Code], 13th edition, Introduction to the Environmental Liability Act, margin no. 34, p. 219 ff.

Fault liability in comparison with liability for consequences (also § 906 Para. 2 Sentence 2 BGB)

Fault liability (“Verschuldenshaftung”)	Liability for consequences (“Kausalitätshaftung”)
Unlawful conduct	Legal conduct
Liability for damages due to transgression of a prohibition on action or restraining order, i.e. for unlawful conduct.	Liability for damages ensuing from rules-compliant and thus lawful conduct which is legal because it is not in conflict with any conduct obligation.
The fault of the person responsible is the legal basis for the obligation to compensate for damages.	Compensation for damages without any examination of fault.
Obligation to modify one’s own conduct to avoid damages determines the standard of fault.	It is not material whether the damages could have been avoided through modification of the conduct of the damaging party.
The obligation to compensate for damages follows the damage avoidance capacity of the damaging party.	It is immaterial whether the damaging party could have modified his behaviour such that the damages would not occur.
Opening of a liability-free space for the acting party within the circle of his own obligations.	No liability-free space, but rather answerability for all causally resulting damages to others from one’s own conduct.
Externalisation of the damage consequences for damages not due to one’s fault.	Internalisation of the damage consequences of one’s own conduct.
No principle of causal responsibility when damages are produced causally but the conduct of the person responsible was not contrary to duty.	Principle of causal responsibility.

3.3.3.3 The compensation claim as a control instrument

In Germany today, civil law is the instrument by way of which the private spheres of legal claims and interests of organic farmers and users of transgenic varieties are defined and mutually demarcated. The limit is drawn using a system of claims under Neighbour Law. In this manner, the conduct of the individual, i.e. the party with the potential to infringe, is indirectly controlled by being induced to not violate the sphere of legal claims and interests of the other party through awareness of the correction of a conceivable limit transgression.¹⁴⁰

The controlling effect of the civil-law compensation system under Neighbour Law in the co-existence with transgenic cultivations is determined by the individual readiness to make claims on the part of organic farmers. If the

organic farmers do not make any claims, then the controlling effect is small. If important claim prerequisites such as causation are not easy to prove and if therefore the cost of providing evidence and the associated litigation cost risk is high, then there will be practically no influence of the legal handling of conflict cases on the concrete behaviour of the owners of transgenic cultures. It is easy to see that the system of reciprocal claims in the neighbour relationship is not simple to manage. It is not possible to predict whether it will be used practically, i.e. whether claims will be made by organic farmers in considerable numbers within its framework. Only in this case would this system acquire a general preventive function alongside its individual compensatory function.¹⁴¹ Only through widespread usage of the claim system by organic farmers will the owners of transgenic cultures be compelled to internalise the expected compensation claims into their operating costs so that they must behave in a more neighbour-friendly manner by undertaking all possible measures to prevent the influx of genetic modifications into neighbouring organic cultivations. According to this picture, the usage of transgenic cultivations would take place only up to the point beyond which the required compensation payments would consume the savings or additional revenue resulting from the transgenic plants.¹⁴²

3.3.3.4 Correction of an exclusively industry- and emissions-friendly regulation

The current version of § 906 BGB is a product of one-hundred years of legal rulings. This product is promulgated as being perceived as fair, namely as a “model solution and solution model”.¹⁴³ The first version of § 906 BGB excluded the injunctive claim according to § 1004 Para. 1 BGB even against considerable infringement if it emanated from a piece of land whose usage is according to

¹⁴⁰ Lytras, Zivilrechtliche Haftung für Umweltschäden [Civil law liability for environmental claims], p. 38.

¹⁴¹ Völler, Umwelthaftungsrecht und Schadensprävention [Environmental law and damage prevention], p. 107.

¹⁴² Gerlach, Privatrecht und Umweltschutz im System des Umweltrechts [Private law and environmental protection in the system of environmental law], p. 66 ff.

usual local practice for the same type of land. No compensation was provided according to this version. The underlying notion here was that any owner could enjoy the possibility of usage of immissions according to usual local practice, thus achieving a fair balance between the advantages and disadvantages of such usage.¹⁴⁴

The Supreme Court of the German Reich handled further judicial legal education regarding the usage conflict between agriculture and industry in a series of properties/expectations rulings (“Gute-Hoffnungs-Entscheidungen” = GHH). In the ruling GHH I, the Court obliged an industrial concern to compensate a neighbouring farmer for damages which the farmer suffered due to land usage in spite of the fact that such a claim was not yet found in the text of § 906 BGB¹⁴⁵. In the ruling GHH II, the Court derives from the order relating to the obligation for mutual consideration that the obligation to tolerate does not encompass such interference which can be prevented through acceptable protection measures. Today, this rule is found in § 906 Para. 2 Sentence 1 BGB. In 1951 the Federal Supreme Court of Justice sided with the ruling of the Supreme Court of the German Reich on the community relationship under Neighbour Law as an application of the principle of good faith for the particular case of the land neighbourhood.

The compensation claim according to § 906 Para. 2 Sentence 2 BGB as compensation for detriments which must be accepted for interference to be tolerated was not taken up until 1959 in § 906 BGB. This was part of a law amending the industrial code and supplementing the German Civil Code of 22 December 1959.¹⁴⁶

The German Civil Code was supplemented such that the obligation to tolerate is more rigorously drafted with regard to extraneous interference. The obligation to

¹⁴³ Hagen, Festschrift für Hermann Lange [Publication in honour of Hermann Lange], p. 483.

¹⁴⁴ Planck/ Achilles, BGB, § 906 note 3b.

¹⁴⁵ RGZ, 139, 29 – GHH I.

¹⁴⁶ Federal Law Journal I p. 781.

tolerate immissions that are part of usual local practice was expressly restricted to immissions which the person responsible cannot prevent through economically acceptable measures, the same person retaining the choice of how to achieve this.

In 1959 with the incorporation of the judicial compensation regulation, the insight was to be documented that – contrary to the legislature’s estimation at the end of the 19th century that the advantages and disadvantages of mutual immissions under usual local practice would be balanced – balance frequently does not occur because the land users affected by emissions themselves cannot select a usage which offers them compensating advantages. In order to compensate for this deficiency, a claim for reasonable compensation beyond the threshold of acceptability was standardised.¹⁴⁷ The 2nd sentence regarding the compensation claim was inserted into paragraph 2 in 1959.

In the new ruling by the Federal Supreme Court of Justice, this is supported solely on the notion of good faith from which an equitability claim is derived. In the legal materials from 1959, there is no clarification of which legal dogmatic structure was intended, particularly concerning which of the different approaches in the ruling of the Supreme Court of the German Reich should be followed.¹⁴⁸ It is important for us today for the Federal Supreme Court of Justice to place the reciprocity of the neighbourly fiduciary relation in the foreground. This has practical consequences for the co-ordination and information obligations between organic farmers and owners of neighbouring transgenic cultivations.

¹⁴⁷ Hagen, at location quoted, p. 494.

¹⁴⁸ Bundestag publications 3/301, 3/1343 and 3/1457 as well as stenographic reports on the proceedings of the Bundestag, vol. 44, p. 4852; cf. Deneke, *Das nachbarschaftliche Gemeinschaftsverhältnis* [The neighbourhood community relationship], p. 153.

3.3.4 Mutual respect obligations in the co-existence between organic farmers and owners of transgenic cultivations

3.3.4.1 The good faith model of the Federal Supreme Court of Justice

The ruling of the Federal Supreme Court of Justice presents a finely balanced system of criteria for mutual respect within the community relationship under Neighbour Law. Fault, i.e. the avoidability of the disturbance, does not play any role in the application of § 906 BGB. The Court uses the concept of the community relationship under Neighbour Law also as a barrier against claims between neighbours which are perceived as unreasonable. The Court expects neighbours to mutually respect one another's spheres of interest. This requires neighbours to do everything in their power to avoid conflicts, including remedying their own conduct such that detrimental consequences land usage in their neighbour which are reasonable because they fall under usual local practice are kept as small as possible. Organic farmers can therefore not unilaterally use the claim system under Neighbour Law in their favour, but instead must accept a sort of interplay under good faith.

The Federal Supreme Court of Justice's 5th Senate, which is responsible for claims arising from § 906 BGB, emphasises in its latest ruling the concepts of "mutual consideration" and "co-responsibility of the affected owner". In the *Hammerschmiede* case¹⁴⁹, the Senate emphasises that the "notion of co-responsibility of the affected owner for the later foreseeable conflict situation" is brought to the forefront sooner. According to the Senate, this is a "consequence of the application of the principle of good faith (§ 242 BGB) which applies also in Neighbour Law". From this, the Supreme Court of the German Reich developed the "so-called community relationship under Neighbour Law", with the Federal Supreme Court of Justice adopting and further developing this ruling. The Senate emphasises that the obligation for increased mutual consideration stems from the community relationship under Neighbour Law, which obligation

¹⁴⁹ BGH, Ruling of 06 July 2001, V ZR 246/00.

can lead in exceptional cases to the exercise of certain rights arising from the property becoming entirely or partially unpermissible.

On the other hand in the youth campground case (“Jugendzeltplatz-Fall”)¹⁵⁰, the Senate also emphasised that the land owner who settles first in the boundary zone of areas with varying quality and merit of protection has no claim to suppression of an emissions-producing usage in the bordering zone in the future. The Senate took up the underlying notion of co-responsibility of the affected owner for the subsequently foreseeable conflict situation in its tennis court poplar root case (“Tennisplatz-Pappelwurz-Fall”)¹⁵¹ and brought it to the forefront. It is the consequence of application of the principle of good faith (§ 242 BGB), which also applies in Neighbour Law. It was from this that the Supreme Court of the German Reich developed the so-called community relationship under Neighbour Law, with the Federal Supreme Court of Justice adopting and further developing this ruling. Namely, the obligation for increased mutual consideration stems from the community relationship under Neighbour Law, which obligation can lead in exceptional cases to the exercise of certain rights arising from the property becoming entirely or partially unpermissible.¹⁵² This applies here too¹⁵³.

3.3.4.2 The circle of obligations of organic farmers

Based on these points given, the logical conclusion is that organic farmers will not be able to knowingly engender a special sensitivity with regard to their own cultivations. Instead, they must actively work to defuse the conflict with their neighbours. In other words, it is not an option to just sit back and enjoy a passive “tolerate and settle up” policy. It follows accordingly that organic farmers cannot demand compensation for loss in commercial value of their crops due to transgenic modifications in the way of neighbour compensation if they helped bring about the obligation for compensation through their own decisions or passivity.

The court ruling would likely deny organic farmers compensation if they had planted their own “sensitive” cultivations in the awareness that their crops would likely, due to proximity to a transgenic cultivation, exhibit genetic modifications which would cause a loss in commercial value to be compensated. In such a situation, organic farmers would probably be expected in case of doubt to opt

¹⁵⁰ BGHZ 121, p. 248, 254.

¹⁵¹ BGHZ 135, p. 235, 241.

¹⁵² Cf. to all the Senate, BGHZ 68, p. 350, 353 f; 88, p. 344, 351; 113, p. 384, 389; Senate ruling of 07 July 1995, V ZR 213/ 94, NJW 1995, p. 2633, 2634, with further citations in each case.

¹⁵³ BGH, ruling of 06 July 2001 - V ZR 246/ 00.

for a different, non-sensitive cultivation, i.e. a cultivation which cannot be pollinated by transgenic pollen from a neighbouring field.

This does not mean that, based on the compensation model from the ruling of the Federal Supreme Court of Justice, organic farmers will always have no choice but to passively respond to the planting selections of their conventional neighbours who use transgenic cultivations. Instead, organic farmers can oblige their conventional neighbours to consideration by promptly informing them, preferably several months prior to sowing, exactly which crops they intend to plant, plot by plot, and requesting that they refrain from planting competing transgenic plants.

Organic farmers can use a personal letter for this purpose, or they can provide the information in a publication of their Chamber of Agriculture or local newspaper. If the conventional farmer is aware of the organic farmer's plans, then this engenders all the more clearly a full obligation for compensation with respect to the loss in commercial value. In cases in which a full renunciation of transgenic cultivation would result in smaller economic damages, i.e. compensation would have to be paid to the organic farmer, the owner of the transgenic cultivation is bound to stop growing his crop in my opinion.

The final result always comes down to the individual case. If it is a matter of the neighbours' crop rotations interlocking in practical terms like "negative zippers" in order to avoid pollination of adjacent organic cultivations, then the organic farmer will be entitled to a compensation claim and also injunctive relief. The aim of this is to prevent an organic crop planned for years from being made susceptible to infringement due to scheduling of a competing transgenic crop on neighbouring fields.

3.3.4.3 Obligations of owners of transgenic cultivations

In an analogous manner, comparable obligations and recommendations for action can be derived for owners of transgenic cultivations: They must become informed about the organic crops in their vicinity which are sensitive to the pollen emanating from their transgenic cultivations. If they are unsuccessful in obtaining this information, it cannot be held against them. However, if no attempt whatsoever is made to obtain the information or to agree on a plan for local co-existence with a neighbouring organic farmer, this will go against them in terms of obligation to compensate the neighbour for loss in commercial value.

However, it is also possible for conventional farmers to provide specific information to his neighbours about the position of transgenic cultivations and thereby obligate them to avoid planting sensitive crops. According to the Federal Supreme Court of Justice's model of co-responsibility of the affected owner, active provision of information by the planter of transgenic seeds can thus relieve him of burden in case of a subsequent, foreseeable conflict situation.

3.3.5 Practical problems in proving causation

3.3.5.1 Exclusion of other sources

If an organic farmer determines through seed analysis prior to harvesting his crops that they exhibit genetic modifications, he will tend to look in the immediate vicinity and beyond to see if transgenic cultivations with the relevant modifications are planted there. He will then make a compensation claim for loss in commercial value, investigation costs and other expenses.

The owner of the transgenic cultivation will presumably defend himself by maintaining that the genetic modification would have been present in the organic products even if he had not planted any GMHPs. He would maintain that if his own conduct were eliminated from the specific facts of the case, the damaging outcome would have ensued nevertheless because it is the result of another causal path. Thus, the owner of the transgenic cultivation could object that the organic farmer must expect that the seed he uses is already genetically modified because it is not feasible to exclude this possibility in seed production. He should also consider that his own equipment, particularly if it is from a machinery co-operative, could contain remnants of transgenic seed after being used in a conventional farming area. Finally, at least if the sample was not taken until after the harvest, the objection will be raised that either harvesting, cleaning, transport or storage equipment were contaminated either through prior use or dust contamination so that all of these sources are more likely to have caused the genetic modification of the organic goods than the neighbouring transgenic cultivation.

It is not easy for affected organic farmers to determine the source of genetic modifications in their harvested crops. If inspection of the seed and analysis of the crops prior to harvest initially reveals that no genetic modifications are present in the seed but they are present in the ripened seed, it is at least clarified that the influx of transgenic pollen during the growing season was the

source. This is sufficient evidence of material damages. However, determination of the damage source is still lacking. All of this is very costly.

How will organic farmers respond to the possible presence of transgenic cultivations in their vicinity with respect to verifying causation and their transparency obligation? If organic farmers wish to invoke liability for consequences which is imposed upon users of transgenic cultivations by the community relationship under Neighbour Law, they must examine all of the interfaces via which genetic modifications can pass. They will need to document the absence of genetic modifications in their seeds, equipment and crops at all stages in production. This is the only way to avoid failure in verifying the causal link between the neighbouring transgenic cultivations and the presence of genetic modifications in their own sensitive organic cultures. The measures relating to preservation of evidence, in conjunction with the transparency of the organic farmer's own conduct which the community relationship under Neighbour Law imposes on organic farmers with respect to their neighbours, leads to the conclusion that if the proof of causation is to succeed and the compensation claim under Neighbour Law is to be enforced, the following documentation steps must, in my opinion, be recommended to organic farmers:

Documentation of the absence of genetic modifications in seeds	Prior to sowing, it is necessary to verify that there are no genetic modifications in the seeds used by organic farmers. Guarantees from the producers of the seeds to be used in organic farming should be available. In case of replanting, it should be ensured that no genetically engineered modifications are present that were incorporated in the previous year. Laboratory analysis results based on the polymerase chain reaction (PCR) should be available which are either provided by the seed supplier or were arranged by the organic farmer after reception of the seeds but prior to sowing. The guarantees and analyses should cover all of the genetic constructs which could reasonably be significant in the neighbour relationship since at least the potential for influx from neighbouring cultivations exists.
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Documentation of the absence of GMOs in the equipment used	It should be ensured through suitable measures that the equipment used does not contain transgenic seed, and the measures employed must be documented. This is most critical in the case of leased equipment or equipment used by subcontractors. Organic farmers should identify all parts of the equipment which must be cleaned following usage in non-organic cultivations, and they must maintain detailed documentation of how they actually carried out these cleaning steps.
Documentation of all genetic modifications in circulation	It must be clarified which genetic modifications are in circulation and are relevant in practical terms. The exact structure of the corresponding genetic constructs must be known in order to evaluate whether the available guarantees and analyses are sufficiently comprehensive. It should be clarified which genetic constructs from transgenic cultivations can occur in the vicinity of organic cultivations. Accordingly, it must be clarified prior to sowing with respect to the organic seeds used by the organic farmer that they do not already contain traces of the genetic modification to be expected from the vicinity. It should not be the case that guarantees and analysis results are available for certain genetic modifications but this does not encompass the genetic constructs that can be transferred from the neighbouring transgenic cultivations.
Documentation of efforts to remove organic cultivations from the vicinity of transgenic cultivations	The neighbours should be requested to provide information on what types of genetic modification are present in their transgenic cultivations. Moreover, the exact location of these transgenic cultivations should be clarified in order to enable a decision whether sensitive organic cultivations which could be disturbed could be arranged in other areas of the organic farm at a reasonably safe distance. It should also be checked whether the use of sensitive organic cultivations can be avoided altogether (defensive renunciation of planting).
Documentation of efforts to choose alternate sowing time	It should be clarified whether it makes sense to set the time point for sowing the transgenic cultivation in order to allow sowing of the neighbouring organic cultivations to be fixed so that the pollination period of the organic cultivation overlaps only minimally with the pollen release of the neighbouring transgenic cultivation (defensive planning of sowing time).
Documentation of efforts to arrange alternate crop scheduling	If the organic farmer is informed about transgenic cultivations in his vicinity, then he will plan his crops so as to avoid insofar as possible the introduction of genetic modifications into his cultivations. He will choose economically suitable, non-sensitive alternatives (defensive selection of crops).

Documentation of informing the conventional neighbour about the sensitivity of the organic cultivations	To be on the safe side, organic farmers should publish the exact field boundaries of their organic crops and also the exact usage of the fields planned for the next growing season in order to allow his neighbours to adapt their own crop scheduling so as to minimise GE contamination of the organic cultivation (protective crop scheduling). Organic farmers should be sure to inform all users of agricultural land in the further vicinity, whether they are property owners or leaseholders.
Documentation of efforts to agree on a system of mutual tolerance (“negative zipper rotation”)	Organic farmers can ask their conventional neighbours to agree on long-term crop schedules which provide mutual protection (“negative zipper rotation” crop scheduling) so that conventional transgenic cultivations are never juxtaposed with sensitive organic cultivations.
Documentation of the presence or absence of genetic modifications in the crop prior to harvest	Field samples should be checked for the presence of genetic modifications which are present in the neighbouring cultivations. The sample cannot be taken after harvesting since one could then object that the contamination is due to remnants in the harvesting machinery, the processing equipment or storage facilities. If contamination is likely, samples should be collected using a step-wise pattern, starting from areas closest to the transgenic neighbouring fields and proceeding to areas that are further removed, in order establish a pattern of causation. Samples should be drawn by objective third parties. Gathering and handling of samples must be carefully documented to avoid an accusation of faulty testing and laboratory procedures. A reference part of each sample should be stored by an objective third party.
Documentation of contamination protection prior to harvest	Post-harvest handling should avoid all possible contamination sources. Dust from transgenic crops can contaminate organic crops. Storage facilities should be carefully isolated and used exclusively for organic products insofar as possible. Grain dryers, rotary screeners and any other equipment should be exclusively used for organic goods. The same applies to vehicles and shipping containers. If dual use cannot be avoided or if exclusive usage for organic products is not clearly documented, equipment used after harvest must be carefully cleaned so as to be free of crop residues, dust or other materials. These efforts must be carefully documented.
Documentation of market prices for organic products without genetic modifications	Records should be kept including purchase offers and other documents in order to precisely establish the loss in commercial value which occurred due to the presence of a genetic modification at the actual time the damage occurred, i.e. at the customary time of sale.

Organic farmers will likely reject this list of measures as unbearable and unrealistic in practical terms, making it clear that the current compensation system provided under civil law by § 906 BGB does not bring harmony in

practical terms, at least for this sort of endeavour, to the basic interests and rights of these competing usages by adjacent neighbours. The legal claims resulting from § 903, 1004, 906 BGB can help for organic farmers to assert their claims in individual cases. As is demonstrated here, the system of assessing and documenting the facts, as required to prove causation, would be such a burden on organic farmers that in actual practice they would be unable to enjoy their rights.

3.3.5.2 Marking off the circles of causation

The next step involves marking off the circles of causation: In the case of maize pollen (for which a pollen drift protection zone of 200 m applies in seed propagation and for which one would expect the transfer into organic cultivations to be largely reduced at 1,000 m), the vicinity within a 1,000 m circle should be examined as the potential location of transgenic cultivations causing the problem. If there are multiple transgenic cultures in this zone with different owners, we must ask whether and how to verify from which of these cultivations the influx of transgenic pollen into the organic cultures occurred and what are the respective shares.

This problem brings to mind the causation of forest damages due to industrial pollutant immissions, but has a different structure due to the normally much smaller radius of interference. For example, a suit by the “Hospital zum heiligen Geist” [Holy spirit hospital] foundation before the Stuttgart district court concerned the causation nexus between coal-burning power plant immissions by the power company Energieversorgung Schwaben over 35 km and more than 700 ha of forests, whereas the pollen drift problem is usually limited to a few hundred meters.¹⁵⁴ A later ruling of the Federal Constitutional Court on the issue of damages to the forests relegated this to the area of compensation with

¹⁵⁴ Cf. Hager, *Umweltschäden - ein Prüfstein für die Wandlungs- und Leistungsfähigkeit des Deliktsrechts* [Environmental damages – A touchstone for the legal capacity and efficiency of tort law], NJW 1986, p. 1961.

respect to the entire society since causation in the indicated manner could not be proven.

Organic farmers can manage a part of the problem of proving causation only through considerable time and financial expense involving their own research and documentation efforts. This becomes even more difficult if the relation between the transgenic and organic fields becomes uncertain due to increasing distance and if multiple transgenic cultivations could be additively causal but it unclear whether all or only some of them are contributing and which this would be. The general rule of proof according to which the plaintiff must verify all facts asserting liability is too strict.¹⁵⁵

The court ruling on proof of causation simplifies some of the details in proving the causal connection between the genetic modification found in the organic products and the presence of transgenic cultivations in the vicinity. In part, the view is justified that the judge could use his own powers of estimation to answer the question of whether there is a causal nexus between the emission and the damaging influx, i.e. does not require sure proof:

“Even if one believed it necessary, contrary to the viewpoint of the court chamber, for the affirmation of the liability-justifying causation to establish a causal relationship between the damaging conduct of the defendant (emission of thallium in cement dust) and the damages maintained by the plaintiff to his cattle, and one does not wait to examine this question in connection with the liability-satisfying causation within the framework of the specific damage computation, one would have to assume that other causes for the damages presented by the plaintiff do not come into consideration.”¹⁵⁶

If the causal connection between the transgenic cultivation and genetic modification in an organic cultivation were a question of liability-satisfying causation as assumed by the Münster district court in a similar case¹⁵⁷, then the judge could establish by a preponderance of evidence on a sound basis

¹⁵⁵ Deutsch, Beweis und Beweiserleichterungen des Kausalzusammenhangs im deutschen Recht [Proof and facilitation of proof of the causal relation in German law], in: Festschrift für Hermann Lange [Publication in honour of Hermann Lange], p. 435 ff.

¹⁵⁶ LG Münster, NJW-RR 1986, p. 947.

¹⁵⁷ Cf. also BGHZ 66, p. 70, 75.

according to § 287 ZPO¹⁵⁸ since the Federal Supreme Court of Justice demands strict proof according to § 286 ZPO only in the area of liability-justifying causation in which the judge can establish the factual proof only in case of personal certainty:

§ 286 ZPO Free evaluation of evidence (“freie Beweiswürdigung”)

(1) The court shall decide of its own free conviction taking into account the entire content of the trial and the result of any evidence heard whether an actual allegation is to be considered true or false. In its decision the court shall indicate the reasons which were controlling in the court’s decision.

(2) The court is bound to legal rules of evidence only in the cases indicated by this code.

§ 287 ZPO Determination of damages; amount of the claim

(1) If the parties dispute whether damages have occurred and the amount of the damages or interests to be compensated, then the court shall decide of its own free conviction after evaluating all of the circumstances. The court shall exercise its own discretion in deciding whether and to what extent a requested hearing of evidence or ex officio based on expert testimony shall be arranged. The court can examine the party submitting evidence with regard to the damages or the interests; the provisions according to § 452 Para. 1 Sentence 1, Para. 2 to 4 apply accordingly.

(2) The provisions of Para. 1 Sentence 1, 2 shall be applied accordingly in disputes involving property rights also in other cases insofar as the amount of the claim is disputed by the parties and the complete clarification of all controlling circumstances is associated with difficulties which are not in proportion to the significance of the disputed part of the claim.

The facilitation of the proof of causation through teleological interpretation of substantive law is supported by the opinion that proof through a preponderance of evidence suffices to prove causation since this already suggests itself through teleological interpretation of substantive law with a view under constitutional law to the guarantee of effective protection of fundamental rights.¹⁵⁹

If causation of the genetic modification in a cultivation is preponderant, then according to this opinion it is sufficiently probable because material participation should suffice with regard to identification of the responsible party.

¹⁵⁸ Code of civil procedure (“Zivilprozessordnung”) of 12 September 1950, Federal Law Journal 1950, p. 455, 512, 533; last amended by Art. 3 Para. 3 No. 2 of the agreement of 5 April 2002, Federal Law Journal I, p.1250.

¹⁵⁹ Cf. Prütting, Münchener Kommentar zum Zivilprozeß [Munich commentary on civil procedure], § 286 margin no. 46; Kegel, Festgabe für Kronstein [Honorary publication for Kronstein], 1967, p. 321 ff.

In order to facilitate proof in case of multiple responsible parties, §§ 830, 840 BGB, which actually apply to fault liability, are invoked analogously:

§ 830 BGB Accessories

(1) If several jointly, by an unlawful act, cause an injury, each is answerable therefore. The same is the case, if it cannot be ascertained, who of several participants has caused the injury by his act.

§ 840 Liability of several persons

(1) If several persons are liable for the injury arising from an unlawful act, they are answerable as joint tortfeasors.

If similar interferences, each considerable in and of itself, from two transgenic cultivations together infringe upon the usage under usual local practice of the organic cultivation beyond the acceptable standard, then each owner must pay compensation according to the extent of the infringement caused by his cultivation. The effective causal contribution of each transgenic field in and of itself or in conjunction with the other is estimated according to § 287 ZPO.

There are three cases where this has practical relevance:

1. A and C caused the damage to the organic cultivation for certain (because they are near to the organic cultivation and there are no other possible responsible parties) but in proportions that cannot be clarified. It is possible that pollen from A's field or pollen from C's field alone cause the entire damage.

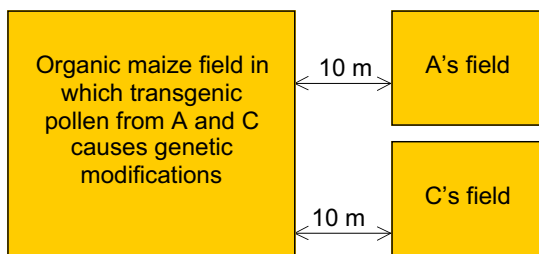


Fig. 3: Delimitation of the causation circles – Case 1

According to § 830 Para. 1 Sentence 2 BGB analogously, A and C are liable jointly and severally with respect to the organic farmer, i.e. the organic farmer

can claim the entire damage from A or C.¹⁶⁰ Within their internal relationship, A and C each bear half of the damage.

2. A caused (or contributed to causing) the damage to the organic farmer for certain (since his field is very near to the organic cultivation) and C caused (or contributed to causing) the damage with preponderant probability (since his field is within the customary interference range of pollen).

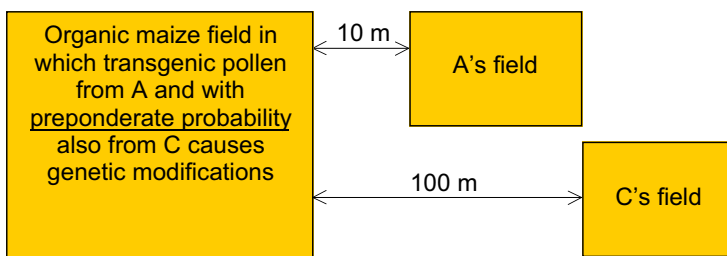


Fig. 4: Delimitation of the causation circles – Case 2

In this case too, § 830 Para. 1 Sentence 2 BGB is applied resulting in joint and several liability of A and C¹⁶¹. Within the internal relationship between A and C, A bears the large share of the damage due to his greater proximity to the organic farmer. The shares are estimated through remedy of one party versus the other according to § 287 ZPO.

¹⁶⁰ Hager, Umweltschäden - ein Prüfstein für die Wandlungs- und Leistungsfähigkeit des Deliktsrechts [Environmental damages – A touchstone for the legal capacity and efficiency of tort law], NJW 1986, p. 1961, 1967 f.; Senate ruling BGHZ 67, p. 14 (18 f.) = NJW 1976, p. 1934.

¹⁶¹ ditto

3. A caused (or contributed to causing) damage to the organic farmer for certain (his field being very near the organic cultivation), whilst C only possibly caused (or contributed to causing) the damage (his field being so far from the organic cultivation that influx of pollen from his field is possible but not probable).

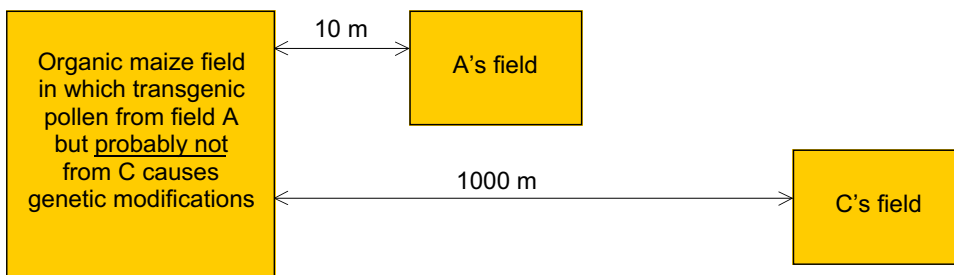


Fig. 5: Delimitation of the causation circles – Case 3

There is no joint and several liability between A and C if it is required for application of § 830 Para. 1 Sentence 2 BGB that with preponderate probability an immission from field C into that of the organic farmer occurred.¹⁶² A is solely liable, possibly reduced by the possible causation share of pollen from C's field estimated according to § 287 ZPO but not reliably ascertainable.

If similar interferences, each considerable in and of itself, from two transgenic cultivations together infringe upon the usage under usual local practice of the organic cultivation beyond the acceptable standard, then each owner must pay compensation according to the extent of the infringement caused by his cultivation. The effective causal contribution of each transgenic field in and of itself or in conjunction with the other is estimated according to § 287 ZPO. Both are liable as joint tortfeasors only for the share of damages caused by the interaction of both contamination sources ("progressive damage increase" =

¹⁶² ditto

“progressive Schadenssteigerung”).¹⁶³ The distinction between “progressive” and “horizontal damage increase” developed based on comments by Kleindienst¹⁶⁴ does not help further in the case of damages due to the influx of pollen since its effect does not allow the required distinctions. Even a small influx can cause far-reaching pollination without it being possible generally to apportion the shares of further pollination through further influx. It is regularly impossible to clarify whether the case involves linear or progressive damage increase.

¹⁶³ BGHZ 66, p. 70, 75.

¹⁶⁴ Kleindienst, Der privatrechtliche Immissionsschutz nach § 906 BGB [Immissions control under civil law according to § 906 BGB], p. 59, 61 ff.

<p>“Progressive damage increase”: A certain damage is caused <u>only</u> through the combination of multiple transgenic cultivations = No fraction of the overall immission can be isolated and it cannot be determined that it caused only a recognisable fraction of the damage.</p>	<p>Joint and several liability of all of the owners of transgenic cultivations for a specific damage: The organic farmer can demand full payment from one of the owners so that the latter is required to take action against the other owner to recover his share of the liability from that party.</p>	<p>BGHZ 66, p. 70, 75.</p>
<p>“Linear damage increase”: Overall damage is caused through the combination of multiple transgenic cultivations consisting of identifiable individual damages = A fraction of the overall immission causes a recognisable fraction of the overall damage.</p>	<p>No joint and several liability of the owners. Instead, the responsible parties are subject to compensation based on their share of the damages caused, to be determined with reference to § 287 ZPO.</p>	<p>BGHZ 66, p. 70, 76 f.; BGHZ 72, p. 289; OLG Zweibrücken, ruling of 12 June 1985 - 2 U 9/85, NJW-RR 1986, p. 688; cf. Kleindienst, Der privatrechtliche Immissionschutz nach § 906 BGB [Immissions control under civil law according to § 906 BGB], 1964, p. 59, 61 ff.</p>
<p>In case it cannot be clarified whether there is progressive or linear damage increase:</p>	<p>Joint and several liability</p>	<p>BGHZ 85, p. 375.</p>
<p>“Alternative causation” = “Doubt about the responsible party” = It is certain that pollen influx can have occurred from multiple transgenic cultivations in the vicinity of an organic cultivation, but it is unclear whether a transgenic cultivation, although it belongs to the circle of possible contamination sources, actually made a contribution to the immission. = It cannot be clarified whether pollen influx into the damaged organic cultivation truly occurred out of all cultivations among multiple cultivations which come into question. = Doubt with respect to a recognisable circle of causation.</p>	<p>Several parties caused a damage, but the actual responsible party cannot be determined. Liability of all parties according to § 830 I 2 analogous BGB for full damages; it is sufficient if there is a “preponderance of evidence” which indicates that the immissions caused the damage. Such liability is customarily not applicable to airborne pollution since the individual polluter customarily cannot have caused the overall damage. However, this is the case for the influx of transgenic pollen.</p>	<p>Hager, Umweltschäden - ein Prüfstein für die Wandlungs- und Leistungsfähigkeit des Deliktsrechts [Environmental damages – A touchstone for the legal capacity and efficiency of tort law], NJW 1986, p. 1961, 1967 f.</p>

3.3.5.3 Proposal for legal clarification of the presumption of cause

If damage compensation claims are likely to regularly fail due to the requirement to prove causation, cause or presumption rules can be used as a means to improve the position of the claimant. The German Environmental Liability Act specifies a so-called presumption of cause (§ 6 UmweltHG¹⁶⁵):

“If a facility is suited, according to the circumstances of the individual case, to cause the damage that occurred, then it is presumed that the damage was caused by the facility”.

In the concrete version of this law, the presumption is then opposed again by the possibility of contrary evidence by the facility operator who can eliminate the presumption of cause by proving the lack of a disruption to operations. According to this configuration of the German Environmental Liability Act, the presumption of cause of the simple suitability of the facility to cause the damage is not effective in normal operation of a facility. If we were to transpose this model to the neighbour conflict between an organic farmer and the influx of transgenic cultivations, the following formulation could be used:

“If a transgenic cultivation is suited, according to the circumstances of the individual case, to cause the genetic modifications that occurred in a neighbouring cultivation, then it is presumed that these modifications were caused by the transgenic cultivation”.

According to the model of the German Environmental Liability Act, this presumption is neutralised in that the proposed formulation offers the owner of the transgenic cultivation the opportunity to provide contrary evidence. However, this is not based on the opportunity to prove the lack of an irregularity in his production as described in § 6 UmweltHG, but instead it involves verification of the lack of causation. The burden of proof would thus be transferred to the owner of the transgenic cultivation and seen from an overall perspective it comes down to justification of joint and several liability of the

owner of a transgenic cultivation and all parties who make use of the same genetically modified construct which is found in the transgenic cultivation and ultimately makes its way into the damaged organic product. Facilitation of proof through presumption of cause with the opportunity for certain contrary evidence of the missing causal nexus leads the principle of causal responsibility, already introduced through the compensation claim under Neighbour Law, within the model of the German compensation and community relationship to a rational conclusion since it essentially helps avoid litigation.

Claims whose basis the affected neighbours of transgenic cultivations cannot set forth or can only seldom set forth and prove (but which they must set forth and prove according to the system found in § 906 BGB) would have little relevance in actual practice:

¹⁶⁵ Environmental Liability Act (Umwelthaftungsgesetz =UmweltHG) of 10 December 1990, Federal Law Journal I, p. 2634.

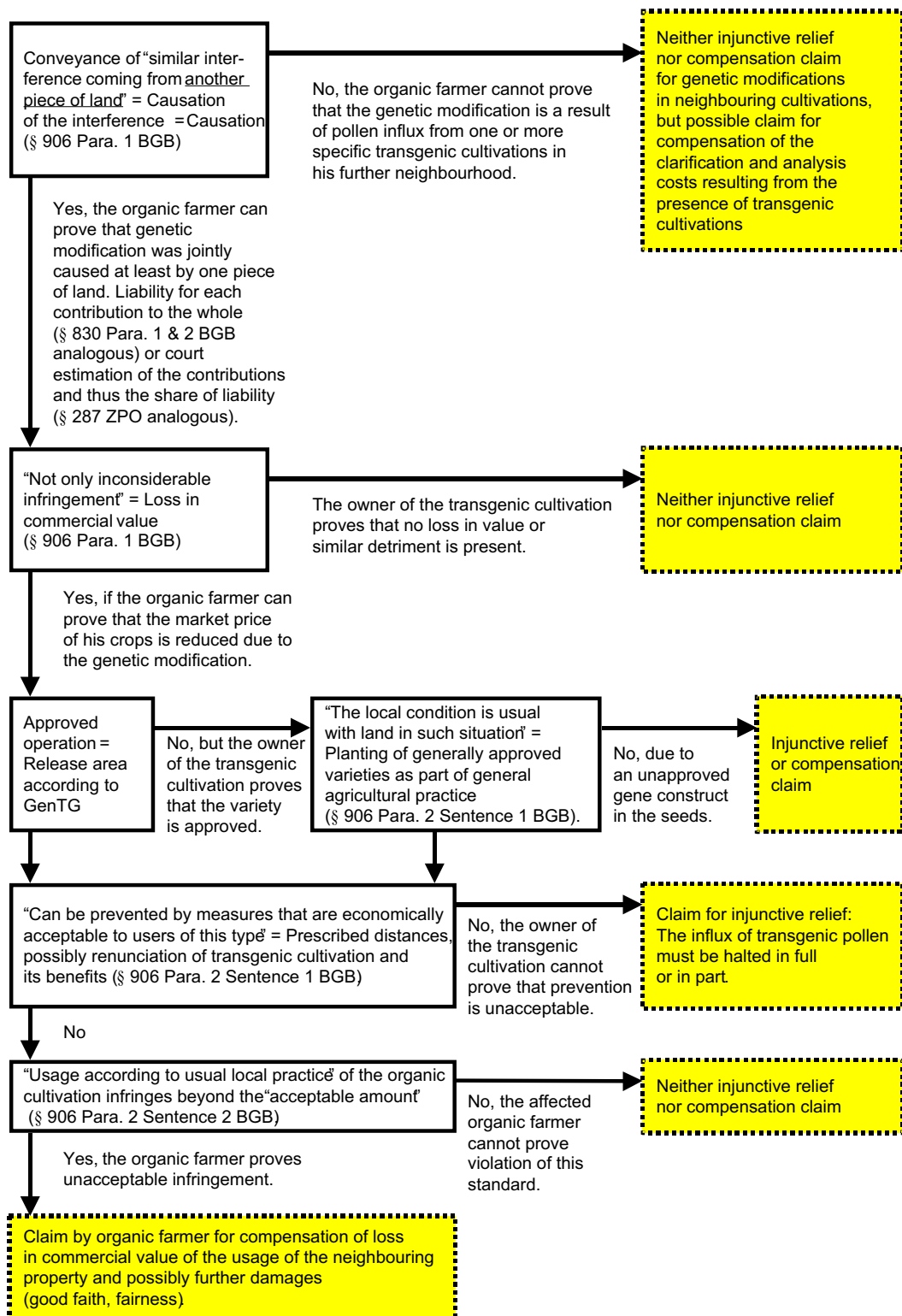


Fig. 6: Claim for damages and a halt to the release of transgenic pollen (injunctive relief)

If it is necessary to prove the damage which occurred but not the causation of certain transgenic cultivations, this would reduce the degree of mistrust and amount of documentation and litigation expense that will arise between neighbours. The circle of organic farmers authorised to make claims must be restricted so that documentation of the genetic modification in the crops during the growing season is sufficient to assert a compensation claim without it also being necessary to investigate from which of the transgenic cultivations the transgenic pollen reached the organic cultivation.

3.3.6 A practical approach to problems encountered by organic farmers under current law

<p>Practical question 1: What can an organic farmer do if, for example, he knows that it would be advantageous to plant a field with organic maize but there are conventional maize fields in the vicinity? The organic farmer must present a plot-by-plot crop schedule each year for the upcoming growing season to his official checkpoint in the inspection system under Community law for organic farming (EU Organic Regulation 2092/91/EEC, Annex III A 3). Would there be any legal advantages if an organic farmers were to also send this crop schedule to his conventional neighbours?</p>	<p>Yes, since the owner of a transgenic cultivation is obligated to prevent the transfer of transgenic pollen into neighbouring sensitive organic cultivations if he knows of their existence and if preventive measures are economically acceptable. Such measures are considered economically acceptable if they result in lower costs than the compensation payments that he would owe to the organic farmer in case of influx of genetic modifications into the latter's produce. The economic benefit he gains from the transgenic cultivations is another reference point. By informing the owner of the transgenic cultivation of his crop schedule, the organic farmer triggers an obligation on the part of the former to consider what preventive measures are possible and economically acceptable.</p>
<p>Practical question 2: An organic farmer wants to know whether he can demand compensation for the price difference from the seed company or neighbour who planted transgenic maize if he determines that despite his due caution genetic modifications are present in his crops which were caused by the influx of transgenic pollen from neighbouring cultivations so that he cannot sell his crops or can sell them only at prices for conventional crops.</p>	<p>There is no legal basis for a claim against a commercialiser of transgenic seed if the variety has been approved for general use. The organic farmer has a claim against the neighbour under Neighbour Law corresponding to the loss in commercial value of the genetically modified organic produce. The compensation claim will be diminished if the organic farmer can be reproached for not having done enough to prevent the damage from occurring since the compensation claim is governed by a relationship of mutual good faith and trust which does not permit a party to knowingly allow damages to occur that his neighbour would have to compensate.</p>
<p>Practical question 3: An organic farmer would like to know what would result (according to the current legal situation) from the publication of the following text in the information bulletin of the rural community within whose communal district the</p>	<p>Under the principle of good faith, the owner of the transgenic cultivation is obligated to provide information to the organic farmer about the planting of transgenic varieties which could result in undesirable pollination of the organic</p>

<p>field and the 1,000 m zone around the field lie: “Next spring I intend to plant my field having parcel number ___ in communal district ___ with maize which will be marketed as organic produce which does not contain genetic modifications. I am guaranteeing these properties to my buyers. I am therefore requesting other parties to refrain from planting cross-fertilising maize varieties within 1,000 m of the boundaries of the above named field and self-fertilising maize varieties within 100 m. If this has already taken place or is imminent despite my notice, please inform me immediately.”</p>	<p>cultivations. According, it makes sense to request such information. Without the organic farmer’s notification, the owner of the transgenic cultivation does not actually know that he could owe compensation. He owes compensation only if the organic farmer makes an injunctive claim and the owner of the transgenic cultivation accepts it or rejects it as unjustified. Only if the organic farmer did not have to consider at all the possible presence of transgenic cultivations does the owner of the neighbouring transgenic cultivation owe compensation without the request to halt. The request to halt is authorised if it is economically acceptable for the owner of the transgenic cultivation to prevent the influx of transgenic pollen into the organic cultivation. This is possible only by keeping the transgenic cultivation out of the 1,000 m zone around the organic cultivation. This prescribed distance is an economically acceptable preventive measure if the compensation presumably owed under Neighbour Law is higher than the economic detriment that arises either through planting the transgenic cultivation outside of the 1,000 m zone or through selection of a non-transgenic maize variety.</p>
<p>Practical question 4: The organic farmer also wants to know if the following notice would have legal consequences if sent to his neighbours: “I am intending to market the maize which I am planting as organic produce. If this is not the case, I risk having to pay damages to my buyers, e.g. for blending and processing damages. Please be aware that if despite my request to not plant transgenic maize you do this nevertheless, you will be obligated to pay compensation under Neighbour Law for the consequential damages. However, the amount of the impending compensation claim corresponds to what you must undertake as economically acceptable preventive measures. If you plant the transgenic cultivation outside of the protected zone, then the economic detriment to you will be less than the impending compensation claim. The same applies to selection of a non-transgenic variety. If you disagree, please inform me of the extent of the detriment so that I can decide whether I can request that you refrain from planting the transgenic variety or not.”</p>	<p>Since the amount of the impending compensation claim corresponds to the amount of costs which are considered economically acceptable to present the transfer of transgenic pollen, then the organic farmer will have, if the owner of the transgenic cultivation refuses to renounce planting such cultivations, a claim for information about the extent of the economic detriment to the owner of the transgenic cultivation since the latter is alone in knowing this information, and the organic farmer must know this information in order to decide whether he does have the right to injunctive relief which he can have imposed by the courts through a provisional order if necessary.</p>
<p>Practical question 5: An association of organic farmers is deliberating whether to advise its members as follows: “Organic farmers should avail themselves of an overview of the genetically modified cultivations to be expected in the upcoming growing season in</p>	<p>According to a ruling by the Federal Supreme Court of Justice, the community relationship under Neighbour Law is a good-faith fiduciary relationship in which neighbours owe one other mutual consideration. If an organic farmer is aware that a transgenic cultivation has already</p>

<p>the extended area around their cultivations. They should also inform farmers in their vicinity (in a local newspaper, professional association or personally) about their crop schedule with a request to not plan any competing transgenic cultivations in the relevant adjacent zone. Organic farmers must plan for compliance with prescribed distances and enforce them so as to practically exclude the risk of genetic modification of his own crops (protective crop scheduling). He should handle his own planting so as to minimise the probability of genetically modified neighbouring cultivations inducing genetic modifications in his organic crops. This includes favouring plants as part of crop rotations for which no genetic modification can be expected (defensive crop scheduling). This also includes making agreements with conventional neighbours many years into the future to prevent transgenic crops and sensitive organic cultivations from being juxtaposed (a technique known as “negative zipper rotation”).”</p>	<p>been planted, he may not opt for a compatible organic cultivation and then assert a compensation claim under Neighbour Law if damages arise. Neighbours may not knowingly allow damages to arise and then claim that the other party is liable. If an organic farmer asks his conventional neighbours as part of crop scheduling to alternately not plant certain transgenic cultivations so that “windows” will be left for endangered organic crops, the neighbours will not be able to refuse this request as long as it is economically acceptable since this type of “negative zipper rotation” is just a special technique to prevent the transfer of transgenic pollen into organic cultivations. However, it is required if it is economically acceptable. The instruction to inform the neighbours coincides with the obligations as part of the community relationship under Neighbour Law to not knowingly allow damages to occur. Organic farmers who do not heed this advice have no right to injunctive relief or compensation.</p>
<p>Practical question 6: Organic farmers want to ask how and for what they need to investigate their own crops. They also want to know how to find out what GE constructs they must consider in analysing genetic modifications in their own produce since using the polymerase chain reaction it is possible to investigate seed only for the presence of those GE constructs whose structure is known at least in characteristic parts. Finally, organic farmers wonder whether they have to bear the high cost of such analysis work themselves.</p>	<p>It does not make sense to investigate one’s own harvested crops. Instead, the crops should be investigated prior to harvest to avoid the objection that transgenic modifications occurred due to residue in the combine harvester, transport vehicles or silos. If there are transgenic cultivations in the vicinity of the organic crops, then the investigation is justified by the presence of these crops. If the influx of transgenic pollen and the associated pollination of the organic cultivation are concrete possibilities, then the expense of taking samples and analysing them becomes a part of the organic farmer’s compensation claim, as decided by the Stuttgart district court in its ruling of 9 May 1997. However, as a prerequisite either the influx of pollen must be verified which is possible through dust analysis (adhesive strips) at the time of pollen release, or the neighbour must be so near that the influx of the pollen is probable.</p>

<p>Practical question 7: Before an organic farmer who currently wishes to grow maize determines how he can respond to the possible influx of pollen bearing genetic modifications, he must consider how to comply with the legal requirement to not use genetically modified organisms in organic agriculture. He must assure that any seed he uses does not contain genetic modifications. With many plants, he can simply use part of the previous year's harvest as seed. However, it is necessary to ask whether the plants had any contact with pollen from genetically modified plants during the previous growing season. If he cannot entirely exclude this possibility, e.g. based on reliable knowledge of the planting practices of farmers in the surrounding neighbourhood, must he have the seed analysed? Who pays the cost of that?</p>	<p>When organic farmers guarantee the absence of transgenic modifications in their produce, they must ensure that the seeds they are using do not contain any genetic modifications. If they are able to purchase seeds from a nursery which employs a controlled organic environment, then they are legally obligated to use such seeds.¹⁶⁶ During a transitional period until the end of 2002, they may, however, use conventional seeds.¹⁶⁷ They must use seed for which reliable guarantees are available based on precision analysis. If the supplier cannot provide such results, then the organic farmer must perform the analysis himself. If the organic farmers guarantees the absence of genetic modifications to his buyers, then such a guarantee alone is sufficient cause for the required investigations. Then, the costs cannot be transferred to the owners of transgenic cultivations in the vicinity based on a compensation claim under Neighbour Law. The situation would be different if the organic farmer were not making this guarantee. In that case, a violation of the 1% mandatory labelling limit would then be relevant in practical terms since only if the limit were exceeded would he no longer be able to sell his goods as "organic". Then, the presence of the transgenic cultivation in the vicinity would be actual cause for justifying the investigation. The cost of analysing the seeds would become part of the compensation claim under Neighbour Law with the same condition as holds for a claim for compensation of costs for investigating the resulting harvest.</p>
<p>Practical question 8: An organic farmer is interested in commercially propagating certified maize seeds from his organic cultivation and then selling it as suitable for organic production. Could he demand a protection zone for seed production?</p>	<p>Some of the German Länder have already legally provided for the arrangement of protection zones for propagation of maize seed. In order to ensure zero tolerance for genetic modifications, the protection zones for maize seed should be extended from 200 m to at least 1,000 m.</p>

¹⁶⁶ EU Organic Regulation 2092/91/EEC, Art. 6 Para. 2.

¹⁶⁷ ditto, Art. 6 Para. 3 Letter A.

3.3.7 Mandatory arbitration as an easily accessible tool in case of disputes with neighbours

Organic farmers in Germany can make of a low-threshold, cost-effective technique known as mandatory arbitration (“obligatorische Streitschlichtung”) in order to make claims for information if they have no other recourse to a hearing with regard to their conventional neighbours. All of the farmers in the area of the organic maize field (i.e. within a range of about 1,000 m) who do not reply to the corresponding notice could be compelled to respond using this mandatory arbitration procedure. Skilled legal application of this low-cost procedure provides an opportunity for amicable out-of-court resolution as well as the risk of legal escalation within the neighbour relationship.

Many Bundesländer (Bayern, Baden-Württemberg, Brandenburg, Hessen, Nordrhein-Westfalen and Sachsen-Anhalt) have used § 15 a II EGZPO¹⁶⁸ as grounds for introducing a new out-of-court arbitration procedure. There, mandatory arbitration is now part of the law. The arbitration procedure is obligatory in case of neighbourly disputes about immissions (§ 906 BGB) as long as the immissions do not emanate from an industrial enterprise. Thus, an organic farmer in Bavaria could not make a claim for information, injunctive relief or compensation prior to consulting with an arbitration committee as stipulated in the Bavarian Arbitration Act¹⁶⁹.

The following parties can be contacted to handle the arbitration procedure: All notaries and lawyers who have informed their chamber of lawyers that they will handle such arbitration on a permanent basis, as well as other arbitration authorities established and recognised by the President of the Bavarian Higher Court. The parties can also choose an arbitration authority by common consent. They include all lawyers and notaries as well as all permanently

¹⁶⁸ Act concerning the introduction of civil procedure rules of 30 January 1877, RGBl. 1877, p. 244; last amended by Art. 3 of the Act of 27 July 2001, Federal Law Journal I, p. 1887.

¹⁶⁹ Bavarian Arbitration Act (Bayrisches Schlichtungsgesetz = BaySchlG), http://www2.justiz.bayern.de/_gesetzgebung/schlichtungsgesetz/schlichtungsgesetz.htm

established arbitration authorities of the chambers. Professional associations or similar institutions can be approved as arbitration authorities.

The arbitration procedure costs 50 Euro if the procedure ends without an arbitration talk and 100 Euro if an arbitration talk is required; there is also a set fee of 20 Euro. If the parties come to an agreement, they sign a arbitration protocol regarding their agreement which in turn can be supplemented by the relevant court with an execution clause.

3.3.8 The unsolved problem of disruption (destruction) of good relations between farmers

Liability for consequences can prove in certain instances to be a useful means of protecting organic farmers. However, widespread usage would result in a conflict pitting every organic farmer against his conventional neighbours in a “bellum omnium contra omnes” as depicted by Hobbes in “Leviathan”. The compensation relationship under Neighbour Law according to § 906 BGB in the interpretation from the Supreme Court ruling does give organic farmers a tool for requiring their neighbours to prevent the transfer of transgenic pollen and by all means a very sharp tool when it comes to obtaining damages for loss in commercial value due to introduced genetic modifications. However, the use of this tool is associated with great organisational expense, and direct confrontation with the neighbours is not avoided through mandatory arbitration but rather is routed into suitable channels.

However, the highest court has not yet ruled conclusively on how to apply the compensation relationship under Neighbour Law to the problems associated with the transfer of transgenic pollen. In particular, the question of which protective measures are economically acceptable to a GMO user in order to prevent the transfer of transgenic pollen is still open. Moreover, there is no protection against the influx of transgenic pollen if the amount of the compensation claim is less than the cost of an economically acceptable

measure. Until a mutually balanced relationship develops, the use of such strict liability for consequences can help to create a sort of “parity of arms”. Wrestling over neighbourly rights will, however, result in an undesirable disruption of rural communities if the conflict is not resolved through self-organisation of the seed producers and their settlement function. Even according to the current legal situation, organic farmers in Germany have recourse to strict liability for consequences with respect to their conventional neighbours who use transgenic cultivations. When compensation under Neighbour Law is used as a tool by organic farmers who suffer from the consequences of the transfer of transgenic pollen, legal uncertainty can arise when it comes to proving causation and there will be disputes over who must bear the cost of the very complex monitoring, analysis and documentation system which organic farmers must employ in order to manage proof causation so as to avoid disputes. Improvements and clarifications are possible in both areas. The end result remains the same, however, meaning that every organic farmer will be pitted against his conventional neighbour if the latter uses transgenic cultivations. Before this backdrop, all of the parties involved have an interest in keeping the system of mutual consideration not at the level of the agricultural producers so that they are not all pitted against one another. Instead, compensation based on the community relationship under Neighbour Law should be shifted to a different level, and preferably to that of the producers of transgenic seeds.

4 Protective measures for preventing gene transfer

4.1 Measures against vertical gene transfer – Overview and discussion

4.1.1 Physical isolation for organic agriculture and seed production

Prescribed distances are a common practice in seed production to ensure purity of different varieties. The aim is to ensure the lowest possible level of impurities. Only a certain percentage of an extraneous variety is tolerated. Existing prescribed distances are based on past experience in seed and plant production and do not fully eliminate the possibility of hybridisation. The distances vary depending on the desired (approved) degree of impurity and the plant variety. For basic seed, the target impurity level ranges from less than 0.1 to 0.5%, and for certified seed types from less than 0.2 to 1%. Similar to the isolation used in seed production, prescribed distances between fields with GMO crops and those with organic crops are being discussed to minimise the introgression of undesirable GMO pollen. However, there is significant disagreement over the required distances to reliably avoid exceeding a certain degree of impurity (see section 4.2). For maize, for example, proposed values range from 130 m to 10 km, with the maximum acceptable impurity ranging from 1% down to 0%.

Conclusion: Prescribed distances between transgenic cultivations and protected cultivations are an effective measure, but they are not 100% reliable when it comes to preventing pollen transfer. The required distances need to be validated at different sites (e.g. Central Europe, Eastern Europe).

4.1.2 Isolation track / hedges

An isolation track consisting of non-GMO plants and physical barriers (hedges, tree rows) arranged around a GMO field can be used to trap drifting pollen. This

techniques works only to a certain extent. Depending on the type of plant, a large percentage of the pollen can be trapped, but lightweight pollen can easily travel further due to air turbulence. This technique does not prevent insects from transferring the pollen. A study by Morris et al. (1994) found higher introgression rates with an isolation track having a width of 4 m and lower introgression rates with an isolation track having a width of 8 m compared to no isolation track at all. Trials by Umbeck et al. (1991) showed that isolation tracks had a positive effect for Bt cotton, i.e. a lower introgression rate into neighbouring fields.

Conclusion: If properly arranged, isolation tracks and hedges can help to decrease pollen propagation. However, they do not provide a reliable means of keeping introgression into neighbouring cultivations below a defined percentage.

4.1.3 Techniques based on genetic engineering and biotechnology

Research efforts are currently underway to produce GMO plants in which the pollen does not contain modified genes or is not fertile, or GMO plants which do not produce any pollen at all. These are all theoretical ways to preventing pollen transfer into organic fields.

One experimental approach for preventing vertical gene transfer (crossing of two plants with transfer of the genes to subsequent generations) involves incorporating the transgenic construct into the genetic material of the chloroplasts instead of the cell nucleus. Only the cell nucleus is transferred as a general rule in case of pollination by the male pollen grain. The chloroplasts remain outside of the ovule. Plastid transgenes are thus usually inherited only maternally. Parental or bi-parental inheritance of chloroplast DNA does occur commonly, however, in gymnosperms, and to some extent also in angiosperms. Completely eliminating the potential for foreign gene transfer through chloroplast transformation thus appears impossible. Moreover, a stable

chloroplast transformation has been achieved so far only in tobacco and tomatoes (Hütter et al., 1999).

Conclusion: Chloroplast transformation is currently not a reliable option for preventing gene transfer and has applications only in certain plant species.

Another possibility is to modify the plants using genetic engineering so that they produce sterile seeds. In terminator technology (GURTs = genetic use restriction technologies), plants are treated chemically to produce sterile seeds. However, terminator technology can only prevent the passing of transgenes to the next generation, but not their introgression into related (wild) plants. One question here is whether wild populations can survive on the long term if they undergo regular hybridisation with a sterilisation mechanism. Another problem stems from the introgression of terminator genes into neighbouring crops of the same species (Meyer, 1999). This would render part of the harvest from neighbouring fields sterile and thereby limit replanting, which is objectionable in social terms (farmers often save part of their harvest to use as seed for the next year).

Conclusion: This technique is objectionable in both ecological and social terms and is thus not an option for securing the future of organic farming.

Another way of limiting introgression is through creation of apomictic plants using genetic engineering. Apomixis is the technical term for the creation of seed without pollination; apomictic seeds are clones of their mother plants. The idea is to modify the plants using genetic engineering to render them apomictic so that they do not produce pollen. This would prevent outcrossings. However, this technique is still far removed from practical applications (development time estimated at 10 to 20 years). It is possible that the seed industry intends to combine apomictic seed with terminator technology so that farmers will not be able to propagate seed for their own use (Grain, 2001).

Conclusion: Apomixis is currently not an option for preventing gene transfer since it is not yet sufficiently developed for practical usage.

Another proposal for preventing gene transfer involves the combined planting of GMO and conventional varieties: Feil & Schmid (2001) have proposed planting sterile male GMO plants and fertile male conventional plants alongside one another. The sterile male GMO plants do not produce any pollen capable of fertilisation (in the ideal case, they produce no pollen), whilst the conventional plants act as pollen donors. This technique can be used with all species which produce an overabundance of pollen, e.g. maize, rye and rape. However, the primary objective of male sterility is not to protect GMO-free cultivations but rather to protect the manufacturer's breeding efforts, resulting in a similar effect to a patent. As with most hybrid varieties, farmers will be forced to purchase seed every year.

If we consider only the protection of organic agriculture against pollen drift, this technique could be useful, although it is still necessary to assess the ecological consequences.

Conclusion: The combination of sterile male GMO plants and fertile male conventional plants is a potential means of preventing gene transfer. However, it is still necessary to determine the overall effectiveness of this technique and whether there are any ecological consequences.

4.1.4 GMO-free zones or GMO cultivation within restricted zones

None of the techniques described above currently offers a failsafe way to prevent pollen drift. The only way to prevent transfer of transgenic pollen is through the use of large areas (> 100 km²) in which no genetically modified plants are allowed.

It is also important to note that pollen is not the sole means of transport of genetically modified material. Seeds, plant parts and even entire plants can be transported very far from GMO fields by people and animals and thus propagate in an uncontrolled fashion.

4.2 Pollen drift and prescribed distances

4.2.1 Methodology used in the studies

Different techniques have been used to determine the range of pollen flow (from Feil & Schmid, 2001):

- Pollen capture with adhesive strips; however, this only provides information about the distance covered and not about the actual introgression.
- Pollen capture using sterile male or self-sterile receptor plants; provides information about the fertilisation capability but not about pollen competition.
- Verification of cross-pollination using xenia which are visible to the naked eye; the actual introgression rate is determined.
- Verification of pollen donor genes in the seeds of receptor plants using the polymerase chain reaction (PCR); the genes can be detected even if they are not expressed.

- Verification of introgression through selection treatment of the offspring (assuming the transgenic traits can be selected).

In order to obtain useful results, the trial facilities must meet very demanding requirements: The donor and receptor fields must be sufficiently large and situated at defined distances from one another, and the pollen release in the donor plot and the female flowering in the receptor field must take place simultaneously.

The results presented below from studies on the range of pollen have widely varying results. This is due to variations in the trial conditions (from Feil & Schmid, 2001):

- Differences in wind direction; the pollen range is greater on the downwind side of the pollen donor than on the upwind side.
- Differences in weather conditions during pollen release (updraught, wind speed, storms, humidity, temperature)
- Differences in the amount of pollen released, e.g. due to different donor fields sizes and different varieties
- Differences in the release of pollen in the receptor fields due to different plot sizes, variety-related effects and selection of the receptor system
- Planting differences between receptor blocks (fringe effects if smaller receptor blocks are used)
- Differences in the timing of the release of donor pollen and the female flowering of the receptor pollen

Pollen concentrations generally decrease rapidly at increasing distances from the source (in the shape of an oblique leptokurtic curve), but small concentrations can be detected at large distances. In many cases, pollen has

been detected at the maximum distance covered in the experiment, i.e. at several kilometres.

Whether plants of the same variety or wild relatives are actually pollinated by a pollen supplier depends on the following factors:

- The quantity of transgenic pollen produced: This varies widely depending on the propagation strategy (wind pollinators such as maize have much greater pollen counts than pure self-pollinators and animal pollinators).
- The self- and cross-fertilisation rates of transgenic plants and potential receiver populations. The greater the cross-fertilisation rate, the greater the risk of introgression. Predominantly self-pollinating species (which pollinate the stigma with their own pollen) include wheat, barley, oats, sorghum, rape, rice, beans, peas and soybeans. Predominantly cross-pollinating species include rye, maize, sugar and fodder beets, sunflower, most varieties of clover and hemp.
- Means of propagation of the transgenic pollen depending on the pollen weight and shape, vector (wind: weather conditions, insects: occurrence, type, radius), topography, direct vicinity (barriers).
- Lifespan of the pollen depending on the species and weather conditions.
- Spatial distance between the transgenic plants and the receiver population.
- Density of the source and receptor populations.
- Amount of pollen competition: Pollination of the flowers by the receptor field makes cross-pollination impossible or difficult.

Treu & Emberlin (2000) make particular reference to the potential for pollen drift over great distances due to strong wind and atmospheric currents, an issue that has received scant attention hitherto. Theoretically, pollen can travel several

hundred kilometres in this manner. Insects can also transport over great distances. Wild bees cover 100 to 800 m, while honeybees have a normal gathering radius of 1 to 2 km. When there were no other nectar sources within this radius, greater travel distances (up to 14 km) have been observed (Saure et al. (1999b), see section 4.2.2.3).

Propagation effects over multiple years must also be considered. In case of continuous planting over several consecutive years, very large distances can be covered (genes can propagate from one field to the next).

4.2.2 Data presentation

4.2.2.1 Wheat

Wheat is a strict self-pollinator. The cross-pollination rate is usually around 1%, but it can range up over 5% depending on the variety. Wheat is anemophilous, meaning that pollen is transferred between plants by the wind. Pollen transfer by means of animals (insects, adhesion to birds, etc.) can be neglected. Wheat pollen is relatively heavy although it is significantly smaller than maize pollen. As a self-pollinator, the wheat ear produces relatively little pollen, amounting to about 450,000 pollen grains per ear (corresponding to about 1 to 3% of the quantity of pollen produced by maize). In wheat fields, about 180 million pollen grains are released per m² (there are large differences between varieties). Data on the amount of time during which pollination is possible vary widely from 5 minutes up to 3 hours (all data from Feil & Schmid, 2001).

There have been very few studies on the pollen dispersal for wheat. The reason is that introgression is rare in the normal varieties of this relatively strict self-pollinator (varieties in which the seed is produced through self-pollination), meaning that seed production is not problematic. However, wheat pollen can travel great distances: Khan et al. (1973) found as much pollen at 48 m distance from the pollen source as at 10 m; the grain filling in sterile male wheat at a distance of 48 m was still 4 to 8.6%. At a distance of 150 m from the pollen

donor, Gorin (1968) determined a grain filling of 2.8% on the sterile male receptor plants. According to calculatory models, wheat pollen travels about half as far as rye pollen. In the latter, successful pollination has been detected at distances of 1,000 m. Wheat pollen can thus cover great distances and still achieve successful pollination. Due to its smaller diameter, pollen from *Triticum durum* (a tetraploid wheat variety) possibly has a greater range than pollen from *T. aestivum* and *T. spelta* (hexaploid wheat types) (Feil & Schmid, 2001).

The probable introgression rate is obtained on the one hand from the percentage of self-pollination and on the other hand from the relationship between own and foreign pollen (assuming that the foreign pollen is still vital). Wheat has a cross-pollination rate of approx. 1%, i.e. 99% of the grain positions are pollinated by pollen released by the plant's own flower before it even opens. The remainder of the pollination activity is shared by field pollen and foreign pollen. If the ratio is 100:1 at a distance of 100 m from the foreign pollen source (a probable scenario), this results in a possible introgression rate of approx. 1% of the 1% cross-pollination mentioned above, i.e. every 10,000th grain position will be pollen from outside the field. This results in a rate of 0.01% (Feil, personal message in December 2001).

Below are results from three published introgression trials described in Table 1 and presented in Fig. 7. The study by Khan et al. (1973) encompassed three different years. The figure should be seen as a fragmentary, provisional result due to the marginal status of the data.

Table 1: Grain filling in sterile male wheat as a function of distance from the pollen source; data from three publications

Distance to pollen source in m	Grain filling in sterile male wheat (in %)				
	Khan et al. 1973	Khan et al. 1973	Khan et al. 1973	Gorin 1968	de Vries 1974
1	42.3	13.5	14.6	32.1	13.0
5	-	-	-	-	1.6

10	-	-	-	-	0.25
12	-	4.4	12.7	-	-
15	5.9	-	-	-	-
24	4.8	5.2	4.6	-	-
36	2.8	2.7	6.3	-	-
48	3.4	4.0	8.6	-	-
100	-	-	-	-	-
150	-	-	-	2.8	-

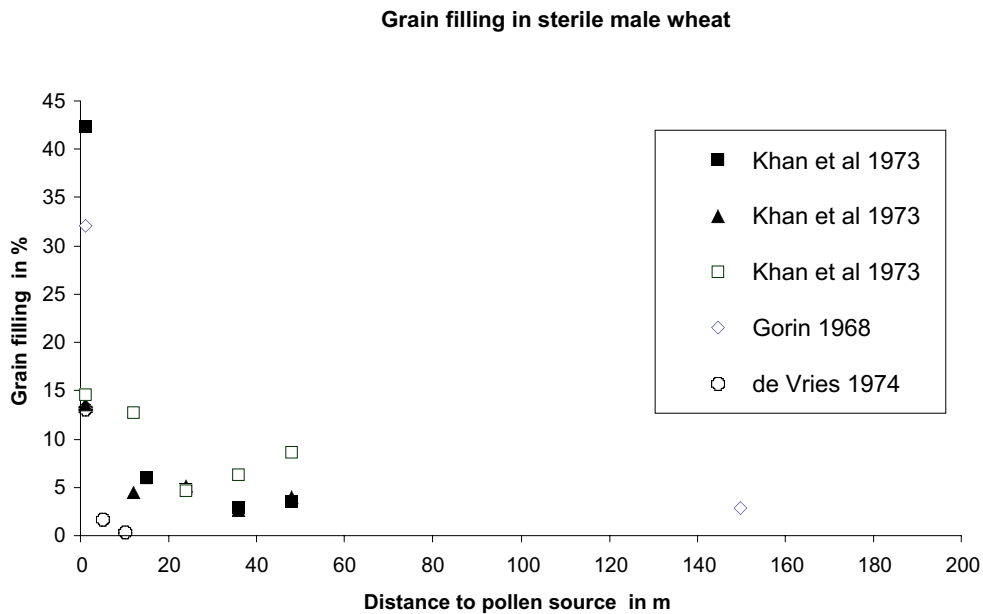


Fig. 7: Grain filling in sterile male wheat as a function of distance to pollen source; Data from three publications

Unfortunately, there is not enough data to derive reliable isolation distances. Due to the high self-pollination rate (99%), in normal varieties spacings of 10, 50 or 100 m from GMO crops would be sufficient to reliably keep the share of transgenic grains in the harvest below 1, 0.5 or 0.1%, respectively. However, relatively large spacings are required if the receptor field produces little pollen due to male sterility (Feil & Schmid, 2001).

4.2.2.2 Maize

Maize is a pronounced cross-pollinator (Purseglove, 1972). The self-pollination rate is around 1 to 15% (Hoffmann et al., 1970). Other sources speak of a cross-pollination rate of 95%. According to Purseglove (1972), the male flowers bloom before the female flowers (protandry), but there is a brief overlap phase during which 5% self-pollination can occur. Each plant releases pollen from 2 to 14 days (Purseglove, 1972).

Maize pollen is anemophilous, meaning pollen is (primarily) wind-borne. Cross-pollination by way of insects is rare since they only visit the male maize flowers. Random pollen transport due to adhesion to animals cannot be numerically estimated at this time and is probably neglected in this study.

On average, maize produces 10,000 pollen per flower, approx. 18 million per flower head (Düll & Kutzelnigg, 1994) and up to 50 million pollen grains (Miller, 1985, according Feil & Schmid, 2001). In maize fields, roughly 147 million pollen are thus released per square meter (Feil & Schmid, 2001). The individual pollen grains are relatively heavy at 0.25 g each (Düll & Kutzelnigg, 1994). The male flower heads are rather far from the ground, which is conducive to dispersal. The female flower heads are situated lower on the plant.

Despite the pollen's relatively large diameter for wind pollination of approx. 100 µm, there is considerable potential for wind transport. The pollen is transported at least 800 m near the ground (Treu & Emberlin, 2000). As is the case with pollen of other plants, the potential dispersal range and survival rate of maize pollen is highly influenced by the current, site-dependent weather conditions (Emberlin et al., 1999). Indications of how long the pollination capability endures in maize range from a few minutes to a few days, also as a function of weather conditions. Purseglove (1972) suggests that maize pollen has the potential to pollinate for at least approx. 24 hours, and under very specific conditions for up to 9 days (Emberlin et al., 1999).

Under typical weather conditions in Great Britain (2 m/s with convection currents), potential pollen drift in higher wind currents was computed to average 172.8 km within 24 hours (7.2 km/h), this being the average time interval during which pollen is still capable of pollination. For wind speeds of 10 m/s, pollen could be transported 864 km within one day (according to Emberlin et al., 1999). Even assuming the shortest pollen lifespan cited in the literature (20 minutes), maize pollen still capable of pollination could travel over 2 km under normal wind conditions.

Of course, we should recall that pollen transfer does not automatically result in gene transfer. The number of introgression events will be less than the amount of pollen reaching a given site. The travelling pollen must reach a female flower which is currently receptive. The success of the pollination is also dependent on the current competitive situation between pollen from different fields (interrelations). For instance, the pollen from the receptor plant (assuming it is not male and sterile) can create competition for the introgression if the male and female flowers are blooming simultaneously (Treu & Emberlin, 2000). The probability of introgression is minimised in this manner.

The probability of introgression over large distances is very difficult to reliably estimate at this point in time. As early as 1942, Fleischmann reported observations from Hungary indicating cross-pollination from a yellow-grained maize field into a white-grained field over 2 km (according to Feil & Schmid, 2001).

Quist & Chapela (2001) recently reported detecting transgenic DNA constructs in indigenous maize varieties in Southern Mexico in the remote mountainous region of Oaxaca. The site was situated more than 20 km from the main road which crosses the mountains and is suspected to be the possible dissemination route of the transgenic maize. There is discussion as to whether the original introgression of the transgenic constructs might have resulted from unauthorised planting of imported transgenic maize intended for use as feed. The resulting transgenic plants are supposed to have then caused an introgression into the indigenous varieties from an unknown distance.

Introgression into hybrid varieties represents a special case. Here, we must assume that there is decreased pollen competition since with hybrid seed many varieties exhibit sterile male plants. In such varieties, a majority of the plants are sterile on the male end, thereby increasing the potential for introgression due to foreign pollen.

A comprehensive discussion on existing regulations dealing with prescribed distances can be found in Feil & Schmid (2001).

The data available for evaluation purposes on the subject of outcrossing distances in maize were gathered under diverse (but in each case very limited) trial conditions which overall do not reflect the many different possible planting scenarios in the real world and often would not be applicable to large-scale cultivations since they are based on trial conditions on a much smaller scale. In many cases as well, there is a significant lack of information about the trial conditions which makes it impossible to draw clear conclusions regarding the relevancy.

Many of the most insightful studies on pollen concentrations around maize fields and on introgression rates were carried out in the United States. Since in the case of air-borne pollen transfer the climate and weather conditions are highly significant, there are restrictions when it comes to applying the results to Germany where the climate is different. There have been very few studies in Germany. Due to the lack of sufficient data relating to conditions in Germany, the only option at the present time is to attempt to use data from regions with different climates.

In light of this situation and given the urgent need to analyse pollen drift scenarios, the graphics presented here on introgression events should be seen as provisional results. Again, we must emphasise the urgent need for more research in this area.

Below are results from studies on introgression distances in maize (

Table 2). More information about the studies as well as further results concerning pollen densities and pollen deposition rates around maize fields can be found in the Annex in Table A 1.

Table 2: Observed introgression rates in maize as a function of distance to pollen source

Distance to source in m	Introgression rates in %										
	Jones & Brooks 1950 according to Feil & Schmid 2001			Salamov 1940 according to Jones & Brooks 1950 according to Feil & Schmid 2001		Narayanaswamy et al. 1997 according to Feil & Schmid 2001		Das 1983	Lieber 1933	Jemison & Vayda 2002	
	1947	1948	1949			1993	1995			1999	2000
0	35.1	17.9	32.9								
10					3.3						
25	16.5	7.0	19.2								
30										1.04	1.49
35										0.11	0.7
40										0.03	0.98
50					0.33			51.0			
75	5.13	3.64	8.6								
100					0.36	2.8	2.9	11.0			0.49
105											0.88
110											1.22
125	0.82	2.48	3.68								
150					0.25			1.5			
200	0.44	0.66	2.47		0.54	0.5	0.5	0.016	4.8		
300	0.15	0.31	0.99			0.14	0.15	0			
350										0	
400	0.15	0.21	0.32		0.02	0.05	0.06				
500	0.15	0.12	0.32		0.08	0.06	0.06				
600					0.79	0.001	0.001				
700					0.18						
800					0.21						

These data were used to produce Fig. 8 and Fig. 9:

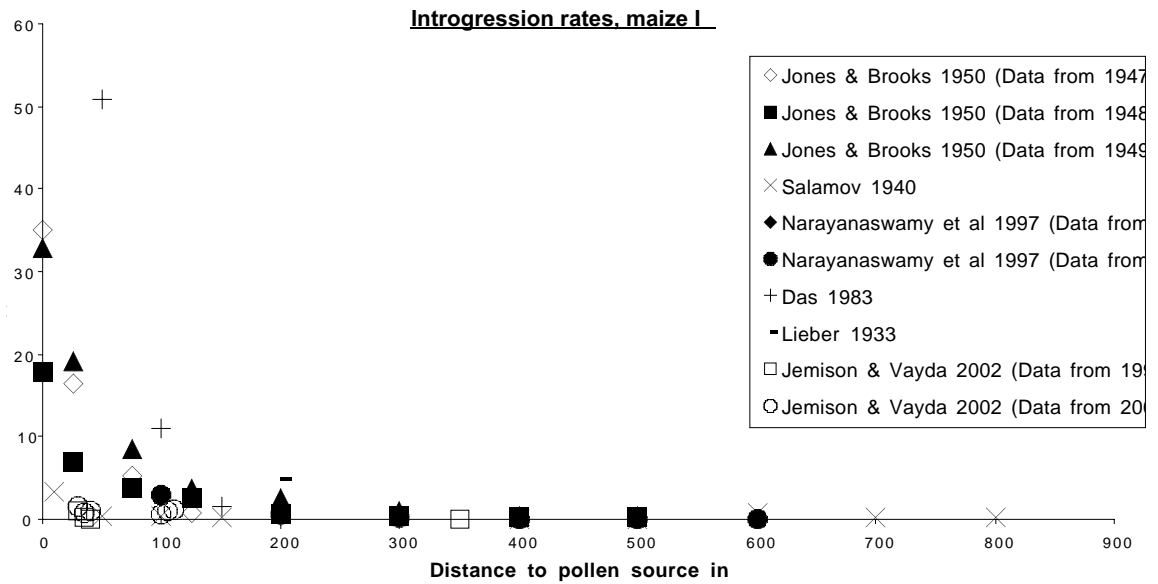


Fig. 8: Full overview of the determined introgression rates in maize as a function of distance to pollen source (various literature sources)

If we consider only values below 12% introgression, the picture becomes somewhat clearer (Fig. 9).

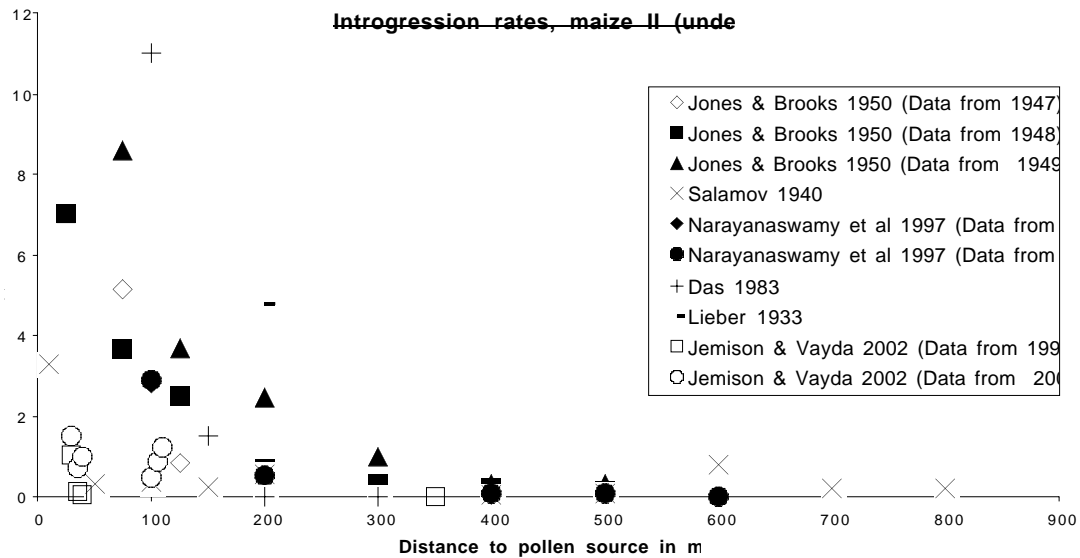


Fig. 9: Full overview of the determined introgression rates up to 12% in maize as a function of distance to pollen source (various literature sources)

The present data from diverse studies are unfortunately not suitable for mathematical or statistical analysis since the data were not gathered using a unified methodology.

From Fig. 9, however, it is clear according to the present results from studies conducted all over the world on introgression in maize that an introgression rate of 1% or more must be expected at distances up to 500 or 600 m. If we derive recommendations from the above graphics without any safety reserve, then we would set the minimum recommended distance for introgression below 1% at 600 m and below 0.5% at 700 m. However, the data evaluated hitherto do not offer any clear trend. At increasing distance from the pollen source, a constant background introgression level appears to remain so that any recommendations on distances for maintaining introgression below 0.1% would be purely

speculative. The only thing that is certain is that the recommendations would cite distances greater than 1,000 m.

Recommended minimum distances derived for these data which are not representative for Germany would have to take into account out-of-the-average situations to some extent. This would concern, say, the position of the receptor fields in the downwind, strong wind events, pollen sources on a hill, (partial) planting of sterile male lines, etc. On the other hand, damaging events would presumably occur with some frequency despite compliance with the recommended distances resulting in damage claims and/or legal confrontations.

Accordingly, a spacing of 800 m from fields of genetically modified maize is proposed if an introgression rate below 1% is desired. If the introgression rate needs to remain below 0.5%, then the minimum spacing is 1,000 m.

4.2.2.3 Rape

Unlike maize, rape is highly self-pollinating since it is self-fertile and its stigmas and anthers are ripe simultaneously. In rape, the stigma is ripe 3 days before to 3 days after the anthers. This makes cross-pollination likely so that a mix of cross- and self-pollination in different percentages is usually the case. Estimations of the percentage of cross-pollination in the pollination of rape cited in the literature vary widely from 2 to 90% (Neemann & Scherwaß, 1999). The average values cited in different sources range from 20 to 30% (Neemann & Scherwaß, 1999), 5 to 55% (Timmons et al., 1995), 5 to 30% (Rakow & Woods, 1987), 22 to 36% (Scheffler et al., 1993), a third (Hühn & Rakow, 1979) or 41% (Lavigne et al., 1998).

Rape fields generally produce pollen for 30 to 40 days. McCartney & Lacey (1991) noted up to 2,800 pollen grains per m³ as the maximum amount of pollen released in a day, whilst the usual daily maximum values were 600 to 1,000 grains per m³.

The more or less cube-shaped rape pollen (25 µm diameter) is close in size to many mushroom spores which are primarily wind-borne (McCartney & Lacey, 1991). With characteristics such as a bright colour, nectar, strong odour and anthers that open outwards, rape flowers are clearly also oriented towards cross-pollination by way of insects (Gerdemann-Knörck & Tegeder 1997). During studies in Brandenburg in 1998 and 1999, a large number of bee, fly and wasp species were noted in and around rape fields (Saure et al. 1998, Saure et al. 1999a). Mesquida et al. (1988) noted that for rape, 90% of the insect pollination was due to honeybees. We can therefore conclude that for rape both wind and insect pollination are important, but wind definitely plays a very important role (Timmons et al., 1995).

Since rape has a relatively high sugar concentration in its nectar and is thus very attractive to bees (Ramsey et al., 1999), it is not great surprise to find bees covering great distances to reach rape fields. Data on flight distances for insects in and around rape fields vary greatly. According to Saure et al. (1999b), flight distances for small-sized bees are around 200 m, sand bees (*andrena fulva*) up to 800 m and bumble bees up to 2,000 m. Other data indicate that bees will regularly travel up to 2 km from the hive when searching for nourishment. A professional beekeeper from Aberdeenshire has even reported that his bees travelled 5 km to a rape field (Ramsey et al., 1999). Eckert (1933) reports flight distances for bees between 4.4 and 7.4 km from the beehive even though adequate nectar sources were situated in the vicinity of the hive. Waddington et al. (1994) also reported gathering radiuses of up to 6 km. According to Saure et al. (1999b), flight paths for bees ranging up to 14 km have been noted.

The existing data for rape¹⁷⁰ in terms of observed introgression events is much better and more up-to-date than for maize. However, the introgression probability studies for rape are also problematic in that data contained in the

different studies are based to some extent on very different reference spaces and were gathered using very diverse methods, meaning it is not always possible to compare or jointly evaluate the data as before. For instance, in some cases only part of the source population carried the marker gene which was supposed to later exhibit a subsequent introgression (Scheffler et al., 1993, Simpson et al., 1999). It is uncertain whether all of the plants in the source population were actually carriers of the marker gene in all of the other studies. Moreover, the tendency in the studies is to not indicate whether the source population was homozygotic for the trait under consideration for outcrossing, i.e. whether all of the pollen was a carrier of this trait. Unlike the evaluation of the maize and wheat data (in which due to the rather poor quality of the data all available studies had to be considered), studies on rape in which the data on the trial conditions was too fragmentary or was not traceable were not taken into account in this analysis.

For the potential self-pollinator rape, it is critical whether fertile or sterile male rape was planted in the potential receiver field. In fields with fertile male rape, there is competition between the pollen from the field and wind- and insect-borne pollen from the surrounding area. Accordingly, lower introgression rates are to be expected here than in sterile male rape fields which require fertilisation by pollen from other fields.

A total of twelve studies were evaluated which investigated introgression rates in rape. See Table A 2 (Annex) for details on the studies and Table A 3 (Annex) for the introgression rates.

¹⁷⁰ There is a very detailed and comprehensive study of gene flow from rape fields and existing literature on this subject by Brauner et al. (2002).

If we consider only introgression events observed in sterile male rape populations, then the situation looks as shown in (Fig. 11):

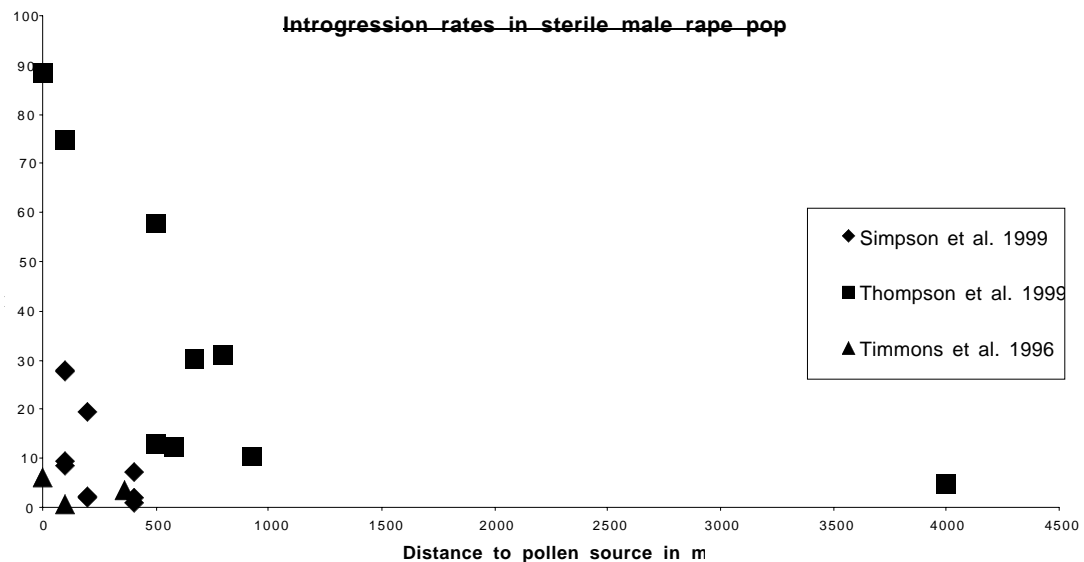


Fig. 11: Overview of the determined introgression rates in sterile male rape populations as a function of distance to pollen source

Due to their particular approach, the studies by Thompson et al. (1999) and Simpson et al. (1999) (Fig. 11) most likely mirror rather well the conditions for a planting scenario in which transgenic and non-transgenic rape are simultaneously planted in a small area (as potential pollen sources) and a field is also planted in the vicinity with sterile male rape into which introgression can occur (for details on the approach used by each trial, see Table A 2 in the Annex). In a scenario involving pollen competition from transgenic and non-transgenic fields, according to the present results introgression can occur into sterile male fields up to a distance of at least 4,000 m at a rate of at least up to 5%. At less than 1,000 m distance, an introgression rate of up to 10% is to be expected; at 500 m introgression rates from 10% to over 50% are to be expected; and at 100 m distance from the edge of the transgenic rape field, introgression rates up to almost 70% can be expected.

For introgression rates up to 1%, no spacing recommendations can be derived from the present data since no measurements were carried out exceeding 4 km distance and an introgression rate of 5% was still measured at this distance (Thompson et al., 1999).

The situation is very different for introgression events in pollen-producing (fertile male) rape fields (Fig. 12):

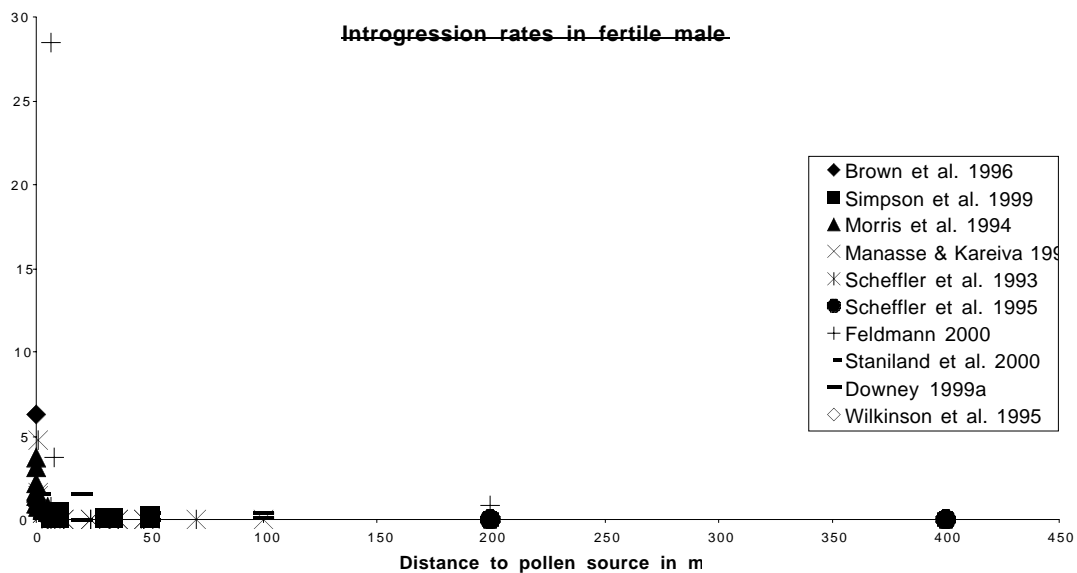


Fig. 12: Overview of observed introgression rates in fertile male rape populations as a function of distance to pollen source

The picture becomes much clearer if we disregard the introgression value of 28.5% at a 6.5 m distance from the pollen source (Feldmann, 2000) and the values between 0.00312% and 0.00495% at a 400 m distance (Scheffler et al., 1995) (Fig. 13):

distance of 200 m, an introgression rate of 0.83% was detected (Feldmann, 2000). Accordingly, a minimum spacing of 300 m should be maintained in order to avoid introgression over 1% in fertile male rape.

Since only the study by Scheffler et al. (1995) included measurements beyond a distance of 200 m, any recommendations for maintaining introgression in pollen-producing rape below 0.5% are solely based on conjecture. It is possible that a distance of 400 m is sufficient, but due to the paucity of the data no recommendations will be derived here.

Insect-based pollination represents a major uncertainty factor in this analysis. As was mentioned above, insects can carry pollen very far (up to 14 km). However, based on the present data, it is not possible to estimate whether insects are involved in a significant share of the pollination in rape fields over great distances. In most of the trials, however, potential pollinators were verified. Pollen influx over great distances due to insects presumably occurs mainly only in isolated cases. High introgression rates should therefore be expected particularly in very small receiver populations.

4.2.3 Prescribed distances from other institutions and our own proposal

As was mentioned in section 4.1.1, isolation distances have already been used in seed production for many years to ensure purity of different varieties. For example in Table 3, isolation distances for production of basic seed (from which certified seed is produced) are given:

Table 3: Isolation distances in seed production for basic seed

	<i>EU</i>	<i>CH</i>
Maize	200 m (0.1 to 0.5%)	200 m (0.1 to 0.5%)
Rape	200 m (0.1%)	400 m (0.3%)
Wheat	No data	Clear separation of fields (0.1%)

(in parentheses): max. percentage of extraneous varieties

Sources:

- EC Directive 66/402/EEC on marketing of cereal seed of 14 June 1966 (wheat, maize)
- EC Directive 69/208/EEC on the marketing of seed of oil and fibre plants of 30 June 1969 (rape)
- Switzerland: Swiss Federal Department of Economic Affairs Regulation on seed and plant products relating to crops and feed plants of 07 December 1998

If introgression of undesired GMO pollen must be minimised, isolation distances offer a means of meet this objective in seed production.

The distances required between transgenic and organic crops need to be discussed taking into account the following criteria which are not directly analogous to seed production guidelines:

- Organic agriculture strictly prohibits the use of transgenic plants. Accordingly, the tolerance needs to be as low as possible.
- There is a systematic difference between the transfer of a plant's own genes and transfer of genes that are foreign to the species (e.g. herbicide resistance).

- There is scientific dispute on whether introgression rates can be predicted at all (the highly divergent results tend to speak for themselves).
- To ensure a practical approach to the uncertainty associated with the release of transgenic plants and use the precautionary principle as a guiding precept, the highest introgression rates determined or computed hitherto must be assumed and an additional safety margin must be incorporated, e.g. with regard to related toxicological issues (Eckelkamp et al., 1997).
- The degrees of purity for seed production achieved (desired) through the use of prescribed isolation distances have not been verified on the level of molecular biology.
- Effects that accumulate over the years must also be considered. However, so far there are few studies which have examined gene transfer in plants over multiple years (Baier et al., 2001).
- Seed production makes use of a relatively small land area so that measures to avoid vertical gene transfer are possible. Once approved, however, genetically modified plants will influence a much greater GE-free area.
- Various authors have studied the question of how large the isolation distances between GMO and non-GMO fields need to be in order to reliably avoid exceeding a certain degree of impurity. This research is summarised in Table 5. The highest values listed in the table are from the British Soil Association, which has proposed prescribed distances based on a study of the literature. Since their objective is zero tolerance, i.e. 0.0% GMO impurity, a large safety margin was used in calculating their proposed distances.

Based on the maximum distances determined for an introgression rate of 0.5%, we have derived the following prescribed distances which incorporate a safety margin (Table 4):

Table 4: Proposed prescribed distances between GE-free fields and fields with GMO crops; desired introgression rate < 0.5%.

	Maximum distance determined with 0.5% introgression	Proposals by different institutions and persons, introgression < 0.5%	Provisional proposal by the project group, introgression < 0.5%	Provisional proposal by the project group, introgression < 1%
Maize	600 m: 0.79%, 800 m: 0.21%	200 m to 1,000 m	1,000 m	800 m
Rape	Sterile male varieties: 5% at 4,000 m Fertile male varieties: 0.8% at 200 m	10 to 600 m	Sterile male varieties: no proposal; Fertile male varieties: no proposal	Sterile male varieties: no proposal; Fertile male varieties: 300 m
Wheat	150 m: 2.8% (sterile male varieties)	50 m for normal strains	100 m for normal strains	50 m for normal strains

Table 5: Recommended prescribed distances between fields with genetically modified plants and organic fields

Crop	Author	Recommended distance	Desired max. impurity
Maize	Holden, 1999	Up to 6 miles (9654 m)	0%
	Garcia et al., 1998	More than 185 m	
	Ingram, 2000	130, 200 or 420 m for maize for silage feed 200, 300 or > 420 m for grain maize	1, 0.5 or 0.1% in fields of at least 2 ha
	Feil und Schmid, 2001	Greater distances than proposed by Ingram (2000), taking into account certain unfavourable conditions	No indication
	Organisacion Internacional Agropecuaria (OIA), Organic Crop Producers & Processors Inc/Pro-Cert Canada Inc (OCPPRO), 2000	1,000 m 600 m	No indication No indication
	SCIMAC (Supply Chain Initiative on Modified Agricultural Crops), 1999	200 m	No indication
Potatoes	Holden, 1999	Up to 1 mile (1609 m)	0%
Rape	Holden, 1999	Up to 6 miles (9654 m)	0%
	Ingram, 2000	1.5, 10 or 100 m; (conventional varieties & non-sterile hybrids) 100 m, > 100 m, > > 100 m (insufficient information) for breeding varieties and partially sterile hybrids	1, 0.5 or 0.1% in fields of at least 2 ha
	Organic Crop Producers & Processors Inc/Pro-Cert Canada Inc (OCPPRO), 2000	600 m	No indication
	SCIMAC (Supply Chain Initiative on Modified Agricultural Crops), 1999	200 m	No indication
Sugarbeets	Holden, 1999	Up to 1 mile (1,609 m)	0%
	SCIMAC (Supply Chain Initiative on Modified Agricultural Crops), 1999	600 m	No indication
Fodder beets	SCIMAC (Supply Chain Initiative on Modified Agricultural Crops), 1999	600 m	No indication
Wheat	Holden, 1999	Up to 3 miles (4,827 m)	0%
	Feil und Schmid, 2001	For normal strains 10, 50 or 100 m	1, 0.5 or 0.1%
Rye	Feil und Schmid, 2001	At least 1,000 m	Under 0.5%
Soybeans	Organisacion Internacional Agropecuaria (OIA), Organic Crop Producers & Processors Inc/Pro-Cert Canada Inc (OCPPRO), 2000	25 m 8 to 25 m	No indication No indication

4.3 Summary

Attempts to prevent or reduce introgression of pollen from neighbouring or nearby fields into related crops is not a new phenomenon that is gaining relevance only now due to the use of genetic engineering in agriculture. Such techniques have been used for many years in seed production.

However, seed production involves a relatively small land area and a limited number of producers so that measures to prevent vertical gene transfer have apparently been successful so far in this limited domain. But, if transgenic varieties are approved, transgenic crops could be planted in all agricultural areas. Close juxtaposition with areas to be kept GE-free for diverse reasons would be expected.

In the domain of seed production, prescribed distances and in some cases special propagation areas are used to ensure isolation.

Following discussion of the various isolation techniques, this paper derives proposals for isolation distances between transgenic crops and those which are to be kept GE-free for maize, rape and wheat insofar as the existing data supports such conclusions.

In analysing the available data, many gaps come to light in the empirical data, highlighting an urgent need for further research. In particular, there is a lack of studies which analyse introgression probabilities with multiple parallels under different environmental conditions based on standardised techniques and under conditions that closely approximate real-world planting scenarios. Despite the significant lack of data, this paper derives its own recommendations taking into account many practical issues insofar as possible based on the available data.

According to the present results for introgression in sterile male wheat, introgression rates of at least 3% are to be expected at least in the zone from 0 to 150 m from the pollen source. It is not possible to derive further conclusions.

According to the present results for introgression in fertile wheat, introgression rates of up to over 1% are to be expected at least in the zone from 0 to 10 m from the pollen source and introgression rates from 1 to 0.5% in the zone from 10 to 50 m. At distances beyond 100 m, the introgression rates will presumably fall below 0.1%.

According to the present results for introgression in maize, introgression rates over 1% are to be expected at least in the zone lying less than 800 m from the pollen source and introgression rates over 0.5% in the zone from 800 to 1,000 m. At distances beyond 1,000 m, the introgression rates will presumably fall below 0.5%.

According to the present results for introgression in sterile male rape, introgression rates of up to over 5% are to be expected at least in the zone up to 4,000 m from the pollen source. It was not possible to derive recommended distances for introgression rates as low as 1% or 0.5% in sterile male rape from the available data.

According to the present results for introgression in fertile, pollen-producing rape, introgression rates of up to over 1% are to be expected at least in the zone from 0 to 300 m from the pollen source. It is not possible to derive recommended distances for introgression rates below 0.5% from the available data.

5 Ways of influencing the future legal situation

5.1 Establishment of a public register of production sites

In order to prevent or minimise introgression of GMOs into organic crops, it is not enough for users of genetically modified plants and organic farmers to be simply aware of the distances at which introgression is possible. In order to undertake measures to prevent GMO introgression, it is very important to know the exact planting sites of genetically modified plants and organic plant varieties. Users of genetically modified plants and organic farmers must be aware of the plots which are subject to the risk of GMO introgression or from whence outcrossings can occur in order to take protective measures. Only then can a user of GMOs know whether he can (or must) comply with certain prescribed distances or whether he can prevent the introgression of GMOs into neighbouring crops by planting a different plant variety or changing the sowing time. Transparency in the crop scheduling of all of the farmers in a given area serves as a necessary basis for the mutual consideration required according to § 906 BGB to avoid GMO introgression. This information can be made available to all farmers using a public register for each farming area.

The following sections will consider what information needs to be included in a public register in order to prevent or reduce introgression of GMOs. The extent to which this information is already required by existing or planned regulations is also considered. Finally, the question of which institution will be responsible for maintaining the public register is considered.

Analysis of the current legal situation within the neighbour relationship shows that a public register must include the following information if it is to make a contribution towards preventing or minimising introgression and thus towards settling local conflicts:

1. Plot-by-plot information about the sowing site and genetically modified plant variety at the start of crop scheduling, and no later than February of each year.
2. Information about the specific GMO construct in the genetically modified plant in order to enable or simplify laboratory identification of any possible introgressions which may occur.

5.1.1 Plot-by-plot information about plant varieties and planting locations

In order to allow organic farmers to assess whether they might possibly be affected by an introgression and so that users of GMOs know which organic farmers in their area are susceptible to introgression, the public register must contain plot-by-plot information about the plant varieties in use and where they are planted. It is not enough for users of GMOs and organic farmers to simply know that GMOs are planted in a given communal district. Knowledge of the plant variety found in each individual plot is required in order to estimate the probability of introgression and check for compliance with prescribed isolation distances. The public register must be associated with an obligation on the part of farmers to provide information on plant varieties and their locations both for GMHPs and for organic varieties.

The following section will consider the extent to which the prerequisites for establishment of a public register have already been put into place by the Deliberate Release Directive 2001/18/EC¹⁷¹. According to Art. 31 Para. 3 lit. b Deliberate Release Directive, the Member States must establish registers indicating the location of any GMOs that are planted. These registers are intended in particular for use in monitoring any consequences of commercialised GMOs on the environment according to the provisions of Art. 19 Para. 3 lit. f and Art. 20 Para. 1 Deliberate Release Directive. Art. 19 Para. 3 lit. f Deliberate Release Directive standardises the obligations of

¹⁷¹ Cf. footnote 1.

persons who commercialise or plant GMOs to report to the Commission and the competent authorities of the Member States “concerning a level of information deemed appropriate on their location”. The obvious question here is whether according to the Deliberate Release Directive it suffices to achieve “a level of information deemed appropriate on their location” if the farmer using GMOs indicates a large area or whether a plot-by-plot indication is required. This question can remain unanswered to the extent that Art. 31 Para. 3 lit. b Deliberate Release Directive provides with regard to the planting locations of GMOs that “without prejudice to such provisions in Articles 19 and 20, the said locations shall: - be notified to the competent authorities, and - be made known to the public in the manner deemed appropriate by the competent authorities and in accordance with national provisions”. The Deliberate Release Directive thus leaves it up to the Member States to determine how precise the information about the planting locations must be. Moreover, information about the planting location is to be made public and thus accessible to any organic farmer interested in such affairs regardless of whether he is located close to the GMO location.

5.1.2 Information about ways to verify GMOs

If an organic farmer is to be able to analyse his crops for introgressions following harvesting, then he needs information about ways to verify the specific GMO in question. The analysis laboratory can look more specifically for introgressions in the organic crops if it has access to information about the specific identifier for the GMO in question. This eliminates the need for laboratory analysis for a wide spectrum of possible GMO constructs and thereby reduces the analysis costs for the organic farmer. In conjunction with the format of the public register for GMOs, there is also the question of the extent to which existing regulations or draft regulations require the provision of information about GMO constructs and ways to verify them and whether such information can be made public or provided to the affected farmer. Already according to Art. 21 Deliberate Release Directive 2001/18/EC, the “Member States shall take all necessary measures to ensure that at all stages of the placing on the market, the labelling and packaging of GMOs placed on the market as or in products comply with the relevant requirements specified in the written consent”. The written consent for commercialisation according to Art. 19 Deliberate Release Directive 2001/18/EC covers only the information requirements relating to the notifier of a GMO, but not for the participants who place the GMO on the market or the farmers who plant it. However, it is important for farmers affected by an introgression (as the affected parties at the end of the chain of commercialisation) to have access to precise information about the planted GMO and ways to verify it. In order to give these farmers access to this information, there must exist an unbroken chain of information from the planted GMO variety back to the notifier data. This unbroken chain of information is to be governed by the proposed regulations on traceability and labelling of GMO food and feed products¹⁷² (Traceability and Labelling

¹⁷² Proposal of the Commission of 25 July 2001 for a European Parliament and Council regulation concerning traceability and labelling of genetically modified organisms and traceability of food and feed products produced from genetically modified organisms and amending Directive 2001/18/EC, COM (2001) 182 val.

Regulation). Besides GMO food and feed products, the traceability and labelling regulation also applies to GMO seed.¹⁷³ According to Art. 1, the Regulation provides “a framework for the traceability of genetically modified organisms (GMOs), and food and feed produced from GMOs, with the objective of facilitating accurate labelling, environmental monitoring and withdrawals of products.” Through the traceability and labelling regulations, the Commission meets its obligation from Art. 4 Para. 6 Deliberate Release Directive 2001/18/EC to ensure traceability for each phase of the placing on the market of a GMO. To ensure traceability, any party who makes available a product for the first time, whether in return for payment or free of charge, to third parties or is involved in any phase of the production or sale of a GMO product which is placed on the market in the Community must provide the following information to the third party according to Art. 4 Traceability and Labelling Regulation:

- Information that the product contains or consists of GMOs
- The relevant unique code assigned to the GMO.

The public register for GMOs could be based primarily on information gathered within the framework of the Traceability and Labelling Regulation. In order to assess the applicability of the information obtained through the Traceability and Labelling Regulation to a public register, we will briefly examine the two-tiered structure of the traceability system:

1. According to the Deliberate Release Directive 2001/18/EC, the consent for commercialising a GMO relates to the identity of the GMO product and the associated (specific) identifier. The object of the consent is thus the transformation event, i.e. the genetic modification through which a conventional organism is transformed by introducing a DNA sequence. In order to allow identification of the transformation event approved for a notifier, a unique identifier is assigned. According to the Traceability and

¹⁷³ Cf. the explanatory memorandum for the Traceability and Labelling Regulation, at location quoted,

Labelling Regulation, a unique code is assigned to each transformation event and the associated identifier. The Commission assigns this code as stipulated in Art. 8 Traceability and Labelling Regulation. The code is used to help identify a GMO and determine its particular properties and characteristics. The notifier data on the identity and specific identifier are recorded along with other information in one or more registers established by the Commission according to Art. 31 Para. 2 Deliberate Release Directive. The register(s) contain a section which must be publicly accessible. The confidentiality provisions according to Art. 25 Deliberate Release Directive must also be followed.

2. Only the code and the indication of GMO content are recorded and transferred each time a GMO product is transferred by each participant in the production chain all the way to the end product.

The unique codes defined in the Traceability and Labelling Regulation are not enough in order to verify possible GMO introgressions into the crops of organic farmers. Contrary to the objectives of the Traceability and Labelling Regulation, the code of the GMO but also the identity and properties of the specific identifier must be known in order to analyse the harvest. Disclosure of the properties of the specific identifier in a public register could be to the detriment of GMO manufacturers' interests as a result of intellectual property issues related to the GMO construct, for example. Accordingly, the transfer of the exact properties of the identifier must be coupled with a warranted interest on the part of the affected farmer.

5.1.3 Local embodiment and standardisation place for the public register

The primary objective of the public register is to provide information to farmers about fields planted with GMOs and organic crops. Since introgression of GMOs can affect immediate neighbours as well as neighbours that are further

see footnote 163.

removed, the public registers need to take into account fairly large agricultural areas. The area covered by the public register thus needs to extend at least beyond individual communal districts. Clearly, it is best to establish multiple registers at the level of the individual Länder or subdivisions thereof instead of having a single register for all of Germany. Then, the registers can be managed by the different Chambers of Agriculture or similar organisations.

The Genetic Engineering Act comes to mind as a standardisation place for introducing public registers. Accordingly, the Genetic Engineering Act must be adapted to the provisions for introducing GMO sites according to Art. 31 Para. 3 lit. a and b of the new Deliberate Release Directive. As part of this amendment, the provisions of the Deliberate Release Directive could be modified so as to simultaneously enact the provisions for GMO public registers.

5.1.4 Interim result

In conclusion, it is clear that the Member States are already obligated according to Art. 4 Para. 6 in conjunction with Annex IV of the Deliberate Release Directive 2001/18/EC to establish a public register indicating any GMOs planted and where they are planted in order to monitor the environmental consequences of GMOs. This register could simultaneously assume the function of a public register for GMOs. The Directive leaves it up to the Member States to choose how to implement the register. In other words, the Directive would not prohibit requiring farmers to provide plot-by-plot information about any GMOs to be planted by February of each year at the latest. Organic farmers would also be required to provide plot-by-plot information for the register about the crops they will plant. In order to include information about the exact GMO construct and ways to verify its presence in the public register, the proposal from the Traceability and Labelling Regulation¹⁷⁴ could be used. According to

¹⁷⁴ COM (2001) 182 final. Adoption of the proposal for the Traceability and Labelling Regulation is seen by some Member States as a prerequisite for ending the *de facto* moratorium; see in this context

the Traceability and Labelling Regulation, however, only the codes for the relevant GMO constructs have to be made public. However, organic farmers need to verify the GMO construct so that the public register must include information about the exact GMO construct. The information about the exact construct must be coupled with a warranted interest on the part of the affected farmer.

5.2 Standardisation of protective measures

Establishment of a public register will initially eliminate only the significant information deficit regarding where GMOs are planted. This information will serve as an important prerequisite for organic farmers and GMO users to employ defensive crop scheduling. In order to allow farmers use make rational usage of defensive crop scheduling, they also need to know at what distances introgressions can result from GMO crops. This is the only way that GMO users and organic farmers can assess whether introgressions into neighbouring organic fields or outcrossings from GMO fields are possible in the first place. Besides defensive crop scheduling, compliance with prescribed distances within which GMOs may not be planted needs to be considered as a protective measure. Finally, a general minimisation requirement for GMO introgressions needs to be considered. The following section will discuss instructions for protective measures on seed packaging, introduction of “good production practice for GMO crops” and the minimisation requirement.

5.2.1 Mandatory instructions in conjunction with seed sales

Seed producers could instruct GMO users on protective measures for preventing GMO introgressions either directly on the seed packaging or on a separate sheet. The seed producers would have to let GMO users know how far pollen typically travels from the crop and what measures exist to minimise the impact, e.g. isolation, sowing time. The instructions could involve graphics on the seed packaging or separate sheet indicating how far the transgenic crop needs to be from a sensitive crop in order to likely avoid an introgression rate of > 1% GMO into the sensitive crop¹⁷⁵. Users of transgenic seed would thus have an orientation aid with regard to the minimum spacing to be complied with in order to avoid exceeding the 1% mandatory labelling threshold in the neighbouring crops and thereby triggering marketing damages. The obligation

¹⁷⁵ Cf. the proposed prescribed distances in section 4.2.3 (Table 4).

to provide instructions for protective measures on the packaging could be enacted through governmental regulation. However, it is also conceivable for the seed industry to voluntarily agree to provide instructions on the seed packaging or a separate sheet, similar to that which is expected in the Australian state of Victoria. The government of the Australian state of Victoria concluded an extensive public hearing in December 2001 by deciding not to institute genetic engineering-free zones for the time being. Instead, the seed industry will be monitored to see if they can institute effective measures of their own for marketing, planting and processing GMOs in order to permit co-existence of all types of agriculture.¹⁷⁶

5.2.2 Standardisation place for the obligation to provide instructions

The instruction requirement for seed producers could be enacted in a regulation based on § 30 Para. 2 No. 14 GenTG. According to § 30 Para. 2 No. 14 GenTG, regulations on the packaging and labelling of products can be enacted to ensure orderly commerce with GMOs and to protect users of GMOs. This can include indications regarding GE modifications and justifiable damaging interference within the meaning of § 16 Para. 2 GenTG insofar as this is required to protect the user. The legal basis of authorisation is thus intended to protect users against risks associated with trade and use of GMOs according to the intended purposes, e.g. damage risks of GMOs according to § 16 Para. 2 GenTG.¹⁷⁷ However, since it is a non-conclusive listing, labelling rules for protecting against GMO introgressions into organic crops could also fall under § 30 Para. 2 No. 14 GenTG.

The instruction requirement for seed producers could also be regulated on the basis of § 30 Para. 2 GenTG by extending the protection of material assets either in the regulation of § 30 Para. 2 No. 14 or by expanding the catalogue in

¹⁷⁶ Cf. die materials from the public hearing and the final report (Genetic Engineering-Free Zones) by the Department of Natural Resources and Environment, Australia under: www.nre.vic.gov.au.

¹⁷⁷ Hirsch/ Schmidt-Didczuhn, Genetic Engineering Act, § 30 margin no. 42.

§ 30 Para. 2 GenTG to include an additional number. The introduction of an instruction requirement for protecting material assets is covered by the legal basis of authorisation in § 30 Para. 2 GenTG. According to this legal basis of authorisation, regulations can be enacted which serve to “achieve the purposes named in § 1 No. 1”. Purposes named in § 1 No. 1 GenTG include protection of “material assets”. According to the opinion maintained above on the extent of the protective intent as it relates to “material assets”, measures can be stipulated to protect material assets in the commercialisation of GMOs.¹⁷⁸

It remains to be checked whether the regulation of instruction requirements when commercialising GMOs in the Genetic Engineering Act does not lead to competition problems with the Seed Commerce Act.¹⁷⁹ The two regulations overlap when it comes to commercialisation of GMO seeds. The collision could happen between commercialisation of a GMO product according to § 14 ff. GenTG and commercialisation of seeds according to § 3 and § 4 of the Seed Commerce Act. According to § 2 No. 4 GenTG, the Genetic Engineering Act is applicable to the commercialisation of products which contain or consist of GMOs. The Genetic Engineering Act is not applicable if the commercialisation is regulated by other legal regulations corresponding to the provisions of the Genetic Engineering Act which make the admissibility of the commercialisation dependent on a corresponding risk assessment. The purpose of this regulation is to ensure that proven special legal inspection techniques according to other regulations also apply to the commercialisation of genetically modified products so that additional techniques can be avoided. The prerequisite for the precedence is that the admissibility of the commercialisation must depend on a risk assessment corresponding to that under the Genetic Engineering Act.¹⁸⁰ According to § 3 Para. 1 No. 1 SaatG, seed may be placed on the market if it is recognised as basic seed, certified seed or standard plant material or according

¹⁷⁸ Cf. section 3.1.1.

¹⁷⁹ Seed Commerce Act of 20 August 1985, Federal Law Journal I, p.1633, last amended by the second law amending the Seed Commerce Act of 21 March 2002, Federal Law Journal I, p. 1146.

¹⁸⁰ Hirsch/ Schmidt-Didczuhn, Genetic Engineering Act, § 2 margin no. 11.

to § 3 Para. 1 No. 9 SaatG the placing on the market of the seed takes place within the framework of an approved released according to § 14 Para. 1 No. 1 GenTG. § 4 SaatG stipulates the requirements for certification of seed. However, the certification process according to § 4 SaatG does not include any risk assessment as provided in the Genetic Engineering Act.¹⁸¹ According to § 3 Para. 1 Sentence 3 SaatG, when offering seed which contains GMO(s) within the meaning of § 3 No. 3 GenTG in “sales catalogues or any other written type of quote document, the genetic modification must be clearly indicated”. However, based on the mandatory labelling requirement for GMO seed, it cannot be concluded that a corresponding instruction requirement can also be enacted based on the Seed Commerce Act. The instruction requirement does not replace the delimitation criterion of the risk assessment. Thus, the introduction of instruction requirements for the commercialisation of seed into the Genetic Engineering Act is not displaced by Seed Commerce Act. Due to the lack of special regulations, instruction requirements for the commercialisation of GMOs must be regulated in the Genetic Engineering Act. A contrary conclusion does not follow even from the newly adopted amendment to the Seed Commerce Act.¹⁸² In the 2nd amendment law, only labelling requirements for GMO seed are introduced; separate risk assessment for GMO seed does not take place.

¹⁸¹ Hirsch/ Schmidt-Didczuhn, Genetic Engineering Act, § 2 margin no. 16; Herdegen in: Eberbach/ Lange/ Ronellenfisch, Recht der Gentechnik und Biomedizin [Law of genetic engineering and biomedicine], vol. 1, § 2 GenTG margin no. 27.

¹⁸² Cf. footnote 170.

5.2.3 Good production practice for GM crops

Measures to prevent greater than 1% GMO introgression into organic crops can be implemented through introduction of “good production practice for GMO crops” (GPP). The GPP could indicate what measures are reasonable and acceptable for avoiding GMO introgression. Possible measures include defensive crop scheduling and compliance with prescribed distances between transgenic crops and sensitive organic cultivations. The GPP should also provide an obligation to minimise outcrossings. The GPP measures will also answer the question of what measures are economically acceptable to GMO users to avoid GMO introgression according to § 906 BGB.¹⁸³ The GPP is also found in a Commission draft of a proposed directive amending the seed regulations. According to this draft, “good production practice for seed production” should be observed when planting seed.¹⁸⁴ Further objectives of GPP in seed production are “to minimise admixtures and undesirable gene flow throughout crop growth and post-harvest handling shall be implemented by seed growers, in particular in respect of drilling, cultivation, harvesting, transport and storage”. Many other environmental laws also stipulate compliance with GPP in agricultural activities. For example, as part of the GPP of the newly amended Federal Nature Conservation Act according to § 5 Para. 4 BnatSchG, various requirements for agriculture have been introduced to ensure accord with the objectives of nature conservation.¹⁸⁵ GPP regulations for agriculture also exist in relation to soil according to § 17 Para. 2 BBodSchG.¹⁸⁶ Further regulations can be found in §§ 2 a, 6 PflSchG (Plant Protection Act) and in § 1 a

¹⁸³ Cf. the comments on economic acceptability in § 906 BGB in section 3.3.2.4.

¹⁸⁴ Cf. only as an example the proposed amendment to Annex I, Part A of Directive 66/400/EEC, in: Draft of a proposed Commission directive of 29 January 2002 amending the Seed Directives 66/400/EEC, 66/401/EEC, 66/402/EEC, 66/403/EEC, 69/208/EEC and 70/458/EEC, p. 9.

¹⁸⁵ Cf. the Federal Nature Conservation Act (Bundesnaturschutzgesetz = BnatSchG), Federal Law Journal II 2002, p. 1193 ff., under: <http://www.bmu.de/download/dateien/bundesnaturschutzgesetz.pdf>

¹⁸⁶ Gesetz zum Schutz vor schädlichen Bodenveränderungen und zur Sanierung von Altlasten [Act on Protection against Harmful Changes to Soil and on Rehabilitation of Contaminated Sites] (Bundes-Bodenschutzgesetz = BBodSchG) of 17 March 1998, BGBl I; p. 502, amended by the law of 09 September 2001, Federal Law Journal I, p.2331.

Fertiliser Act (Düngemittelgesetz = DMG)¹⁸⁷. The standard for the GPP is specified more precisely in the listed technical regulations in some cases through administrative provisions.¹⁸⁸ Here, technical contents, e.g. in the form of notifications or warning sheets from technical agencies, define the content of the GPP.¹⁸⁹ A more concrete definition of the rather vague “GPP” could also be carried out within the law itself or through an authorisation to enact a special legal regulation, as was done in defining GPP in the Fertiliser Act.¹⁹⁰ The GPP must include regulations on possible protective measures to prevent GMO introgression as well as a requirement to minimise GMO outcrossings. The objective of preventing introgression exceeding 1% GMO in organic crops is not sufficient alone to prevent material damages due to GMO introgression. Thus, solely considering the 1% threshold a GMO user will undertake measures to prevent GMO introgression only if has to consider introgression into neighbouring organic crops. Due to the problem of the ubiquitous presence of transgenic pollen, this sort of procedure is unsatisfactory if we wish to use a precautionary approach. The proposed liability fund would compensate for damages that occur due to the ubiquitous presence of transgenic pollen, but would not prevent such damages from occurring in the first place. Accordingly, if we take a precautionary approach, measures other than those requiring compliance with prescribed distances are also needed. The minimisation requirement is also necessary for the case in which multiple parties come into question as being responsible for introgression into organic crops. In order to prevent introgression of more than 1% GMO into organic crops in this case, further requirements can be imposed on GMO users under the minimisation requirement.

¹⁸⁷ Cf. Fertiliser Act of 15 November 1977, Federal Law Journal I, 2134, last amended by the law of 25 June 2001, Federal Law Journal I, p.1215.

¹⁸⁸ Bender/ Sparwasser/ Engel, Umweltrecht [Environmental law], Chapter 5, margin no. 89.

¹⁸⁹ Publication of the Federal Ministry for Food, Agriculture and Forestry on basic principles for implementing good production practice in plant protection of 30 September 1998, Official Journal No. 220a, p. 16485 and supplement.

¹⁹⁰ Regulation on basic principles of good production practice in fertilisation (Fertiliser Regulation) of 26 January 1996, BGBI I, p. 118, last amended by the second regulation amending fertiliser provisions of 16 July 1997, BGBI I, p. 1835.

In order to implement a GPP, authorities must be allowed to enact specific protective measures. Parties violating such provisions should then be in breach of an administrative provision. Administrative offences are necessary for cases where the amount of the potential material damage to the organic farmer is less than the cost of the acceptable protective measure. There is then a risk that GMO users will not undertake any protective measures since it is more to their advantage to wait to compensate for the material damage to be verified subsequently.

5.2.4 Standardisation places for “good production practice for GMO crops”

“Good production practice for GMO crops” could be introduced as part of an amendment to the Genetic Engineering Act or the Seed Commerce Act. This could also be regulated through a separate (Organic) Farming Act.

A possible approach for compliance with the “good production practice for GMO crops” in the Genetic Engineering Act would involve the consent for commercialisation according to § 16 Para. 2 GenTG. The consent for commercialisation could be subject to the condition that GPP for GMO crops must exist or be complied with for the given GMO. Introduction of a condition of this sort would be directly binding only for commercialisers of GMOs but would not ensure compliance with the GPP by the users. Linking the consent for commercialisation to compliance with the GPP would raise serious issues under constitutional law since compliance with the GPP cannot be required from the commercialisers and once granted the consent enjoys legitimate protection. Moreover, an obligation of this sort is in conflict with the prohibition in Art. 22 Deliberate Release Directive.¹⁹¹ The commercialisation of GMOs would be restricted or prohibited by the prerequisite for the “existence of or compliance with a GPP” without the fulfilment of the exception prerequisites from Art. 23 Deliberate Release Directive.

Aside from the consent for commercialisation, the planting of GMOs could be made subject to the requirement that the “GPP for GMO crops” must be complied with. Such a regulation could be integrated into the Genetic Engineering Act due to the material relationship with the planting of GMOs. In order to control the GPP as part of a separate (Organic) Farming Act, the Federal jurisdiction according to Art. 72 Para. 2 in conjunction with Art. 74 Para. 1 No. 17 and 11 GG could be invoked. According to Art. 72 Para. 2 GG, the Federation shall have the right to legislate on such matters if and to the extent that the establishment of equal living conditions throughout the federal territory or the maintenance of legal or economic unity renders federal regulation necessary in the national interest. According to Art. 74 Para. 1 No. 17 GG, areas of competing legislation include the promotion of agricultural production, assurance of the food supply and the import/export of agricultural products. According to Art. 74 Para. 1 No. 11 GG, the jurisdiction for competing legislation also includes law relating to economic affairs. Regulation of GPP in a separate Farming Act could be based on the two cited jurisdiction references. Regulation of uniform federal practice for planting of GMOs is also necessary according to Art. 72 Para. 2 GG to maintain legal and economic unity.

5.3 Liability fund for GM introgression

Even if prescribed distances are complied with, there is no way to exclude the possibility that transgenic pollen will be transferred from transgenic cultivations even over very large distances. The consequences of this ubiquitous presence of pollen which is relevant to many crops must also be managed. In the partially comparable case of forest damage due to large-scale dissemination of airborne pollutants, the Federal Constitutional Court saw the legislature as obligated to take action even if it is allowed considerable discretion in how it acts.¹⁹² According to the Constitutional Court, avoidance of unacceptable damages to

¹⁹¹ Cf. section 2.1.

¹⁹² Ruling of the Federal Constitutional Court of 26 May 1998, file no.: 1 BvR 180/88.

the forest by way of measures to keep the air clean has precedence over other possibilities relating to the government's obligation to realise legal protection of property according to Art. 14 Para. 1 Sentence 1 GG. Nevertheless, the Court did not exclude the possibility of compensating forest owners for damages through the introduction of compensation regulations.

For GMO introgression due to non-determinant sources, a certain system of compensation for marketing disadvantages of organic farmers is therefore possible. The compensation could involve a government indemnification statute or a fund model based on government regulation or a voluntary agreement commercialisers and users of GMOs. The latter possibility has been chosen by the Australian state of Victoria.¹⁹³ In choosing a model for compensation for damages that are worthy of compensation but not qualified, the following basic principles should be considered:¹⁹⁴

- The compensation model must follow the basic principles of cost/benefit analysis in the broadest sense, i.e. based on a set administrative expense (to be minimised), a financial volume must be distributed in such a manner as to cover all losses in full or at least mitigate the most severe losses.
- The compensation model may not result in neglect of the existing regulation model under the law of obligations.
- The principle of causal responsibility must be taken into account, i.e. the party causing the damage must bear the cost and not general public. By placing the burden of the cost on the wrongdoer, the idea is to achieve more optimum solutions in production and distribution for the economy as a whole.

¹⁹³ Cf. section 1.3.

¹⁹⁴ Cf. Salje, Umwelthaftungsrecht [Environmental liability law] – Commentary, introduction margin no. 22 with numerous further citations.

- The prevention principle should help to prevent future damages insofar as possible.
- Besides ensuring the preservation and survival of the damaged party, the compensation principle is also intended to make the wrongdoer aware of the full extent of the damages so that he can account for these damages in his balance sheet and consider them in making investment decisions.

In view of the criteria named above, a compensation fund should be given preference over a government indemnification regulation. One factor against a government indemnification regulation is the fact that it is a flagrant violation of the principle of causal responsibility if damages are paid out of general budgetary resources. On the other hand, if the government compensation payments were financed using special charges assessed based on causation, the principle of causal responsibility would still be respected. However, there is still the issue of whether an inadmissible special charge would be introduced in this manner, and it would also be necessary to check whether the government regulation would function efficiently according to the cost/benefit principle. Like government regulation, a fund model is based on pure compensation, but it could call upon GMO commercialisers and users to compensate for damages they cause according to the principle of causal responsibility. With regard to the financing and outlay profile, the fund model would be more flexible than a government model integrated into budgetary regulations. Finally, if a fund were organised under private law, the existing expertise of liability insurers could be exploited to administer the ensuing property damages. A fund solution in which the financing and damage administration was handled directly by the GMO commercialisers and users could increase the attraction of pursuing (joint) measures to prevent damages.

In any case, a liability function must work to ensure that organic farmers are paid compensation for damages due to GMO introgression in case they cannot verify the causation behind the introgression due to cumulative effects or

distance. It is also worthy of considering whether the liability fund should be accountable in other cases in which damages arise in organic crops due to GMO introgression. An obligation would thus exist as soon as an organic farmer verifies damage due to GMO introgression. In this case, an organic farmer would not have to first attempt to recover the damages based on liability standards under civil law. In the latter case, the fund would serve to ease tensions between farmers by largely circumventing litigation between them.

5.4 Protection of organic seed propagation

Production of organic seed requires absolute, foolproof protection against the influx of transgenic genetic information. This requires a special legal protection status so that the integrity of organic agriculture as an alternative production form without the active use of transgenic organisms is ensured. In terms of the requirements for protective measures, a distinction must be made between production of organic basic seed or certified seed and an organic farmer's seed production for replanting. In order to produce certified seed, it is necessary to allocate closed planting areas with sufficient isolation zones. This could involve discretionary assignment of protection zones, e.g. through Länder regulation. Corresponding models for conventional seed production already exist on the basis of § 29 SaatG. Currently, closed planting areas are regularly allocated for seed propagation upon request of the participating farmers in which farmers who do not participate in the seed propagation efforts may not plant any competing crops in order to prevent foreign genetic information from entering into propagation cultivations due to pollen drift.

In order to allow better insight into the current legal situation, the following pages contain an English translation of the Land law for Baden-Württemberg for protection of seed propagation areas and a legal regulation for delimiting a closed planting area for maize seed production. The protection already accorded to seed propagation areas under current law has great relevance for

the protection of organic seed propagation. However, the distances required for transgenic cultivations will exceed by far the 200 m strip normally used in conventional seed propagation.

I. Seed Commerce Act (SaatG)

Of 20 August 1985

§ 29 Closed planting areas

The Länder can establish closed planting areas for seed production.

II. Act on the Protection of Seed Production in Closed Planting Areas (Baden-Württemberg) Of 13 May 1969

§ 1 Closed planting area

(1) The Government Presidiums can declare an area as a closed planting area for the production of true and genuine seed of certain cross-pollinators (seed propagation) through legal regulation.

(2) The closed planting area encompasses one or more propagation areas as well as an area which is required to comply with the minimum distance specified in the implementation regulations for the Seed Commerce Act of 20 May 1968 (BGBl. I p. 444) for the variety of seed to be propagated. Further areas can be incorporated in order to determine the boundary of the planting area based on property boundaries and if possible according to clearly recognisable natural boundaries.

(3) The declaration of a closed planting area presumes that:

1. At least 25% of the agriculturally used land in the area to be delimited under Paragraph (2) is intended for seed propagation;

2. The measure is called for also taking into account the economic needs of the affected operations in the interest of rural land improvement;

3. Owners of more than 25% of the agriculturally used land in the area to be delimited under Paragraph (2) have not raised objections which were not taken into account.

(4) The seed propagators are obligated to verify the prerequisite according to Paragraph 3 No. 1 by presenting the required maps and documents in which the pieces of land and propagation areas are unambiguously designated indicating their size and owners as well as the boundary shape of the area to be covered.

§ 2 Protective provisions

(1) In order to protect the propagation fields, the Government Presidiums can through legal regulation:

I. Determine that within the closed planting area

a) Of the plant species to be propagated only one or more specific varieties may be planted;

b) In case of propagation of hybrid varieties, planting for consumption can be restricted to the usage of seed from the father component of the variety intended for propagation or to potential varieties;

2. Enact further provisions insofar as they are required in special cases to ensure the production of true and genuine seed along with its recognition;

3. Make provisions to designate and monitor the closing planting area.

(2) In order to protect the propagation fields, the Government Presidiums can carry out measures in individual cases according to Paragraph 1.

§ 3 Procedural provisions

(1) Prior to enacting a legal regulation, professional representation shall be heard.

(2) The Government Presidiums shall make arrangements such that:

a) The draft of a legal regulation as well as the maps and documents according to § 1 Para. 4 are publicly displayed for a period of two weeks in each rural community in whose communal district the closed planting area is planned to extend;

b) The time and place of the display in the format determined for the affected rural community shall be publicised, or the affected parties informed thereof;

c) The affected parties are requested in the public announcement or memorandum to raise any objections during the display deadline in writing or for recording at the town hall.

(3) Opposing parties whose objections are not considered shall be informed of the reason(s).

§ 4 Tolerance and information obligations

(1) Natural and legal persons as well as associations of individuals without legal capacity which are affected by a legal regulation according to § 1 Para. 1 shall tolerate the entry into the pieces of land encompassed within the closed planting area by persons authorised by the Government Presidiums. They are further obligated to provide any information required to carry out this Act or the legal regulations passed by reason of this Act. Upon request they shall provide seed samples without payment.

(2) A party which is obligated to provide information can refuse to answer such questions which if answered would expose himself or one of the associate designated in § 383 Para. 1 No. 1 to 3 Civil Procedure Code to the risk of criminal prosecution or proceedings under the Administrative Offences Act.

§ 5 Administrative offences

(1) A party is in violation of these regulations if he deliberately or negligently

1. Violates his obligations according to § 4 Para. 1

2. Disobeys a legal regulation enacted based on this Act insofar as it refers to this civil penalty provision for specific findings of facts;

(2) The administrative offence can be punished with a monetary fine;

(3) The administrative authority within the meaning of § 36 Para. 1 No. 1 of the Administrative Offences Act is the Government Presidium.

§ 6 Entry into force

This Act enters into force on the day after its delivery.

III. Regulation of the Freiburg Government Presidium for Protection of the Production of Hybrid Seed Maize in Closed Planting Areas

Of 3 March 2000

In view of §§ 1 and 2 of the Act for Protection of the Production of Hybrid Seed in Closed Planting Areas of 13 May 1969 (GBl. p. 80), the followed is decreed:

§ 1

(1) In the Breisgau-Hochschwarzwald rural district, partial areas of the communal districts listed hereafter are hereby declared to be closed planting areas for the production of true and genuine hybrid maize seed.

1.1 Bad Krozingen - Tunsel district

1.2 Bad Krozingen - Tunsel district

1.3 Bad Krozingen - Tunsel district

1.4 Bad Krozingen - Schlatt and Tunsel districts

1.5 Bad Krozingen - Tunsel district as well as Eschbach

1.6 Eschbach and Heitersheim

1.7 Heitersheim and Buggingen - Seefeldern district as well as Neuenburg - Grießheim district

1.8 Heitersheim

1.9 Bad Krozingen - Schlatt and Hartheim district - Feldkirch district

1.10 Bad Krozingen - Hausen district as well as Hartheim including Feldkirch district

1.11 Hartheim - Feldkirch district

(2) In the Emmendingen rural district, partial areas of the communal districts listed hereafter are hereby declared to be closed planting areas for the production of true and genuine hybrid maize seed.

2.1 Sasbach

2.2 Weisweil

2.3 Kenzingen including Hecklingen and Riegel districts

2.4 Kenzingen including Hecklingen district

2.5 Kenzingen and Riegel

(3) The lands or boundaries of the lands in Paragraphs 1 and 2 are marked with a red line in the maps of the Freiburg Government Presidium of 3 March 2000, which are part of this regulation. The area within the red line encompasses the

propagation area as well as area which is required to comply with the minimum distance requirement. Each map is provided with the name of the Government Presidium, the date and the number according to Paragraphs 1 and 2.

§ 2

(1) The regulation with maps shall be publicly displayed at the Freiburg Government Presidium for a period of two weeks starting on the day after the delivery of this regulation in the Law Journal for free inspection by anyone during office hours. In the same manner, the regulation shall be publicly displayed with the maps affecting the region of the respective authority at the following administrative authorities listed below:

District administrator's offices of the Breisgau-Hochschwarzwald, Freiburg and Emmendingen rural districts
as well as
Local administrative association Müllheim-Badenweiler, Müllheim

(2) The regulation including the maps may be viewed free of charge by anyone during office hours at the authorities named in Paragraph 1 as long as the regulation is in force. This applies to those maps affecting the region of the respective authority.

§ 3

Only the maize variety provided for the production of hybrid maize seed may be planted in the closed planting areas. Exceptions to this are the usage of seed of the father component of the variety intended for propagation and the usage of seed from varieties with sterile pollen. The maize variety provided in the respective area for production of hybrid maize seed shall be indicated in writing by 15 April 2000 at the latest to the Freiburg Government Presidium.

§ 4

In the protected area, the variety planted for propagation in each case shall be designated by the seed propagators through the use of signs.

§ 5

Violations of §§3 and 4 of this regulation are administrative offences within the meaning of §5 of the Act for Protection of the Production of Hybrid Seed in Closed Planting Areas and can be punished with a monetary fine.

§ 6

This regulation enters into force on the day after expiration of the display period. Its last day in force is 31 December 2000.

FREIBURG I. BR., 3 March 2000
VON UNGERN-STERNBERG

If an organic farmer saves his own seed for replanting, he cannot regularly cite the same protection level accorded to basic and certified seed. Besides the protective measures which users of GMOs have to comply with, e.g. based on GPP for GMO crops, the organic farmer must also additionally comply with his own protective measures when replanting seed. For example, he must comply with additional isolation distances or use defensive crop scheduling. How the respective obligations of an organic farmer and a GMO user stand in relation to

one another would then have to be stipulated within the framework of the GPP or would be governed under the system according to § 906 BGB.

5.5 From closed seed propagation areas to closed organic areas?

Below, we have included (in translation) the draft version of a German Federal regulation in an organic farming act as well as the draft of the Land law based thereupon and finally a regulation regionally implementing the Federal and Land regulations. The disadvantage of establishment of closed organic agriculture areas is that organic agriculture would probably be pushed into marginal lands, and this could not be reconciled with the objectives in landscape ecology which the legislature is also pursuing through protection of organic farming. Accordingly, it is not recommended to make use of an instrument for legally distinguishing agricultural lands in which transgenic cultivations are allowed from those in which they are not allowed in order to protect organic farming. Such an instrument does not seem suited to establishing practical co-existence between the competing types of agriculture.

Draft of a German Federal regulation, a Land law based upon it and a regulation for allocating closed planting areas in organic farming

I. Federal law

According to Article 72 Para. 2 Basic Law (GG), the Federation shall have the right to legislate on matters within the concurrent legislative power – for the regulation proposed here based on Article 74 Para. 1 No. 17 GG (promotion of agricultural production and forestry as well as the importation and exportation of agricultural and forestry products) and Article 74 Para. 1 No. 11 GO (law relating to economic affairs) – if and to the extent that the establishment of equal living conditions throughout the federal territory or the maintenance of legal or economic unity renders federal regulation necessary in the national interest. A Federal regulation is necessary for both reasons. An Federal Organic Agriculture Act is conceivable as a regulation to protect planting areas in which no transgenic organisms are released. The provision to be inserted into the “Organic Agriculture Act” is as follows:

“The Länder (states) shall establish closed planting areas for organic agriculture (Regulation (EEC) No. 2092/91).”

Alternatively, the Federal law can encompass all of the regulations which are incorporated in the following proposal into the Land's provision. The advantage of this procedure would be that it would better take into account the aspect of Federal unity of agricultural production relations.

II. Land law based on the example of Baden-Württemberg

Act for Protection of Organic Agriculture Production in Closed Planting Areas

On ... the Landtag adopted the following Act which is handed down herewith:

§ 1 Closed planting areas

(1) The Government Presidiums can declare an area upon request through legal regulation as a closed planting area for organic agriculture according to Regulation (EEC) No. 2092/91.

(2) The closed planting area encompasses one or more areas as well as the area required for compliance with minimum isolation distances with which the influx of transgenic genetic information into the organic production areas can be sufficiently avoided. Sufficiently avoided means that the influx of transgenic genetic information into the harvested organic crops does not exceed 1%. Further areas can be incorporated in order to determine the boundary of the planting area using property boundaries and where possible clearly recognisable natural boundaries.

(3) The declaration of a closed planting area presumes that:

1. At least 25% of the land used for agricultural purposes out of the area to be delimited according to Para. 2 is used for organic agriculture according to Regulation (EEC) No. 2092/91 and owners of more than 50% of the land used agriculturally for organic farming submit a request according to Para. 1;

2. The measure is necessary also taking into account the concerns of the affected operations in the interest of promoting organic agriculture or preserving reference areas in which transgenic organisms are not used, and;

3. Owners of more than 50% of the agriculturally used land in the area to be delimited under Paragraph 2 have not raised objections which were not taken into account.

(4) Operations under Regulation (EEC) No. 2092/91 are obligated to verify the prerequisites according to Para. 3 No. 1 through the display of maps and documents in which the pieces of land and propagation areas to be covered are unambiguously designated indicating their size and owners as well as the boundary shape of the area.

§ 2 Protective provisions

(1) In order to protect organic agriculture according to Regulation (EEC) No. 2092/91, the Government Presidiums can through legal regulation:

1. Enact further provisions insofar as they are required in special cases to ensure organic agriculture production according to Regulation (EEC) No. 2092/91;

2. Make provisions to designate and monitor the closing planting area.

(2) In order to protect organic agriculture according to Regulation (EEC) No. 2092/91, the Government Presidiums can carry out measures in individual cases according to Paragraph 1.

§ 3 Procedural provisions

(1) Prior to enacting a legal regulation, professional representation shall be heard. "

(2) The Government Presidiums shall make arrangements such that:

a) The draft of a legal regulation as well as the maps and documents according to § 1 Para. 4 are publicly displayed for a period of two weeks in each rural community in whose communal district the closed planting area is planned to extend;

b) The time and place of the display in the format determined for the affected rural community shall be publicised, or the affected parties informed thereof;

c) The affected parties are requested in the public announcement or memorandum to raise any objections during the display deadline in writing or for recording at the town hall.

(3) Opposing parties whose objections are not considered shall be informed of the reason(s).

§ 4 Tolerance and information obligations

(1) Natural and legal persons as well as associations of individuals without legal capacity which are affected by a legal regulation according to § 1 Para. 1 shall tolerate the entry into the pieces of land encompassed by the closed planting area by associations of persons authorised by the Government Presidium. They are further obligated to provide any information required to carry out this Act or the legal regulations passed by reason of this Act.

(2) A party who is obligated to provide information can refuse to answer such questions which if answered would expose himself or one of associates designated in § 383 Para. 1 No. 1 to 3 Civil Procedure Code to the risk of criminal prosecution or proceedings under the Administrative Offences Act.

§ 5 Administrative offences

(1) A party is in violation of these regulations if he deliberately or negligently:

1. Violates his obligations according to § 4 Para. 1

2. Disobeys a legal regulation enacted based on this Act insofar as it refers to this civil penalty provision for specific findings of facts.

(2) The administrative offence can be punished with a monetary fine;

(3) The administrative authority within the meaning of the Land law on Administrative Offences Act is the Government Presidium.

§ 6 Entry into force

This Act enters into force on the day after its delivery.

III. Planting area regulation

The regulation consists of a map on which the delimitation (boundary line) is entered plot-by-plot along with the following text:

"Regulation of the Government Presidium ... for protection of organic agriculture in closed planting areas

By reason of §§ 1 and 2 of the Act for Protection of Organic Agricultural Production in Closed Planting areas of ... (GBl. p. ...), the following is decreed:

§ 1

(1) In the ... rural district, partial areas of the communal districts listed hereafter are hereby declared to be closed planting areas for organic agriculture according to Regulation (EEC) No. 2092/91.

[...]

(2) The lands or boundaries of the lands in Paragraph 1 are marked with a red line in the maps of the ... Government Presidium of [date on which this regulation is issued], which are part of this regulation. The land within the red line encompasses the area used according to Regulation (EEC) No. 2092/91 as well as the area which is required to comply with the minimum distance requirement. Each map is provided with the name of the Government Presidium, the date and the number according to Paragraph 1.

§ 2

(1) The regulation with maps shall be publicly displayed at the ... Government Presidium for a period of two weeks starting on the day after the delivery of this regulation in the Law Journal for free inspection by anyone during office hours. In the same manner, the regulation shall be publicly displayed with the maps affecting the region of the respective authority at the following administrative authorities listed below:

District administrator's offices of the ... rural districts

(2) The regulation including the maps may be viewed free of charge by anyone during office hours at the authorities named in Paragraph 1 as long as the regulation is in force. This applies to those maps affecting the region of the respective authority.

§ 3

Only organic agriculture according to Regulation (EEC) No. 2092/91 is allowed within the closed planting areas.

§ 4

In the protected area, operations according to Regulation (EEC) No. 2092/91 shall be designated through the use of signs.

§ 5

Violations of §§3 and 4 of this regulation are administrative offences within the meaning of §5 of the Act for Protection of Organic Agricultural Production in Closed Planting Areas and can be punished with a monetary fine.

§ 6

This regulation enters into force on the day after expiration of the display period. Its last day in force is 30 November of the fifth year following the year it entered into force."

Alternatively, § 3 could be worded as follows:

"Within the closed planting areas, transgenic genetic information may not be released, particularly neither in organisms nor in their derivatives."

6 Evaluation of various possible improvements

This chapter will evaluate the different proposals on how to improve the current legal situation for protecting against damage of material assets due to GMO introgression. The proposals are evaluated particularly in terms of the need for legal adaptation, their legal certainty, their ease of execution and their compatibility with or ease of integration into European law.

6.1 Introduction of public registers

No major legal adaptation is required to introduce public registers since the essential legal underpinnings of a register, e.g. for publication of the location of GMOs according to Art. 31 Para. 3 b Deliberate Release Directive or provision of information about the GMO construct, must already be implemented into German law or can be found in the legislative process at the European level. However, there is considerable execution expense to be expected in conjunction with the establishment and maintenance of the public registers as well as the provision of information to the farmers. Farmers who use GMOs and organic farmers would incur additional expense in reporting the site and the plant variety in use. The added expense is offset partially for users of GMOs by the site reporting already required according to the Deliberate Release Directive or for organic farmers by the reports they send to their planting associations. Obviously, synergy effects associated with reports that are already required can be exploited for reports submitted to the public register. For example, the public register could be arranged simultaneously as the register required under Art. 31 Para. 3 b Deliberate Release Directive. Introduction of public registers increases the degree of legal certainty for GMO users as well as for the affected parties since the basic information required to prevent GMO introgression or for subsequent handling of damages is contained in the register for use by both parties.

6.2 Standardisation of protective measures

The introduction of a GPP for GMO crops will help to establish a standard under public law for avoiding GMO introgression. In order for the GPP to have a protective function with respect third parties, i.e. organic farmers can sue for compliance with protective measures according to the GPP, the GPP should be regulated in a law or regulation based on suitable authorisation. The corresponding law or ordinance must be formulated so that compliance with the GPP is a condition for planting GMOs. Moreover, it should be an objective of the concrete provision on the GPP or the respective law to protect organic farmers from GMO introgressions. The specific shaping of a GPP with this sort of legal underpinnings should take place within the framework of the lower body of legislation so that proper adaptation of the protective measures and flexibility can be ensured. In order to achieve the required legal certainty in stipulating the GPP, it should be ensured that the measures in the GPP are formulated with sufficient specificity in accordance with the government's certainty requirement. For example, it should be indicated whether the distance specification for isolation tracks applies from the boundary of the GMO cultivation area to the boundary of the organic cultivation area or some other reference points apply. If the requirements do not have adequate specificity, then the regulation will be ineffective.

Monitoring of the GPP by the relevant authority will be impossible in case of a large number of GMO cultivation areas without having farmers report violations on their own or significantly boosting the personnel assigned to the monitoring authority. When violations do occur, the authority can arrange for protective measures or threaten violators with administrative offences. This set of instruments is in addition to the potential protection enjoyed by organic farmers based on the injunctive claim under civil law according to §§ 1004, 906 BGB.

According to the opinion enumerated above, introduction of the GPP is compatible with the Deliberate Release Directive.¹⁹⁵

Standardisation of the instruction obligation for seed packaging would establish a standard for controlling the community relationship under Neighbour Law and thus lead to more legal certainty in case of legal confrontation under § 906 BGB. With regard to shaping the instruction obligation as a voluntary obligation, see our comments on the advantages and disadvantages of voluntary agreements.¹⁹⁶

6.3 Seed industry liability fund

Creation of a liability fund based on a voluntary agreement by the seed industry would have the advantage of engaging the industry's own organisational expertise and responsibility. This would save government legislation and reduce the expense incurred by the relevant authorities. In Germany, voluntary agreements are normally unilateral, non-binding declarations by a given industry. However, there are a number of concerns posed by such an agreement. In general, the degree of readiness to enter into and comply with such voluntary agreements is a function of impending legal measures. Moreover, the format and process for out-of-court handling of damages would lie exclusively with the hands of the seed industry. If the non-binding voluntary agreement violates legally protected interests of farmers, then the affected farmers will have no way to legally protect themselves against the voluntary agreement.

If in the creation of the liability fund the format and process for compensation is stipulated through legal regulation, the government can exert its influence to ensure that the compensation is handled fairly. Affected farmers will then be

¹⁹⁵ Cf. section 2.1.

¹⁹⁶ Cf. the statements in section 6.3.

able to legally protect themselves, e.g. if their legally protected interests are violated by the provisions of the liability fund.

The compatibility of a seed industry liability fund with European legal regulations depends on its specific form. Violations, particularly if it is a voluntary agreement, are contrary to the provisions on free competition, the competition rules and assistance law. For example, if a Member State offers benefits to the seed industry as an incentive to enter into a voluntary agreement, then this could represent a violation of Art. 28 EU Treaty.¹⁹⁷

Regardless of the form of the liability fund, the avoidance of direct and individual conflict between neighbours and the administration of compensation issues by an industry liability fund would make a significant contribution towards the satisfaction of all parties involved.

6.4 The community relationship under Neighbour Law according to § 906 BGB

In terms of the relationship between organic cultivations and neighbouring transgenic cultivations, § 906 BGB offers, through its legal rulings on other subject matters, a well established instrument that is probably also viable for ensuring reasonable compensation. It offers injunctive and compensation claims to organic farmers under the conditions already worked out and to be worked out in the future. The question of whether (and if so which) protective measures are acceptable to users of transgenic cultivations in order to prevent the presence of transgenic modifications in organic cultivations will be answered through legal rulings according to the practice presented in this paper. The legislature could decide to answer this question either entirely or partially through standardisation. However, since it has not opted for this approach in other areas, no action is expected in this area either. It is also conceivable that

¹⁹⁷ Cf. Barth/ Dette, “The Integration of Voluntary Agreements into Existing Legal Systems”. In: Higley/Léveque, *Environmental Voluntary Approaches: Research Insights for Policy-Makers*, p. 13, 19.

the legislature might decide to answer the question of what percentage of genetic modification must be tolerated in organic cultivations under usual local practice through a legal standard. A legislative decision of this sort would be coupled with a corresponding legal loss to the detriment of organic farmers. Even if such standardisation efforts are possibly suited to answering the questions that are raised to some extent, there remains a ream of other questions that must be answered through court rulings. The judge would be presented in each individual case with a situation which differs from the other cases. This means that court rulings would be non-uniform in the first years. Not until some years had passed would a uniform (and thus easier to predict) legal practice be established. For all of the parties involved, and particularly for users of transgenic seed, compensation under the community relationship according to § 906 BGB would be associated with considerable uncertainty and thus with significant risk. Based on practice observed over the decades in relation to the standards of § 906 BGB, a normative response by the legislature to individual elements is conceivable but not probable. The only way to reduce the prevailing uncertainty for all parties is through agreement on arbitration, mediation and compensation mechanisms between the affected organic farmers and the commercialisers of transgenic cultivations.

7 Summary

There is a world wide consensus among organic farmers not to use genetically engineered organism (GMO). Initially implemented through the guidelines of organic farming associations, this rule has now gained accession to consumer protection legislation in the USA, Japan and the European Union. EU-Regulation 2092/91/EEC on Organic Agriculture which is equal in rank to national statutory law in all member states of the European Union, prohibits the use of GMO by organic farmers. At the same time EU law permits under certain conditions the market introduction of GMO for use in agricultural production. In order to resolve any resulting conflicts between organic and GMO-based agriculture this law must provide a way of reconciling opposing interests and maintaining peace between the two competing forms of agriculture.

EU law permits protective measures for organic agriculture

At the European level neither the EU Regulation on Organic Agriculture nor the seeds directives prescribe mandatory measures for the protection of organic crops against pollination by GMO pollen. An evaluation of EU Directive 2001/18/EC on the Deliberate Release of GMO shows, however, that the permission to market a GMO may include an order to take measures to avoid property damage through pollination as one of the “specific conditions of use and handling” of the GMO. This results from a systematic and parallel interpretation of the EU Directive on the release of GMO and the EU Regulation on Organic Agriculture. Only inasmuch as the interpretation of the Directive on the release of GMO takes into account the legislative targets of the EU Regulation on Organic Agriculture will a balance of interests between organic agriculture and the cultivation of GMO be accomplished.

To this end member states may give their consent to the marketing of GMO contingent on preventive measures being taken for protection against the violation of property rights through GMO pollination of organic cultures. Property

rights are as a rule violated, when more than 1 % of the genetic information in organic products originate from GMO, since, if this is the case, Regulation 258/97/EC on Novel Foods requires that the labelling must indicate the genetic modification. Such mandatory labelling will cause losses to organic farmers, since as a rule they will be unable to demand the high price that organic products normally achieve relative to conventional products.

Proposals for isolation distances

Currently the most widely discussed option for affording protection against property damages is to provide isolation distances between cultures with GMO plants and organically managed cultures; another is to demarcate GMO-free regions.

Isolation distances have for a long time been used in seed production to maintain purity of breed. The goal is to keep impurity to a minimum. Statutory minimum isolation distances are based on past experience with seed production and they do not completely rule out hybridisation. Nevertheless, the imposition of safety distances does offer itself as one possible way of protecting organic agriculture.

An analysis of empirical data with a view to defining isolation distances revealed many gaps and hence an urgent need for further research. Despite this shortcoming, and for pragmatic purposes, the present survey was based on what data were available to derive first recommendations for isolation distances. However, these can obviously only serve as rough guidelines.

According to the available results, at a distance between 0 and 150 meters from the pollen source pollination by male sterile wheat can be expected to occur at a rate of 3 %.

At a distance of 0 to 10 meters from the pollen source, pollination in fertile wheat is expected to occur at a rate of 1% and between 10 and 50 meters at a

rate from 1 to 0.5 %. At distances greater than 100 meters the rate of pollination is expected to be under 0.1 %.

For the pollination of maize at a distance of less than 800 meters from the pollen source a pollination rate of more than 1 % is expected and at a distance from 800 to 1000 meters a pollination rate of more than 0.5 %. The pollination rate is expected to drop below 0.5 % at a distance of 1000 meters.

At distances up to 4,000 meters pollination rates of male sterile rapeseed are expected to exceed 5 %. No recommendations for isolation distances can be given for keeping pollination rates in male sterile rapeseed below 1 % or 0.5 % .

Such information could be printed on labels of seed product packaging.

Measures for protection against property damages through GMO pollination in organic agriculture, such as the declaration of isolation distances on commercial packaging of GMO seed, could be imposed by way of commercialisation permits. Implemented through commercialisation permits such measures could even today have an effect on civil-law relationships between organic farmers and GMO farmers, under certain conditions entitling organic farmers to claims for damages caused by genetic introgression.

Paths towards conciliation between neighbours

In Germany the private legal rights and spheres of interest of organic farmers and users of transgenic varieties are defined and delimited by civil law. The borderline is drawn by a system of legal claims governing neighbourly relationships. § 906 of the German Civil Code is the central norm of private environmental law. Under § 906 of the German Civil Code users of transgenic plants can be required to avoid or minimise genetic modifications in neighbouring cultures. When an organic farmer suffers market losses due to the pollination of organic cultures by GMO pollen, the owner of the neighbouring transgenic cultures can be ordered to pay damages. Under § 906 of the Civil

Code users of transgenic seed may desist from their efforts to avoid and minimise genetic modification in neighbouring cultures and pay compensation for such modifications only when the cost of the minimisation efforts are clearly higher than the damage to be expected and to be compensated in the neighbouring organic cultures. As yet there is no established jurisdiction on the degree of financial effort users of GMO plants can reasonably be expected to undertake to avoid and minimise GMO modifications. Since it requires the proof of a causal nexus between a source and an effect within the realm of the neighbourly relationship the principle of causal liability imposes a stringent regime of reporting, analysis and documentation on the organic farmer. It threatens users of transgenic seeds with compensation claims which will be enforced with considerable probability. At present it is difficult to assess the level of enforceable claims. This will codetermine the point when conventional farmers must desist from using GMO plants or relocate their transgenic cultures. The level of enforceable compensation claims will thus codetermine when organic farmers can demand neighbouring conventional farmers to take measures to prevent GMO pollen from infiltrating their cultures. This complex intercalating system of claims to desist or to compensate will have an inhibitory impact on the use of transgenic seeds, since in practice the individual responsibility of each user of GMO seeds, and the economic burden of having to avoid GMO pollination of neighbouring cultures or pay compensation, will not be calculable in advance. However, organic farmers are so burdened with having to secure cogent proofs of causality that many will see this as an intolerable manacle. Under these conditions there will be little hope of arriving at a state of peaceful coexistence.

A more promising solution might be an effective self-organisation of companies that produce transgenic plants and market GMO seeds. One possibility is to establish an “administrative and compensation system for promoting relations between users of transgenic cultures and their neighbours” as a means of implementing the “polluter pays principle”. The task of such a system would be,

firstly, to plan operations with respect to time and space in a manner conducive to peaceful coexistence (joint crop planning) and secondly, to develop a neutral mediation system for resolving conflicts between neighbouring farmers over crop planning. This mediation system could be cost-free for organic farmers. On the other hand the system could manage the disbursement of compensation to organic farmers, which could be made contingent on proof being furnished of a genetic modification of their cultures, yet without the necessity to prove a causal link of this modification to a specific neighbourhood culture.

The system could be financed by producers and suppliers of transgenic seeds. Consequently both sides, organic farmers as well as users of transgenic plants, would be served well. If the idea of a self-organised mediation system for temporal and spatial isolation in connection with a compensation scheme financed by GMO producers and users failed to gain acceptance, both elements could be introduced by statutory law.

This could be done in a variety of ways: introduction of a public register of production sites; introduction of good production practice in GMO cultivation; mandatory instruction on seed product packaging; and safeguarding of GMO-free production.

Public register of production sites

All member states of the European Union are required by the Release Directive 2001/18/EC to establish public registers documenting GMO cultivation sites and the identity of cultivated GMO varieties for the purpose of monitoring environmental effects. This register could at the same time serve as a production register for GMO. The Directive leaves it up to the member states to determine the details of register management. The Directive contains no impediment to requiring farmers to provide precise information on the location of their GMO cultures for the register. Organic farmers could likewise be required to provide information on their cultivation plans for the register. Information

concerning the precise design of the GMO and the analytical measures to detect it could be included along the lines of the draft of the EU Regulation concerning traceability and labelling. However, this draft only requires that the codes of GMO sequences be published. Since organic farmers must be in a position to reliably detect GMO sequences, the cultivation register would need to contain precise information on their identity. Such information would only need to be disclosed to farmers with a justified interest in it.

Instructions on seed product packaging

Producers of seed products can be required to instruct users of GMO on protective measures to prevent GMO pollination by means of labels on the packaging of seed products or instruction leaflets. For this, seed producers would need to inform users of GMO over which distances pollen from specific cultures are typically carried into neighbouring cultures and which measures for minimisation are available, such as isolation distances and crop timing. Users of transgenic seeds would thus know the minimum distance they must maintain to avoid neighbouring cultures exceeding the 1 % mandatory label indication level, which would constitute a damage. The obligation of the seed producer to instruct could be established by a legal regulation. Another conceivable solution would be for the seed industry to voluntarily commit itself to providing instructions on seed product packaging or accompanying leaflets.

Introduction of Good Production Practice in GMO cultivation

Protective measures to avoid GMO pollination of more than 1 % in organic cultures could be imposed on users of GMO seeds through the introduction of a code of "Good Production Practice in GMO cultivation" (GPP). This GPP code could provide a gauge for determining which measures for the avoidance of GMO pollination are expedient and reasonable. Such measures could include, for example, defensive cultivation planning and the maintenance of specific distances between transgenic and susceptible organic cultures. The GPP code

should set up rules for an obligation to minimise GMO pollination of other cultures. The measures of the GPP code should also resolve the issue which measures taken on the part of users of GMO to avoid GMO pollination are economically reasonable within the meaning of § 906 Civil Code.

For the implementation of the GPP code the administration must be empowered to impose specific single protective measures. Non-observance of such an order must be penalised as a regulatory offence. The possibility to punish such offences is required in particular in cases where the amount of potential damage to the organic farmer is lower than the costs of a defensive measure which the owner of a transgenic culture can be reasonably expected to undertake. In this case there is otherwise the danger that the user of the GMO dispenses with protective measures since it is more convenient for him to compensate the damage, which must still be proven.

“Good Production Practice in GMO cultivation” could be introduced by an amendment to the Gentechnikgesetz (German act on genetic engineering) or the Saatgutverkehrsgesetz (German act on the marketing of seed). Alternatively, it could be introduced through an amendment to a specific (organic) agriculture statute.

Damage fund for GMO pollination

For pollination by GMO from non-determinable sources a system for compensating organic farmers for market losses is necessary and indeed feasible. Compensation could be provided by a governmental compensation system or a fund model based on a statutory regulation or a voluntary self-commitment of producers and users of GMO. A compensation fund is to be preferred over a governmental compensation system, as the disbursement of compensation from public budgets would violate the polluter pays principle.

A private compensation fund would be exclusively used for compensation payments, in the same way as a governmental system would. Its advantage would be that producers and users of GMO would bear the burden of compensation, in accordance to the polluter-pays-principle.

Protection of organic seed production

The protection of organic seed production necessitates closed regional production areas. This requires the development of an appropriate legal basis. In addition, the authors have developed a draft for an organic farming statute which applies an already existing concept for the establishment of closed conventional seed production areas to organic farming. However there is considerable doubt whether such a law could contribute to a beneficial coexistence of organic and conventional farming outside of seed production.

In the overall analysis, taking account of the legal situation, the standards of organic farming, consumers' expectation of transparency and their freedom of choice in buying food, it becomes clear that the problem of how to arrive at a form of coexistence which does justice to consumers' right to freedom of choice will not easily be solved. The law in force provides clear starting points for the introduction of protective measures for organic agriculture. However, this requires substantial efforts from all those involved, the burden of which, from the viewpoint of the representatives of organic agriculture, should not be placed on organic farmers.

8 Zusammenfassung

Ökologisch wirtschaftende Landwirte verzichten nach ihrem weltweiten Konsens auf die Verwendung gentechnisch veränderter Organismen (GVO). Die von den Bio-Bauern in ihren eigenen Richtlinien entwickelte Vorgabe, in der ökologischen Landwirtschaft keine gentechnisch veränderten Organismen einzusetzen, findet sich als Rechtsnorm in allen entsprechenden Verbraucherschutzgesetzen, insbesondere in denen der USA, Japans und der Europäischen Union. Auch nach der in allen Mitgliedstaaten der Europäischen Union direkt wie ein nationales Gesetz wirkenden EU-Öko-Verordnung 2092/91/EWG dürfen Bio-Bauern in ihren Kulturen keine transgenen Organismen einsetzen. Der europäische Gesetzgeber schreibt also für die Herstellung und die Vermarktung von Produkten aus ökologischem Landbau vor, dass GVO nicht verwendet werden dürfen. Gleichzeitig wird das Inverkehrbringen von GVO unter bestimmten Bedingungen zugelassen. Um den dadurch entstehenden Konflikt zwischen der ökologischen Landwirtschaft und einer Landwirtschaft, die GVO einsetzt, zu lösen, muss das europäische Regelwerk den Interessenausgleich und die Friedenssicherung zwischen beiden Anbauformen herbeiführen.

Das europäische Recht ermöglicht Schutzmaßnahmen für den ökologischen Landbau

Auf europäischer Ebene enthalten weder die EU-Öko-Verordnung noch die Saatgutverkehrsrichtlinien Regelungen, aufgrund derer Schutzmaßnahmen zur Verhinderung oder Vermeidung von GVO-Einkreuzungen in ökologische Kulturen vorgeschrieben werden können.

Eine Prüfung der neuen Freisetzungsrichtlinie ergibt aber, dass bei der Genehmigung zum Inverkehrbringen als „besondere Bedingungen für die Verwendung und Handhabung“ eines GVO auch Maßnahmen zum Schutz vor Sachschäden durch GVO-Einkreuzung vorgeschrieben werden können. Dies

ergibt sich aus einer systematischen Zusammenschau der Regelungen in der Freisetzungsrichtlinie mit den Vorschriften der EU-Öko-Verordnung. Nur wenn bei der Freisetzungsrichtlinie auch die Zielsetzung der EU-Öko-Verordnung berücksichtigt wird, kann ein Interessenausgleich zwischen der ökologischen Landwirtschaft und dem GVO-Anbau erreicht werden. Dazu können die Mitgliedstaaten bei der Zustimmung zum Inverkehrbringen von GVO Maßnahmen zum Schutz vor Eigentumsverletzungen an der ökologischen Feldfrucht durch GVO-Einkreuzung vorschreiben. Eigentumsverletzungen bezüglich der ökologischen Feldfrucht treten regelmäßig dann auf, wenn mehr als 1 % GVO in die ökologische Feldfrucht eingekreuzt sind. Denn in diesem Fall besteht die Pflicht, das ökologische Ernteerzeugnis mit dem Hinweis zu kennzeichnen: „Enthält GVO“. Durch diese Kennzeichnung erleidet der Bio-Bauer einen Vermarktungsschaden, da er regelmäßig seine Ernte nicht mehr als biologisches Erzeugnis zu einem höheren Preis verkaufen kann.

Vorschläge für Abstandsregelungen

Als Maßnahmen zum Schutz vor Sachschäden werden hauptsächlich Sicherheitsabstände zwischen Feldern mit GVO-Pflanzen und ökologisch bewirtschafteten Kulturen sowie zusätzlich gentechnikfreie Gebiete diskutiert.

Sicherheitsabstände werden seit langem in der Saatgutproduktion verwendet, um die Sortenreinheit aufrechtzuerhalten. Dabei wird eine minimale Verunreinigung angestrebt. Die festgesetzten Mindestisoliationsabstände basieren auf Erfahrungswerten bei der Saat- und Pflanzgutproduktion und schließen die Möglichkeit einer Hybridisierung nicht vollständig aus. Die Festlegung von Sicherheitsabständen bietet sich dennoch als ein Element zum Schutz des ökologischen Anbaus an.

Bei der Analyse der Datenlage zur Definition von Sicherheitsabständen treten jedoch viele Lücken in der empirischen Datenbasis zu Tage, so dass sich hier dringender Forschungsbedarf abzeichnet. Trotz der mangelhaften Datenlage

werden jedoch unter pragmatischen Gesichtspunkten in diesem Gutachten erste Abstandsempfehlungen entwickelt, die allerdings nur ungefähre Größenordnungen angeben können.

Nach den vorliegenden Ergebnissen für eine Einkreuzung in männlich sterilen Weizen ist im Bereich von 0 bis 150 m Abstand zur Pollenquelle mit Einkreuzungsraten von mindestens 3 % zu rechnen.

Für eine Einkreuzung in fertilen Weizen ist im Bereich von 0 bis 10 m Abstand zur Pollenquelle mit Einkreuzungen bis über 1 % und im Bereich von 10 bis 50 m mit Einkreuzungsraten zwischen 1 und 0,5 % zu rechnen. Ab einer Distanz von 100 m liegen die Einkreuzungsraten voraussichtlich unter 0,1 %.

Für eine Einkreuzung in Mais ist im Bereich von unter 800 m Abstand zur Pollenquelle mit Einkreuzungsraten über 1 % und im Bereich von 800 bis 1.000 m mit Einkreuzungen über 0,5 % zu rechnen. Ab einer Distanz von 1.000 m liegen die Einkreuzungsraten voraussichtlich unter 0,5 %.

Für eine Einkreuzung in männlich sterilen Raps ist im Bereich bis 4.000 m Abstand zur Pollenquelle mit Einkreuzungsraten bis über 5 % zu rechnen. Für Einkreuzungsraten bis 1 % oder gar 0,5 % in männlich sterilen Raps können keine Abstandsempfehlungen abgeleitet werden.

Für eine Einkreuzung in fertilen, pollenproduzierenden Raps ist im Bereich von 0 bis 300 m Abstand zur Pollenquelle mit Einkreuzungsraten bis über 1 % zu rechnen. Abstandsempfehlungen für Einkreuzungsraten unter 0,5 % können aus den vorliegenden Daten nicht abgeleitet werden.

Solche Informationen könnten auf der Saatgutverpackung angebracht werden.

Maßnahmen zum Schutz vor sachschädigenden GVO-Einkreuzungen in ökologische Kulturen, z. B. ein Hinweis auf der Saatgutpackung zu den einzuhaltenen Sicherheitsabständen, können den Inverkehrbringern von GVO-Saatgut mit der Genehmigung zum Inverkehrbringen auferlegt werden. Die im

Zusammenhang mit dem Inverkehrbringen auferlegten Schutzmaßnahmen können bereits heute Auswirkungen auf die Rechtslage im Nachbarschaftsverhältnis zwischen dem Landwirt mit ökologischen Anbauflächen und dem Verwender gentechnisch veränderter Kulturen haben. Sie begründen unter bestimmten Randbedingungen Haftungsansprüche des ökologisch wirtschaftenden Landwirts gegenüber dem Landwirt, der transgene Sorten anbaut.

Wege zum nachbarschaftlichen Ausgleich

Das Zivilrecht ist heute in Deutschland das Instrument, mit dem die privaten Rechts- und Interessensphären der Bio-Bauern und der Nutzer transgener Sorten definiert und im Wechselspiel gegeneinander abgegrenzt werden können. Die Grenze wird durch ein System von nachbarrechtlichen Ansprüchen gezogen. § 906 BGB lässt sich hier als zentrale Steuerungsnorm des Umweltprivatrechts heranziehen. Nach § 906 BGB können die Verwender von transgenen Pflanzen verpflichtet werden, gentechnische Veränderungen in Nachbarkulturen zu vermeiden und zu minimieren. Wenn die Bio-Bauern dennoch durch die Befruchtung der ökologischen Kulturen mit transgenen Pollen merkantile Wertminderungen erleiden, können die Eigner transgenen Saatguts verpflichtet sein, diesen Schaden durch nachbarrechtliche Ausgleichszahlungen zu ersetzen. Bei Anwendung des § 906 BGB dürfen die Verwender transgenen Saatgutes in ihren Vermeidungs- und Minimierungsbemühungen nur nachlassen und sind stattdessen verpflichtet, Ausgleich zu zahlen, wenn die Kosten der Vermeidungsmaßnahmen deutlich höher sind als der in den benachbarten Bio-Kulturen zu erwartende auszugleichende Schaden. In der Rechtsprechung ist allerdings bislang noch nicht geklärt, welche Vermeidungs- und Minimierungsmaßnahmen dem Anwender von GVO wirtschaftlich zumutbar sind. Die Kausalitätshaftung zwingt die Bio-Bauern zudem in ein enges Korsett von Informations-, Analyse- und Dokumentationsschritten, denn sie setzt den Nachweis des Zusammenhangs von Ursache und Wirkung im Nachbarschaftsverhältnis voraus. Sie droht den Nutzern transgenen Saatguts mit Ausgleichs-

ansprüchen, die mit erheblicher Wahrscheinlichkeit eintreten werden, aber der Höhe nach nur schwer abschätzbar sind. Zugleich hat die Höhe dieser möglichen Ausgleichsansprüche Einfluss darauf, wann die konventionellen Landwirte auf transgene Kulturen ganz verzichten oder räumlich abrücken müssen, also im Ergebnis darauf, wann Bio-Bauern die Unterlassung des Übertritts transgener Pollen in ihre Kulturen fordern können. Dieses komplex ineinandergreifende System von Unterlassungs- und Ausgleichsansprüchen wirkt für die Nutzung transgenen Saatguts voraus-sichtlich hemmend, da die individuelle Verantwortlichkeit eines jeden Nutzers transgenen Saatguts, also die wirtschaftliche Vermeidungs- und Ausgleichslast, praktisch im Voraus nicht kalkulierbar ist. Den Bio-Bauern wird aber ein solches Maß an rechtlicher Präzision bei der Beweissicherung für den Kausalitätsbeweis auferlegt, dass viele dies als unerträgliche Fessel empfinden werden. Keine der beiden Seiten wird so zu zufriedener Koexistenz finden. Eine Lösung wäre daher eine wirksame Selbstorganisation des Wirtschaftszweigs der Saatgutindustrie, die transgene Pflanzen züchtet und das Saatgut in Verkehr bringt. Sie könnte zur Verwirklichung des Verursacherprinzips eine "Verwaltungs- und Ausgleichsgesellschaft für das Gemeinschaftsverhältnis der Nutzer transgener Kulturen mit ihren Nachbarn" einrichten. Ihre Aufgabe wäre einerseits die Planung der Bedingungen konkreter räumlicher Koexistenz (wechselseitig aufeinander abgestimmte Anbaupläne) in Verbindung mit einem neutralen, für die Bio-Bauern kostenfreien Mediationssystem, in dem die widerstreitenden Interessen der benachbarten Landwirte bezüglich ihrer Anbauplanung zu einem gerechten Ausgleich geführt werden könnten. Andererseits könnte sich die Gesellschaft um die Auszahlung von Ausgleichsansprüchen der Bio-Bauern kümmern, die sich am Nachweis des Eintritts gentechnischer Veränderungen in ihren Kulturen orientieren würde, ohne dass ein Kausalzusammenhang dieses Eintrags zu bestimmten Nachbarkulturen dargelegt und bewiesen werden müsste. Die Mittel dafür würde sie aus dem Kreis der Hersteller und Inverkehrbringer transgenen Saatguts aufbringen. Damit wäre beiden Seiten gedient. Wenn sich zeigt, dass dieser Mechanismus der raumordnenden Anbauplanung durch

selbstorganisierte Mediation, verbunden mit dem Ausgleichsfond der Saatgutindustrie, von dieser abgelehnt wird, lassen sich beide Elemente auch durch Gesetz einführen.

Dazu bieten sich eine Reihe von Möglichkeiten an: Die Einrichtung eines Anbaukatasters, die Einführung einer guten fachlichen Praxis des GVO-Anbaus (GfP), die Festlegung einer Instruktionspflicht auf der Saatgutverpackung sowie der Schutz der ökologischen Saatgutproduktion.

Das Anbaukataster

Die Mitgliedstaaten sind schon nach der Freisetzungsrichtlinie 2001/18/EG verpflichtet, ein öffentliches Register einzurichten, in dem zur Überwachung der Umweltauswirkungen von GVO der angebaute GVO und sein Anbauort anzugeben sind. Dieses Kataster könnte gleichzeitig die Funktion eines Anbaukatasters für GVO übernehmen. Die Richtlinie überlässt es den Mitgliedstaaten, das Register näher auszugestalten. Es bestehen also aufgrund der Richtlinie keine Hindernisse, die Landwirte zu verpflichten, spätestens bis zum Februar eines jeden Jahres parzellengenaue Informationen über den Anbauort von GVO für das Anbaukataster bereitzustellen. Ebenso müssten auch die ökologisch wirtschaftenden Landwirte verpflichtet werden, ihre Anbauplanung parzellengenau für das Kataster zur Verfügung zu stellen. Um genaue Informationen über das GVO-Konstrukt und seine Nachweismöglichkeiten im Anbaukataster zu erhalten, könnte auf den Richtlinien-Vorschlag zur Kennzeichnungs- und Rückverfolgbarkeits-Verordnung zurückgegriffen werden. Nach dem Entwurf der Kennzeichnungs- und Rückverfolgbarkeits-Verordnung müssen aber nur die Codes für die jeweiligen GVO-Konstrukte öffentlich bekannt gemacht werden. Da für den ökologisch wirtschaftenden Landwirt aber der genaue Nachweis des GVO-Konstrukts wichtig ist, müssen im Anbaukataster Informationen über die genaue Zusammensetzung des GVO-Konstrukts zur Verfügung stehen. Die Information über das Konstrukt ist an ein berechtigtes Interesse des betroffenen Landwirts zu koppeln.

Instruktionen auf der Saatgutverpackung

Die Saatguthersteller können verpflichtet werden, die Verwender von GVO über Schutzmaßnahmen zur Verhinderung der GVO-Einkreuzung auf der Saatgutverpackung oder in einem Beipackzettel zu instruieren. Dazu müssten die Saatguthersteller dem Verwender von GVO mitteilen, wie weit Pollen aus der entsprechenden Kultur typischerweise ausgetragen wird und welche Maßnahmen der Minimierung sich anbieten, z. B. Abstände, Zeitpunkt der Aussaat etc. Der Verwender transgenen Saatguts erhält so eine Orientierung für den Mindestabstand, den er einhalten muss, wenn er vermeiden will, dass in den Nachbarkulturen die 1 %-Pflichtkennzeichnungsschwelle überschritten und damit entsprechender Vermarktungsschaden ausgelöst wird. Die Instruktionspflicht der Saatguthersteller könnte in einer Verordnung auf der Grundlage von § 30 Abs. 2 Nr. 14 GenTG erlassen werden. Es wäre aber auch denkbar, dass sich die Saatgutindustrie durch eine freiwillige Selbstverpflichtung zu einer Instruktion auf der Saatgutverpackung oder dem Beipackzettel verpflichtet.

Die Einführung einer guten fachlichen Praxis des GVO-Anbaus

Schutzmaßnahmen zur Verhinderung von mehr als 1 % GVO-Einkreuzung in ökologische Anbauflächen können den Verwendern von GVO-Saatgut durch die Einführung einer „guten fachlichen Praxis des GVO-Anbaus“ (GfP) vorgegeben werden. In der GfP könnte der Maßstab für die Beurteilung der Frage festgelegt werden, welche Maßnahmen zur Vermeidung von GVO-Einkreuzungen sinnvoll und zumutbar sind. Als mögliche Maßnahmen kommen z. B. die defensive Anbauplanung oder die Einhaltung von Abständen zwischen transgenen und entsprechenden empfindlichen ökologischen Kulturen in Frage. Weiterhin sollte in der GfP eine Verpflichtung zur Minimierung von Auskreuzungen geregelt werden. Die Regelungen nach der GfP steuern zugleich auch die Frage, welche Maßnahmen zur Vermeidung der GVO-Einkreuzung nach § 906 BGB dem Verwender von GVO wirtschaftlich zumutbar sind.

Zur Durchsetzung der GfP muss der Behörde die Möglichkeit gegeben werden, einzelne Schutzmaßnahmen anzuordnen. Die Missachtung der Anordnung sollte mit der Möglichkeit verbunden werden, als Ordnungswidrigkeit geahndet zu werden. Ordnungswidrigkeitstatbestände sind insbesondere für den Fall nötig, dass die Höhe eines potenziellen Sachschadens beim ökologisch wirtschaftenden Landwirt niedriger ist als die Kosten einer zumutbaren Schutzmaßnahme. Dann besteht die Gefahr, dass der Verwender von GVO keine Schutzmaßnahmen ergreift, weil es für ihn günstiger ist, den erst noch nachzuweisenden Sachschaden auszugleichen.

Die „gute fachliche Praxis des GVO-Anbaus“ könnte bei einer Novellierung des Gentechnikgesetzes oder des Saatgutverkehrsgesetzes eingeführt werden. Denkbar wäre auch die Regelung in einem eigenen (Öko-) Landbau-Gesetz.

Für die Einkreuzung von GVO aus nicht feststellbaren Quellen ist ein gewisses System des Ausgleichs von Vermarktungsnachteilen der Bio-Bauern möglich. Der Ausgleich könnte durch eine staatliche Entschädigungsregelung oder ein Fondsmodell basierend auf einer gesetzlichen Regelung oder einer freiwilligen Selbstverpflichtung der Inverkehrbringer und Verwender von GVO erfolgen.

Schutz der ökologischen Saatgutproduktion

Zum Schutz der ökologischen Saatgutproduktion sind geschlossene Anbaugebiete notwendig. Dafür müssen erweiterte gesetzliche Grundlagen ausgearbeitet werden. Zusätzlich wird ein Entwurf eines Öko-Landbau-Gesetzes entwickelt, der sich an die Möglichkeiten der Einrichtung von geschlossenen Saatgutvermehrungsgebieten für den konventionellen Landbau anlehnt. Allerdings bestehen erhebliche Zweifel, ob ein solches Gesetz zu einer guten Koexistenz zwischen ökologischem und konventionellen Landbau außerhalb der Saatgutproduktion beitragen könnte.

Hoher Aufwand erforderlich

Deutlich wird bei der Analyse der Rechtslage, der Verpflichtungen des ökologischen Landbaus und der Verbrauchererwartungen von Transparenz und Wahlfreiheit beim Einkauf von Lebensmitteln, dass sich das Problem einer Koexistenz, die eine Wahlfreiheit im Sinne der Verbrauchererwartungen ermöglicht, nicht einfach lösen lassen wird. Das bestehende Recht bietet klare Ansatzpunkte, Schutzmaßnahmen zugunsten des ökologischen Anbaus zu realisieren. Dies erfordert aber von allen Beteiligten einen hohen Aufwand, der aus Sicht von Vertretern des ökologischen Landbaus nicht diesem aufgebürdet werden darf.

9 References

1. Baier A, Vogel B, Tappeser B (2001): Grüne Gentechnik und ökologische Landwirtschaft. Vorarbeiten/Fachgespräch. Umweltbundesamt (Hrsg.), UBA Texte 23/01, Berlin.
2. Barth R, Dette B (2001): The Integration of Voluntary Agreements into Existing Legal Systems. In: Higley C, Léveque F (Hrsg.): Environmental Voluntary Approaches: Research Insights for Policy-Makers. Policy Briefs im Rahmen des CAVA-Projekts, Brüssel: S. 13.
3. Baumgärtel G (1999): Handbuch der Beweislast im Privatrecht. 2. Aufl., Heymann, Köln.
4. Bender B, Sparwasser R, Engel R (2000): Umweltrecht: Grundzüge des Umweltrechts, 4. Auflage, CF Müller, Heidelberg.
5. Brauner R, Roth E, Tappeser B (2002): Entwicklung und Auswertung von Szenarien zur Verbreitung von transgenem Raps. Endbericht des Öko-Instituts e. V. zum Verbundprojekt GenEERA im Rahmen des Programms ‚Biotechnologie 2000‘ des BMBF (‚Sicherheitsforschung und Monitoring‘) an das UFT Bremen (unveröffentlicht).
6. Brown AP, Brown J, Thill DC, Brammer TA (1996): Gene transfer between canola (*Brassica napus*) and related weed species, Cruciferae. Newsletter 18: S. 36-37.
7. Das KGS (1983): Vicinity distance studies of hybrid seed production in maize (*Zea mays* L.) at Bangalore. Mysore Journal of Agricultural Sciences 20 : S. 340.
8. Deneke D (1987): Das nachbarschaftliche Gemeinschaftsverhältnis. Heymanns, Köln.

9. Deutsch E (1992): Beweis und Beweiserleichterungen des Kausalzusammenhangs im deutschen Recht. In: Medicus D, Mertens HJ, Nörr KW, Zöllner W (Hrsg.): Festschrift für Hermann Lange. Stuttgart, Berlin, Köln.
10. Downey RK (1999): Gene flow and rape – the Canadian experience. In: Lutmann PJW (1999): Gene Flow and Agriculture: Relevance for Transgenic Crops. BCPC Symposium Proceedings No. 72: S. 95-100.
11. Düll R, Kutzelnigg H (1994): Botanisch-ökologisches Exkursionstaschenbuch. 5. Auflg, Quelle & Meyer, Heidelberg, Wiesbaden: S. 590.
12. Eastham K, Sweet J (2002): Genetically modified organisms (GMOs): The significance of gene flow through pollen transfer. European Environment Agency (Hrsg.), Copenhagen.
http://reports.eea.eu.int/environmental_issue_report_2002_28/en
13. Eberbach W, Lange P, Ronellenfitsch M (Hrsg.) (1998): Recht der Gentechnik und Biomedizin (GenTR/BioMedR) - Gentechnikgesetz, Verordnungen, EG-Richtlinien und Formulare mit amtlichen Begründungen und Erläuterungen. Loseblattausgabe, 31. Ergänzungslieferung, Stand: 04.05.2001, CF Müller, Heidelberg.
14. Eckelkamp C, Mayer M, Weber B (1997): Basta-resistenter Raps. Vertikaler und horizontaler Gentransfer unter besonderer Berücksichtigung des Standortes Wölfersheim-Melbach. Öko-Institut e.V., Werkstattreihe Nr. 100, Freiburg.
15. Eckert JE (1933): The flight range of the honeybee. Journal of Agricultural Research 47(5): S. 257-285.
16. Emberlin J, Adams-Groom B, Tidmarsh J (1999): A report on the dispersal of maize pollen. National Pollen Research Unit for the Soil Association, www.soilassociation.org.

17. Feil B, Schmid JE (2001): Pollenflug bei Mais, Weizen und Roggen. Ein Beitrag zur Frage der beim Anbau von transgenen Kulturpflanzen erforderlichen Isolierabstände. Schweizerischer Saatgut-Produzentenverband (Hrsg.), Z-Saatgut, Schweiz, InterNutrition. Institut für Pflanzenwissenschaften ETH Zürich, Shaker Verlag, Aachen.
18. Feldmann S (2000): Begleitforschung zur Freisetzung herbizidresistenter, transgener Rapspflanzen 1995 - 1999. Ein Beitrag zur biologischen Sicherheitsforschung – Endbericht; Niedersächsisches Landesamt für Ökologie (Hrsg.), Nachhaltiges Niedersachsen 13 - Dauerhaft umweltgerechte Entwicklung, Hildesheim, S. 1-57.
19. Fleischmann B (1942): 33 Jahre Maiszüchtung. Z. Pflanzenzüchtung 24: S. 363-373.
20. Garcia CM, Figueroa MJ, Gomez LR, Townsend R, Schoper J (1998): Pollen control during transgenic hybrid maize development in Mexico. Crop Science 38: S. 1597-1602.
21. Geiger R (2000): EUV/EGV – Vertrag über die EU und Vertrag zur Gründung der EG. 3. Auflage, München.
22. Gerdemann-Knörck M, Tegeder M (1997): Kompendium der für Freisetzungen relevanten Pflanzen; hier: Brassicaceae, *Beta vulgaris*, *Linum usitatissimum*. Umweltbundesamt (Hrsg.), UBA Texte 38/97, Berlin.
23. Gerlach JW (1989): Privatrecht und Umweltschutz im System des Umweltrechts. Duncker und Humblot, Berlin.
24. Gorin AP (1968): Results of studies on the biology of flowering and pollination in field crops. Rep. Timirjazev. Acad: S. 175-181. Referiert in: Plant Breeding Abstracts 39 (1969): S. 4289.

25. Grain (2001): Apomixis: The Plant Breeder's Dream. Seedling September: www.grain.org/publications/seed-01-9-2-en.cfm
26. Hagen H (1992): Der nachbarrechtliche Ausgleichsanspruch nach § 906 Abs. 2 S. 2 BGB als Musterlösung und Lösungsmuster – Rechtsfortbildung in mehreren Etappen, In: Medicus D, Mertens HJ, Nörr KW, Zöllner W (Hrsg.): Festschrift für Hermann Lange. Stuttgart, Berlin, Köln.
27. Hirsch G, Schmidt-Didczuhn A (1991): Gentechnikgesetz. Kommentar, Beck, München.
28. Hoffmann W, Mudra A, Plarre W (1970): Lehrbuch der Züchtung landwirtschaftlicher Nutzpflanzen II. 1. Aufl., Paul Parey, Berlin, Hamburg.
29. Holden P (1999): Policy Paper: Segregation of GM Foods - Written Evidence to the House of Common Select Committee on Agriculture. With Annex 1: Soil Association standards regarding Genetic Engineering. Annex 2: GMO risk evaluation matrix - to establish the need for a site visit. Annex 3: Criteria for assessing pollution risk of organic holdings lying within a six mile notification zone of intended GM trial plots. Soil Association:
<http://www.soilassociation.org/sa/saweb.nsf/848d689047cb466780256a6b00298980/80256ad80055454980256862003d7538?OpenDocument>
30. Hühn M, Rakow G (1979): Einige experimentelle Ergebnisse zur Fremdbefruchtungsrate bei Winterraps (*Brassica napus oleifera*) in Abhängigkeit von Sorte und Abstand. Z. Pflanzenzüchtung 83: S. 289-307.
31. Hütter E, Bigler F, Fried PM (1999): Verwendung transgener schädlingresistenter Nutzpflanzen in der Schweiz. FAL, im Auftrag des BUWAL, Schriftenreihe Umwelt Nr. 317.

32. Ingram J (2000): Report on the separation distances required to ensure cross-pollination is below specified limits in non-seed crops of sugar beet, maize and oilseed rape. Hrsg.: Ministry of Agriculture, Fisheries and Food .
http://www.foe.co.uk/resource/consultation_responses/report_separation_distances_foe.pdf.
33. Jemison JM Jr; Vayda ME (2002): Cross Pollination From Genetically Engineered Corn: Wind Transport And Seed Source. News, February 18, University of Maine. <http://www.agbioforum.org/>.
34. Jones MD, Brooks JS (1950): Effectiveness of distance and border rows in preventing outcrossing in corn. Oklahoma Agricultural Experiment Station Technical Bulletin No. T-38 : S. 3-18.
35. Karsten A (1998): Der nachbarrechtliche Ausgleichsanspruch gemäß § 906 Abs. 2 S. 2 BGB analog im System der Ausgleichsansprüche. Nomos-Verlags-Gesellschaft, Baden-Baden.
36. Kegel in Biedenkopf KH (1967): Festgabe für Heinrich Kronstein aus Anlass seines 70. Geburtstages am 12. September 1967, CF Müller, Karlsruhe.
37. Khan MN, Heyne EG und Arp AL (1973): Pollen distribution and the seedset on *Triticum aestivum* L. Crop Science 13: S. 223-226.
38. Klinger T (2001): Variability and Uncertainty in Crop-to-Wild Hybridization. In Letourneau DK, Burrows BE (Hrsg.): Genetically Engineered Organisms, CRC Press Boca Raton, USA, S. 1-16.
39. Koch F, Ibelgaufts H (1992): Gentechnikgesetz - Kommentar mit Rechtsverordnungen und EG-Richtlinien. VCH, München.

40. Lavigne C, Klein EK, Vallée P, Pierre J, Godelle B, Renard M (1998): A pollen-dispersal experiment with transgenic oilseed rape. Estimation of the average pollen dispersal of an individual plant within a field. *Theoretical and Applied Genetics* 96: S. 886-96.
41. Lieber R (1933): Beobachtungen und Arbeitsergebnisse in der badischen Maiszüchtung. *Der Züchter* 5: S. 193-196.
42. Liebs D (1999): *Römisches Recht: ein Studienbuch*. 5. Auflage, Vandenhoeck & Ruprecht, Göttingen.
43. Lienhard U (2002): Der mehrstufige gemeinschaftliche Verwaltungsakt am Beispiel der Freisetzungsrichtlinie. *Natur und Recht*, Heft 1, S. 13.
44. Lytras T (1995): *Zivilrechtliche Haftung für Umweltschäden*. Duncker & Humblot, Berlin.
45. Manasse R, Kareiva P (1991): Quantifying the Spread of Recombinant Genes and Organisms. In: Ginzburg LR: *Assessing ecological risks of biotechnology*. Boston: S. 215-231.
46. McCartney HA, Lacey ME (1991): Wind dispersal of pollen from crops of oilseed rape (*Brassica napus* L.), *Journal of Aerosol Science* 22: S. 467-477.
47. Mesquida J, Renard M, Pierre J-S (1988): Rapeseed (*Brassica napus* L.) Productivity: The effect of honeybees (*Apis mellifera* L.) and different pollination conditions in cage and field tests. *Apidologie* 19 (1): S. 51-72.
48. Meyer H (1999) : Gentechnische Sterilisation von Pflanzen :Terminator-Technik. Argumentationsleitfaden Gen-ethisches Netzwerk. www.gen-ethisches-netzwerk.de.

49. Miller PD (1985): Maize pollen: Collection and enzymology. In: Sheridan WF (Hrsg.): Maize for biological research. A special publication of the plant molecular biology association, Kapitel 45, USA: S. 279 – 282.
50. Morris WF, Kareiva PM, Raymer PL (1994): Do barren zones and pollen traps reduce gene escape from transgenic crops? Ecological Applications 4 (1): S. 157-165.
51. Narayanaswamy S, Jagadish GV, Ujjinaiah US (1997): Determination of isolation distance for hybrid maize seed production. Current Research 26. University of Agricultural Science Bangalore (monthly newsletter): S. 193-195.
52. Neemann G, Scherwaß R (1999): Materialien für ein Konzept zum Monitoring von Umweltwirkungen gentechnisch veränderter Pflanzen. Umweltbundesamt (Hrsg.), UBA Texte 52/99, Berlin.
53. Organic Crop Producers & Processors Inc/Pro-Cert Canada Inc (OCPRO) (2000): Richtlinien für Kontrolle und Zertifizierung von Bioprodukten.
54. Organizacion Internacional Agropecuaria (OIA): Richtlinien für Kontrolle und Zertifizierung von Bioprodukten (Argentinien).
55. Palandt O (2002): Bürgerliches Gesetzbuch – Kurzkommentar. 61. Auflage, Beck, München.
56. Pernice I (1990): Auswirkungen des europäischen Binnenmarktes auf das Umweltrecht – Gemeinschafts(verfassungs-) rechtliche Grundlagen, NVwZ 1990, S. 201, 207.
57. Prütting H (1992) in: Münchener Kommentar zum Zivilprozeßrecht.
58. Purseglove JW (1972): Tropical crops – Monocotyledons. Longman Group Limited, Harlow, Essex, London, UK: S. 607.

59. Quist D, Chapela ICH (2001): Transgenic DNA introgressed into traditional maize landraces in Oaxaca, Mexico. *Nature* 414: S. 541-543.
60. Rakow G, Woods DL (1987): Outcrossing in Rape and Mustard under Saskatchewan Prairie Conditions. *Canadian Journal of Plant Science* 67: S. 147-151.
61. Ramsay G, Thompson CE, Neilson S, Mackay GR (1999): Honeybees as vectors of GM oilseed rape pollen. In: Lutmann PJW (1999): *Gene Flow and Agriculture: Relevance for Transgenic Crops*. BCPC Symposium Proceedings No. 72: S. 209-216.
62. Raynor GS (1972): Dispersion and Deposition of Corn Pollen from Experimental Sources. *Agronomy Journal* 64: S. 420-427.
63. Rebmann K, Säcker F, Rixecker R (Hrsg.) (2001): *Münchener Kommentar zum Bürgerlichen Gesetzbuch*. München.
64. Salamov AB (1940): About isolation in corn. *Sel.i.Sem.* 3 (Russian translation by Michel Atanasiev in 1949).
65. Salje P (1993): *Umwelthaftungsgesetz: Kommentar*. Beck, München.
66. Saure C, Kühne S, Hommel B (1998): Auswirkung von gentechnisch verändertem Raps auf blütenbesuchende Bienen (Apidae) und Schwebfliegen (Syrphidae). *Jahresbericht der BBA 1998*, Berlin und Braunschweig.
67. Saure C, Kühne S, Hommel B (1999a): Auswirkung des Anbaus gentechnisch veränderter Rapspflanzen auf blütenbesuchende Bienen (Apidae) und Schwebfliegen (Syrphidae). *Jahresbericht der BBA 1999*, Berlin und Braunschweig.

68. Saure C, Kühne S, Hommel B (1999b): Untersuchungen zum Pollentransfer von transgenem Raps auf verwandte Kreuzblütler durch Wind und Insekten. Proceedings zum BMBF-Statusseminar, 29. – 30. Juni 1999, Braunschweig: S. 111-119.
69. Scheffler JA, Parkinson R, Dale PJ (1993): Frequency and distance of pollen dispersal from transgenic oilseed rape (*Brassica napus*), Transgenic Research 2: S. 356-364.
70. Scheffler JA, Parkinson R, Dale PJ (1995): Evaluating the effectiveness of isolation distances for field plots of oilseed rape (*Brassica napus*) using herbicide-resistance transgene as a selection marker. Plant Breeding 114 (4): S. 317-321.
71. Schiwy P (1988): Deutsches Pflanzenschutzrecht - Kommentar. Schulz, Percha am Starnberger See, Stand: 1. Juni 2000.
72. SCIMAC (Supply Chain Initiative on Modified Agricultural Crops) (1999): Code of practice on the introduction of genetically modified crops - Guidelines for growing newly developed herbicide tolerant crops and the genetically modified crop management guide. Ely, Cambridgeshire
73. Simpson EC, Norris CE, Law JR, Thomas JE, Sweet JB (1999): Gene flow in genetically modified herbicide tolerant oilseed rape (*Brassica napus*) in the UK. In: Lutmann PJW. (1999): Gene Flow and Agriculture: Relevance for Transgenic Crops. BCPC Symposium Proceedings No. 72: S. 75-81.
74. Staniland BK, McVetty PBE, Friesen LF, Yarrow S, Freyssinet G, Freyssinet M (2000): Effectiveness of border areas in confining the spread of transgenic *Brassica napus* pollen. Canadian Journal of Plant Science 80 (3): S. 521-526.
75. Staudinger J von (1996): Kommentar zum BGB. 13. Auflage, Schweitzer, Berlin.

76. Storm P, Bunge T (1988): Handbuch der Umweltverträglichkeitsprüfung (HdUVP). Schmidt, Berlin, Stand: 01.11.2001.
77. Thompson CE, Squire G, Mackay GR, Bradshaw JE, Crawford J, Ramsay G (1999): Regional patterns of gene flow and its consequence for GM oilseed rape. In: Lutmann PJW (1999): Gene Flow and Agriculture: Relevance for Transgenic Crops. BCPC Symposium Proceedings No. 72: S. 95-100.
78. Timmons AM, Charters YM, Crawford JW, Burn D, Scott SE, Dubbels SJ, Wilson NJ, Robertson A, O'Brien ET, Squire GR, Wilkinson MJ (1996): Risks from transgenic crops. *Nature* 380: S. 487.
79. Timmons AM, O'Brien ET, Charters YM, Dubbels SJ, Wilkinson MJ (1995): Assessing the risks of wind pollination from fields of genetically modified *Brassica napus ssp. oleifera*. *Euphytica* 85: S. 417-423.
80. Treu R, Emberlin J (2000): Pollen dispersal in the crops Maize (*Zea mays*), Oil seed rape (*Brassica napus ssp. oleifera*), Potatoes (*Solanum tuberosum*), Sugar beet (*Beta vulgaris ssp. vulgaris*) and Wheat (*Triticum aestivum*). Evidence from publications. A report for the Soil Association from the National Pollen Research Unit, University College Worcester, 54 S. <http://www.soilassociation.org> January. 2000.
81. Ulpian (1999): Kommentar zum Prätörischen Ediktbuch 17, Titel: Über die Gebäudedienstbarkeiten; zitiert nach Liebs D (1999): ein Studienbuch. 5. Auflage. Vandenhoeck & Ruprecht, Göttingen, S. 156.
82. Umbeck PF, Barton KA, Nordheim EV, McCarty JC, Parrott WL, Jenkins JN (1991): Degree of pollen dispersal by insects from a field test of genetically engineered cotton. *Journal of Economic Entomology* 84 (6): S. 1943-1950.

83. Vitzthum W, Geddert-Steinacker T (1990): Der Zweck im Gentechnikrecht – Zur Schutz- und Förderfunktion von Umwelt- und Technikgesetzen. Tübinger Schriften zum Staats- und Verwaltungsrecht, Band 4, Duncker & Humblot, Berlin.
84. de Vries A (1974) : Some aspects of cross-pollination in wheat (*Triticum aestivum* L.). *Euphytica* 23: S. 601-622.
85. Völler (1993): Umwelthaftungsrecht und Schadensprävention. Dissertation Frankfurt.
86. Waddington KD, Visscher PK, Herbert TJ, Richter MR (1994): Comparisons of forager distributions from matched honey bee colonies in suburban environments. *Behavioral Ecology and Sociobiology* 35: S. 423-429.
87. Wahl R in: Landmann R, Rohmer G (2002): Kommentar zum Umweltrecht. Beck, München, Stand: 1.10.2001.
88. Wilkinson MJ, Timmons AM, Charters Y, Dubbels S, Robertson A, Wilson N, Scott S, O'Brien E, Lawson HM (1995): Problems of Risk Assessment With Genetically Modified Oilseed Rape. Brighton crop protection conference -weeds-, S.1035-1044.

