Co-existence in North American agriculture: can GM crops be grown with conventional and organic crops?

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Executive summary

This paper examines the issue of co-existence[1] of GM and non GM (including organic) crops, with specific applicability to the main arable crops grown in North America.

Current crop context
In 2003, GM crops accounted for 60% of the total plantings of soybeans, corn and canola in the USA and Canada combined (80%, 41% and 70% respectively of soybean, corn and canola plantings). This compared with an organic share of less than 0.22% (0.05% in canola, just over 0.1% in maize and 0.24% in soybeans[2]). The balance (of 39.78%) was accounted for by conventionally grown crops, some of which[3] were to speciality types (eg, nexera canola, waxy corn).

Have the different crops managed to co-exist ?
The evidence to date shows that GM crops have co-existed with conventional and organic crops without significant economic or commercial problems:

a) Co-existence of GM and non GM crops has, to date, only been an issue of relevance to farmers where their crops are/have been sold to some users in the human food sector and/or for export to some markets where there is a distinct market for non GM products. Within the context of the total markets for these crops (domestic North American and exports onto world markets), the non GM market accounts for a small share. For example, the non GM market is probably largest in soybeans/derivatives, and within this, in the EU – the level of non GM demand in the EU soy market was equal to about 2.6% of global soy oil use and 6.2% of global soymeal use in 2002/03;
b) North American farmers have been successfully growing specialist crops (eg, seed production, nexera canola, waxy corn) for many years, near to crops of the same species (including GM crops), without compromising the high purity levels required;
c) North American farmers have also been successfully growing and channelling some GM and non GM crops of the same species into different markets (usually differentiating between domestic and some export destinations);
d) Survey evidence amongst US organic farmers shows that the vast majority (92%) have not incurred any direct, additional costs or incurred losses due to GM crops having been grown near their crops. Only 4% had any experience of lost organic sales or downgrading of produce as a result of GM adventitious presence having been found in their crops (the balance of 4% had incurred small additional costs for testing only);
e) A small number of instances of adventitious presence of GM events have been found in non GM and organic crops (and resulted in possible rejection of deliveries by buyers or imposition of contractual price penalties):

    - Often this has been due to deficiencies in segregating/channelling crops once harvested, in storage or transport;

[1] Co-existence as an issue relates to 'the economic consequences of adventitious presence of material from one crop in another and the principle that farmers should be able to cultivate freely the agricultural crops they choose, be it GM crops, conventional or organic crops. The issue is, therefore, not about product/crop safety, but, about the economic impact of the production and marketing of crops cultivated for different markets

[2] Organic shares based on canola in Canada, and soybeans and corn in the USA

[3] These speciality crops tend to account for 3%- 5% of total plantings of each crop

- The only crop/sector where there appear to be disputes about the feasibility of co-existence between GM and non GM/organic crops[4] is canola, in Canada. However, the lack of publicly available information on key issues (eg, levels of adventitious presence of GMO material found in organic canola, frequency of testing of organic crops, location of crops relative to GM crops, origin of seed, measures taken to minimise adventitious presence occurring), means it is not possible to fully assess whether there have been, or may be co-existence problems between organic and GM canola in Canada.

Has the growth of the GM crop area impeded the development of organic crops?
Examination of trends in the planting of GM and organic crops suggests that the growth of the GM crop area has not impeded the development of the organic sector in North America:

f) The US organic areas of soybeans and corn have increased by 270% and 187% respectively between 1995 and 2001, a period in which GM crops were introduced and reached 68% and 26% shares of total plantings of soybeans and corn;
g) States with the greatest concentration of organic soybean and corn crops are often states with above average penetration of GM crops. For example, the leading organic corn growing states are Iowa, Minnesota and Wisconsin. Of these, Iowa and Minnesota have above average penetration of GM crop plantings (32% and 36% respectively of total corn plantings relative to the US average of 26% in 2001);
h) Given the historically low area planted to organic canola[5] and the current existence of some organic plantings (about 2,000 hectares in Canada), this suggests that GM and organic canola can and is co-existing without causing significant economic and commercial problems for organic growers. These organic growers may have made some changes to farming practices in order to successfully co-exist (eg, ensuring reasonable separation distances, testing seed prior to use, operating rigorous control of volunteers and sowing *brassica rapa* varieties).
i) Some in the organic sector perceive that there is a lack of defined GM crop co-existence stewardship conditions, which if applied, would minimise the risk of neighbouring organic crops being down-graded due to the adventitious presence of GM events. It should however, be noted that some GM crop stewardship conditions (notably for corn) specifically provide GM crop farmers with 'coexistence type' recommendations for minimising the chances of adventitious presence of GM crop material being found in non GM crops of the same species. Also, farmers of GM herbicide tolerant crops are provided with weed (volunteer) management practice guides. It is therefore probable that some changes to farming practices by some GM growers have already been made to facilitate improved co-existence with non GM growers.

Concluding comments
Overall, co-existence of GM and non GM, including organic, crops has been occurring in North America. The market has effectively facilitated this without government intervention since GM arable crops were first introduced in 1995. In effect there has been recognition that if producers wish to avoid GM events in their production systems the onus for implementing measures to facilitate this falls on the speciality producers (including organic) which are, in turn rewarded via

[4] This refers to presence of GM material being found that may impact economically on the grower. In other words, GM material may be found in non GM crops grown on adjacent land to a GM crop, but is not of relevance to the non GM farmer if the market the crop is sold into (or its use) is indifferent to whether it is GM derived or not, or the level of GM presence is below a contractual or labelling threshold (eg, 0.9% in the EU)

[5] This essentially reflects difficulties in growing organic canola and the limited nature of the market – see section 5.2

price premia, for incurring costs associated with meeting the requirements of their customers and certification bodies.

In the organic sector, the onus placed on (organic) growers to implement measures to facilitate co-existence also reflects the lack of clarification by the organic certification organisations on what constitutes a violation of organic principals where adventitious presence of GM events is detectable at very low levels even though the crop has been cultivated in accordance with organic principles. Also, there appears to be recognition that any policy relating to acceptance or rejection of organic crop status (ie, its right to be labelled and sold as an organic crop) because of GM adventitious presence is a marketing issue and that, under organic regulations, organic producers should not be penalised for adventitious presence of GM events, if this occurs through no fault of their own. This practice is consistent with the practices and principles, applied by the organic sector, in relation to the adventitious presence of other unwanted materials and is proportionate to the perceived negative impact on the environment and the perceived risks to human health.

1 Introduction

GM crops[6] have been widely grown in North America since 1996, with the total GM area planted to soybeans, corn and canola rising to over 42 million hectares in 2003. Over the same period, the area devoted to organic crops (of the same three arable crops for which GM traits have been commercially introduced) has also increased. For example in the USA, the organic area of corn and soybeans has increased from about 33,000 hectares in 1995 to about 109,000 hectares in 2001. The value of the organic food market has also increased. For example, in the USA the total market value rose from $3.3 billion in 1996 to $11 billion in 2002.

Against this background, a number of organic producers and certification organisations, both in North America and the EU, perceive that organic agriculture cannot exist in the presence of GM crops (ie, that the two types of production system cannot take place in close proximity, or co-exist). For example, 908 Saskatchewan organic producers are claiming in a class-action lawsuit that they cannot produce organic canola due to market concerns about cross-pollination with GM crops. They assert that they have lost markets for the equivalent of 20,000 tonnes of organic canola that offered a 100% price premium relative to non organic canola[7]. In the EU, co-existence of GM and organic has also become a major focus of attention for many in the organic sector who wish to prevent and/or minimise the cultivation of GM crops in the EU.

This paper examines these issues from an economic perspective, with specific applicability to experiences in North America[8].

2 What is co-existence?

Co-existence as an issue relates to '*the economic consequences of adventitious presence of material from one crop in another and the principle that farmers should be able to cultivate freely the agricultural crops they choose, be it GM crops, conventional or organic crops*'[9]. The issue is, therefore, not about product/crop safety[10], but, about the economic impact of the production and marketing of crops cultivated for different markets.

Adventitious presence of GM crops in non-GM crops becomes an issue where consumers demand products that do not contain, or are derived from GM crops. The initial driving force for differentiating[11] currently available crops into GM and non-GM has came from consumers and interest groups who expressed a desire to avoid support for, or consumption of, GM crops and their derivatives, based on perceived uncertainties about the impact of GM crops on human health and the environment. This has subsequently been recognised by some in the food and feed supply chains (notably some supermarket chains, many with interests in organic farming and suppliers of GM event testing services) as an opportunity to differentiate their products and services from competitors and hence derive market advantage from the supply of non-GM derived products, including organics. This has been taken furthest in the organic sector, which has opted to prohibit

[6] The crops examined in detail in this paper are soybeans, maize and canola the three main crops used in the food and feed sectors for which GM traits have, to date been commercialised

[7] Phillips P & Smyth S (2003)

[8] The authors acknowledge that a funding contribution towards the researching of this paper was provided by companies within the agricultural biotechnology sector. The material presented in this paper is, however the independent views of the authors – it is a standard condition for all work undertaken by PG Economics that all reports are independently and objectively compiled without influence from funding sponsors

[9] Source: European Commission 2003

[10] Commercially grown GM crops having obtained full regulatory approval for variety purity, use in livestock feed, human health and safety and the environment

[11] Generally referred to either segregation or identity preservation

the use of GMOs in (organic) production, and is well illustrated by the relevant organic sector legislation in the USA. Thus, the USDA Organic Standard[12] defines the term 'organic' and details the methods, practices and substances that can be used in producing and handling organic crops and livestock, as well as processed products. It establishes clear organic labelling criteria[13], and specifically prohibits the use of genetic engineering methods '*The use of genetically engineered organisms or their products are prohibited in any form or at any stage in organic production, processing, or handling'*[14]*'*.

In addition, some food companies have withdrawn from using GM derived ingredients, so as to minimise possible adverse impact on demand for their branded food products by anti-GM consumers. Probably the most notable example of this in the USA has been the case of GM potatoes. New Leaf Plus potatoes, which contained a Bt gene (conferring resistance to Colorado Beetle (CPB)[15]) were commercially launched in the USA/Canada in 1996. Genetic resistance to the potato leaf roll virus (PLVR) was also added to the product in 1999. By 1999, GM potato varieties were planted on about 4% of the US potato area[16]. This then fell to 2% in 2000, and in 2001, the technology provider (Monsanto) withdrew from selling GM potatoes, to concentrate on GM crops in corn, soybeans and cotton, and potentially, for the future, in wheat (research into the latter has now been 'put on hold' from May 2004). This commercial decision was probably influenced by the decision of some leading potato processors and fast food outlets to stop using GM potatoes because of perceived concerns about this issue from their customers (the processing market is the main outlet for potatoes in the USA), even though the GM potato provided the producer and processor with a lower cost, higher yielding, more consistent product. It also delivered significant reductions in insecticide use[17].

To fully accommodate this perceived demand for product differentiation, producers, elevators, processors and retailers can segregate, channel or identify preserve (IP) either GM or non GM crops and label these and derived (food) products according to the market in which the produce are sold. In the North American context, this not only includes sales into domestic markets but also export markets, which are of major importance in the soybean, corn and canola sectors[18].

Whilst absolute purity of the segregated product is striven for, it is a fact of any practical agricultural production system that accidental impurities can rarely be totally avoided (ie, it is virtually impossible to ensure absolute purity). This is also the case with organic branded produce which can contain a level of non-organic materials.

Adventitious presence of unwanted material can arise for a variety of reasons. These include, for example, seed impurities, cross pollination, volunteers (self sown plants derived from seed from a

[12] The US National Organic Programme requires any organic agricultural product to meet USDA standards in order to be sold as organic. Along with the national organic standards, USDA developed labelling rules to help consumers know the exact organic content of the food they buy. The USDA Organic Seal informs consumers that a product is at least 95% organic and products with 70-95% organic ingredients can also have an 'organic' label although such products cannot display the Organic Seal

[13] The USDA Organic seal tells the consumer that a product is at least 95% organic

[14] The US National Organic Standards Board also defines genetic engineering as 'made with techniques that alter the molecular or cell biology of an organism by means that are not possible under natural conditions or processes. Genetic engineering includes recombinant DNA, cell fusion, micro- and macro-encapsulation, and the following results when achieved by recombinant techniques: gene deletion and doubling, introducing a foreign gene, and changing the positions of genes. It shall **not** include traditional breeding, conjugation, fermentation, hybridisation, in-vitro fertilisation, or tissue culture'

[15] A primary pest of potatoes in North America

[16] Gianessi et al (2002)

[17] See PG Economics (2003) Consultancy support to….., appendix 5 for a review of literature on the impact of GM potatoes

[18] For example, the USA exports annually about 20% of its corn production and 38% of its soybean production. Canada annually exports about 60% of its canola production

previous crop), and may be linked to seed planting equipment and practices, harvesting and storage practices on-farm, transport, storage and processing post farm gate. Recognising this, almost all traded agricultural commodities accept some degree of adventitious presence of unwanted material and hence have thresholds set for the presence of unwanted material. For example, in most cereals, the maximum threshold for the presence of unwanted material (eg, plant material, weeds, dirt, stones, seeds of other crop species) commonly used is 2%, although in durum wheat, the presence of non durum wheat material is permitted up to a 5% threshold.

3 Current cropping patterns by type of production

3.1 GM crops

There are three main arable crops used in the feed and food chains for which GM traits have been commercially developed in North America; soybeans, corn and canola, which have all been grown by farmers since 1996[19].

In 2003, there were a total of 42 million hectares planted to these three GM crops (60% of total plantings to these three crops: Table 1). This comprised 24.6 million hectares of soybeans, 13.5 million hectares of corn and 3.6 million hectares of canola. In terms of the share of total production, GM traits accounted for 81%, 40% and 84% respectively of soybeans, maize and canola grown in the USA and 48%, 58% and 68% of these three crops grown in Canada (Table 1).

The importance of GM plantings in these three crops (accounting for 60% of total plantings of the combined crops in the USA and Canada in 2003) reflects the farm level benefits derived by growers from the technology. These include yield gains, cost reductions, higher profitability, greater convenience and improved management flexibility[20].

Table 1: Area devoted to GM crops in North America 2003 ('000 hectares)

	Total crop area	GM crop area	GM share
USA			
Soybeans	29,807	24,114	81
Corn	31,998	12,799	40
Canola	486	410	84
Canada			
Soybeans	1,047	500	48
Corn	1,226	710	58
Canola	4,689	3,190	68
Total both countries	**69,253**	**41,723**	**60**

Sources: USDA, Agriculture Canada, ISAAA, University of Manitoba

[19] For canola in the USA, from 2000

[20] For a comprehensive review of literature examining the farm level impact of GM traits in soybeans, corn and canola, see PG Economics (2003) Consultancy support for the analysis of the impact of GM crops on UK farm profitability. www.pgeconomics.co.uk or Ford Runge C & Ryan B (2003) The economic status and performance of plant biotechnology in 2003, adoption and research and development, CBI, Washington

3.2 Organic crops

The latest publicly available data on organic crop plantings for soybeans and corn in the USA[21] is shown in Table 2. This indicates that the organic area devoted to soybeans and corn accounted for 0.24% and 0.12% respectively of the total areas planted to these crops in 2001. In the USA no organic canola has been identified out of a production area of 651,960 hectares in 2001.

Information on the organic area of these crops in Canada is much more limited[22]. Trade sources suggest that the organic canola area in the period 1997-1999 was about 3,240-4,050 hectares, equivalent to about 0.09% of total canola plantings. Since 1999, the area of organic canola is perceived to have fallen from this level, although some production, remains in the provinces of Alberta, Manitoba and Saskatchewan[23]. Trade sources estimate that the organic canola area in 2003 was about 2,000 hectares.

Table 2: Areas of organic corn and soybeans in the US (1995-2001: hectares)

	1995	1997	2000	2001	Total corn area (2001)	Certified organic as a % of total area
Corn	13,213	17,282	31,531	37,860	30,655,605	0.12%
Soybeans	19,102	33,243	55,067	70,606	29,542,695	0.24%

Source: USDA

3.3 Conventionally grown crops

The balance of plantings for each crop (excluding GM and organic) can broadly be categorised as conventionally grown crops (Figure 1). However, even within this categorisation it is important to recognise that it is possible to further disaggregate the crops into 'commodity' traded crops and speciality crops which are grown and kept separate from other forms of each crop both on-farm and further down the supply chain:

- in the case of corn, there are several speciality types such as high amylase, high oil, white, waxy, hard endosperm and nutritionally dense corn, that in total account for about 4.9% of total corn plantings in the US (about 1.5 million hectares);
- in soybeans, specific varieties are grown to meet requirements in the tofu market (mostly for customers in Japan);
- in canola, there are speciality segments for high erucic acid (varieties with desirable properties for manufacturing industrial oils) and Nexera canola (varieties that produce a healthier and naturally stable alternative to partially hydrogenated vegetable oils). In Canada, these two speciality canola crops account for about 120,000 ha (2.6%) and 60,000 ha (1.3%) respectively of the total 2003 Canadian canola crop (4.69 million hectares).

[21] The USDA information on organic crop areas does not list canola because the organic canola area is thought to be extremely small, and hence too small to included as a specific crop category (ie, any organic area is included in 'other crops')

[22] There does not appear to be any government survey or source that collects this information, at national or provincial level

[23] Saskatchewan is reported to account for 30% of all organic farmers in Canada. Within the province 14,100 hectares of organic oilseeds were reported to have been grown in 2001, of which the vast majority was flax (Source: University of Saskatchewan)

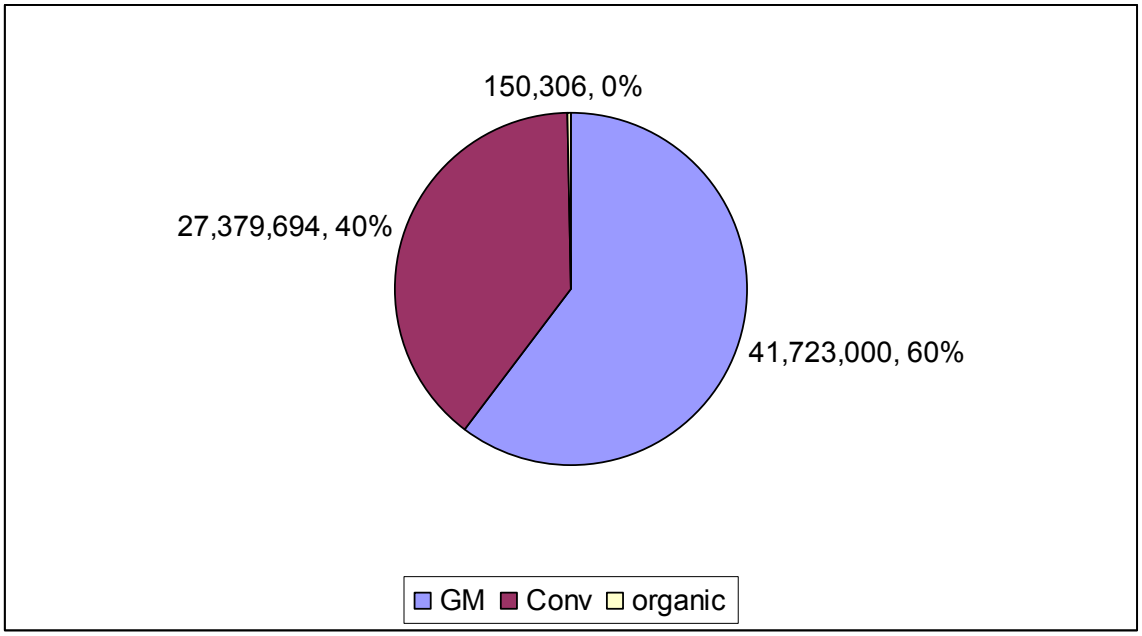

Figure 1: Share of GM, conventional and organic production systems in soybeans, corn and canola 2002 in North America (hectares)

Sources: USDA, ISAAA, University of Manitoba
Notes: Canadian organic area of soybeans and corn based on US organic shares: total share is 0.22%

4 How do current crops co-exist?

This section examines the extent to which existing crops grown to service different markets in North America currently co-exist. It focuses on the three main arable crops used in the feed and food chains for which GM traits have been commercially developed; soybeans, corn and canola.

4.1 GM crops

Are there any 'co-existence' type conditions or recommendations (eg, relating to planting and/or supply to buyers) for farmers planting GM crops?
In North America there are two main forms of 'crop stewardship' conditions of relevance to farmers growing GM crops.

a) Insect resistance management plans
Farmers planting GM (insect resistant: Bt) corn in the USA are required to implement an insect resistance management plan (IRM) to contribute to minimising the possibilities of target pests (corn borers and corn earworms) developing resistance to the Bt trait. This requirement is backed up by government regulation. As such, this is not directly related to meeting economic and market 'co-existence' issues but can, through compliance with the IRMs, contribute to indirectly facilitating co-existence (see below).

Bt corn growers are required to sign a stewardship agreement before accessing Bt technologies and to re-affirm this pledge annually. If farmers are found to have failed to comply with the IRM for two consecutive years (see below), they risk losing access to the technology in the third year. Seed suppliers are required to ensure that farmers are informed about the IRM requirements (or they could lose their right to sell Bt seed) and Bt corn registrants (ie, the biotechnology

companies) are required to sponsor an annual survey, conducted by a third party, to measure the degree of IRM compliance.

The IRM programme also includes guidelines on separation distances and insecticide usage:

- At least 20% of total corn plantings must be to non Bt varieties, on the basis of a minimum of 8.1 hectares (20 acres) of non Bt per every 32.38 hectares (80 acres) of maize planted. If the Bt corn is also planted in regions where Bt cotton is present this non Bt refuge requirement rises to 50% of the corn crop;
- A non Bt refuge must be planted within half a mile of each Bt corn field, and preferably within one quarter mile;
- Refuges can be in the form of strips; lateral, within or around the Bt crop, or as blocks between Bt crops;
- Non Bt corn refuges can only be treated with conventional insecticides if target pest pressure reaches economic thresholds;
- Bt-based foliar insecticides are not allowed to be used on the refuge areas.

b) GM crop stewardship
All suppliers of GM seed to farmers in North America provide farmers with 'Technology Use Guides' or 'Crop Stewardship Guides'. These provide recommendations for use of the GM products (eg, herbicide use for weed control recommendations) and some advice on 'co-existence issues' that target maintaining the purity of non GM crops growing on GM crop planting farms, on nearby farms, in storage or when supplied to buyers. For example, in relation to GM corn, farmers are provided with information and advice to help them meet the requirements of different corn markets, including speciality markets (eg, seed, waxy, high oil), non GM and organic markets (this also covers the current differences between the US and EU regulatory position on approval of different GM traits in corn, which has largely arisen from the EU moratorium on the approval of GMOs which began in 1998[24]) covering:

- Pollen movement: ways of minimising the chances of cross pollination through the siting of crops in relation to prevailing wind directions, use of buffer crops and barriers, timing of plantings, varieties planted (with different flowering times), separation distances and removal (ie, separate harvesting and segregation) of outer strips of crop in a field (eg, some speciality corn crops require the removal of the outer 9 metres (30 feet) of a crop to ensure the removal of impurities from adjacent (non speciality) corn crops);
- Holding discussions with neighbours about planting intentions;
- Holding discussions with grain buyers to ensure that contractual requirements are identified (eg, whether GM traits not yet approved for importation into the EU are accepted).

All farmers of herbicide tolerant crops are also provided with advice on managing volunteers in crops[25]. This advice covers aspects of an integrated weed management system, the majority of which is equally applicable to non GM varieties of these crops, and includes:

- Crop rotation;

[24] As a result of this moratorium, there are a number of GM corn traits that are currently approved for use in the USA and other important export markets (eg, Canada and Japan) but which are not approved (and hence are not permitted) for importation and use in the EU

[25] See for example CropLife Canada, Controlling herbicide tolerant volunteers in a succeeding crop: a best practice guide. www.croplife.ca

- Rotation of herbicides;
- Rotation of herbicide tolerant traits;
- Rotation of timing of herbicide applications;
- Rotation of timing of tillage;
- Use of certified seed.

Relevance of condition/recommendations

a) Insect resistance management plans
The latest annual survey on compliance with the IRM requirements (covering the 2003 growing season) suggests that the IRM requirements are being effectively implemented. Ninety two per cent of Bt corn farmers met the requirements in relation to refuge size and 93% met the requirement on distances. This represented an increase in compliance for these aspects of the IRM, relative to 2000 when the level of compliance was 87% and 82% respectively.

As compliance with the IRM requirements includes the planting of non GM corn refuges, these have probably played a role in minimising the possible occurrence of cross pollination of GM corn with non GM corn, in circumstances where this has been of relevance (ie, where nearby crops have been planted to corn varieties for which the non GM, speciality type maize or GM approved trait (in the EU) status of the crop has been important).

b) GM crop stewardship
The practical relevance of GM crop stewardship conditions to the co-existence[26] of GM and non GM crops in North America has been limited. This largely reflects the limited nature of markets for non GM and organic produce/derivatives from these crops in the USA and Canada and the very small scale of organic production[27] (see section 3.2). GM crops have been and are usually sold through normal marketing channels, without any requirement for on-farm or post farm channelling or segregation from non GM crops (see below for exceptions to this).

Given that the criteria for purchasing soybeans, corn and canola, by the majority of the users (especially in the animal feed sector and many in export markets) has not specified non GM status, GM growing farmers have not had to take into consideration factors such as possible cross pollination and adventitious presence of GM material in non GM crops on their farms, or in relation to non GM crops grown on the vast majority of adjacent/nearby farms. In addition, most farmers have not had to store GM and non GM crops separately.

Although there have been few examples of positive actions being taken by GM farmers to minimise the possibility of adventitious presence of their crops being found in non GM crops of the same species, there have been two notable examples of positive GM crop segregation or channelling having taken place:

- *The initial commercialisation of GM (herbicide tolerant) canola in Canada between 1995 and 1999*. During this period, although the GM canola had been given regulatory approval for use in the USA and Canada, it had not received approval for importation and use in some important export markets (notably Japan). As such, the technology providers (Monsanto and Bayer) developed and managed a segregation system to ensure that the GM crops were channelled into domestic (North America) market uses only and did not

[26] As distinct from stewardship conditions designed to ensure effective use of the technology, compliance with IRM conditions, compliance with any user licence conditions and general, good weed management practices (eg, control of volunteers)
[27] Also the tradition that speciality crop growers are responsible for the maintenance of their product integrity

enter export markets. During this period, the technology providers contracted with selected grain merchants to manage the development and operation of the segregation system so that the canola was kept out of export handling systems, including elevators, rail carts and port terminals. This segregation of the GM canola into the domestic markets was widely considered to have been successful[28];

- *GM corn containing GM traits not yet approved for importation and use in the EU.* In addition, channelling of some GM corn varieties has occurred because of the EU moratorium on the regulatory approval of a number of GM corn traits approved for planting in the USA. US growers of GM corn containing events not yet approved for importation and use in the EU are advised to channel this corn to buyers who do not supply corn/derivatives to the EU market. Whilst a practical system has been set up to provide for effective channelling of this corn away from EU markets, buyers in the EU have tended to source non US origin corn[29] and hence this positive channelling of some GM corn has focused mainly on supplies to corn starch manufacturers who sell the by-product corn gluten to the EU feed sector.

4.2 Conventionally grown crops

Are there any 'co-existence' type conditions or recommendations for farmers planting conventional crops?
Farmers of non GM, conventional soybeans, corn and canola are not generally given any advice or recommendations about the siting of their crops relative to GM or organic crops. However, where crops (eg, soybeans or corn) are sold to some users and/or exporters, there may be a requirement to supply only certified non GM crops – certified that any presence of GM material is below a specified threshold, (eg, in respect of crops destined for export to the EU there is a 0.9% threshold for labelling products as produced from GMOs).

There are, however examples of specialist conventional crops grown that are required to be kept separated from mainstream commercial crops (see section 3.3). For example, in the canola sector there is the specialist crop Nexera canola. Available since 2000, these speciality varieties produce netreon quality canola oil which is healthier and more naturally stable than alternative partially hydrogenated vegetable oils. In order to capture the added value of this product it is in the interests of the user to contract production with growers and to keep supplies and oil separate from conventional varieties. Growers are advised on several issues about how to minimise adventitious presence of non Nexera canola in a crop, including keeping crops at least 25 metres away from non Nexera crops of canola, cleaning seed and harvest equipment before and after use, cleaning all transport and paying careful attention to on-farm storage. Farmers of non GM crops are also provided with weed management guides that focus on issues such as control of volunteers and minimising the risks of herbicide resistance developing. These guides are, however equally applicable to GM and non GM farmers.

[28] Since 1999, the Canadian canola sector has also had to effectively channel GM canola away from the EU market, where approval to import and use GM canola remains outstanding (due to the moratorium on approvals introduced in 1998). This has, however not involved active channelling of canola into GM and non GM streams for different export markets, but rather a focus on exporting to markets other than the EU. This has not proved difficult, especially as the EU has historically been a minor market for Canadian canola exports

[29] Mostly GM corn from Argentina, where the only GM traits approved for plantings are those approved for importation and use in the EU

Relevance of condition/recommendations
Co-existence of GM and non GM crops in the USA and Canada has, to date, only been an issue of relevance to farmers where their crops are/have been sold to some users in the human food sector and/or for export to some markets where there is a larger, distinct market for non GM products than exists in the domestic US and Canadian markets. Within the context of the total markets for soybeans, maize and canola (domestic US and Canadian markets plus exports onto world markets), the non GM market[30] accounts for a small share. For example, the largest single crop market for non GM products is probably in soybeans where global demand is about 12 million tonnes[31], relative to global soybean production of 193 million tonnes and the globally traded volume of about 48 million tonnes[32].

These non GM markets (found mostly outside North America) have been serviced mainly through the purchase of soybeans, corn and canola from countries and regions of the world where GM crops are either not grown or where there are low levels of plantings (eg, supplies of non GM corn and canola demanded in the EU have come mostly from domestic sources and supplies of soybeans from Brazil). At the farm level in the US and Canada, servicing of this market has essentially been through the planting of non GM varieties and, where relevant, agreeing to planting and supplying non GM crops via dedicated (to non GM) transport, storage and possibly processing facilities. The adoption of such segregation practices has resulted in the adventitious presence of GM events being kept below the thresholds set by the major buyers and importers with little impact on price differences between GM and non GM products. Where isolated instances of adventitious presence exceeding agreed thresholds have occurred, these have usually been the result of poor segregation of crops on/post farm.

In respect of GM (herbicide tolerant) canola grown in Canada, some analysts (eg, Van Acker 2003) have, more recently suggested that the lack of co-existence or stewardship conditions for the planting of GM canola has resulted in problems for both GM and non GM canola farmers. This mostly relates to the control of volunteers, resistant to one or more of the herbicides used with GM (herbicide tolerant) crops[33] in subsequent crops. Two key points are important to recognise in respect of this issue:

- It relates to herbicide use and weed resistance (to specific herbicides). As such, it applies to all forms of canola on which herbicides are used. This includes conventional (non herbicide tolerant) canola, canola with non GM herbicide tolerance, and GM herbicide tolerant canola. In other words this is not a GM-specific issue, as illustrated by the provision of volunteer management advice to farmers (see section 4.1);
- Although Van Acker suggests that this problem is widespread in Canada, other bodies and published data suggest that this is not a major issue or problem. For example, the Canola Council undertook survey-based work in 2001 amongst GM and non GM canola growers and included questions of adopters about their management practices to avoid weed resistance and for volunteer management. This found that farmers considered using strategies to minimise the development of weed/pest resistance as 'normal husbandry practice' and about 60% of adopters of GM canola perceived that herbicide management to avoid weed resistance had been made easier as a result of using GM canola. Only 7%

[30] In this context, non GM markets refer to markets where users specifically require produce to be certified as derived from non GM crops

[31] In soybean equivalents

[32] For corn and canola, the main markets in which a non GM segment has developed is the EU. In respect of these two crops and their derivatives, the EU is largely self sufficient and, therefore, does not import significant quantities of these crops

[33] This also applies to volunteers of canola crops resistant to herbicides in which the herbicide resistance has been incorporated into canola through non GM methods

perceived it had been made more difficult (the balance perceived no change). In terms of volunteer canola management in subsequent crops 60% perceived that management was about the same as before, 16% indicated it was easier and 23% thought it more difficult. This suggests that volunteers do not appear to be a problem for most of the farmers surveyed – it is also interesting to note that one of the GM technology providers, Monsanto offers a free GM canola volunteer removal service but reports few calls and requests for this service. Other research suggesting that volunteer GM herbicide tolerant canola is not a significant problem and can be relatively easily controlled includes Downy R (2000), Pekrun C et al (1998), Thomas A & Lees J (1999), Thomas P et al (2000) and Topinka K et al (2000)[34].

In relation to speciality crops like Nexera canola, adherence to the contractual requirements and in particular the separation distances have delivered purity levels to those required by the buying sector and the user sector has not reported any problems in meeting purity standards required.

4.3 Organic crops (soybeans, corn and canola)

Are there any 'co-existence' type conditions or recommendations for farmers planting organic crops?

USA
The United States Department of Agriculture's (USDA) Agricultural Marketing Service implements legislation[35] relating to organic production and marketing in the USA and has established national certification standards. Since October 2002 all organic growers and crop handlers, except the smallest organic growers (less than $5,000 in sales), must be certified by a State or private agency accredited under USDA's national organic standards. Currently fifty-three organic certification organisations, including 14 State programmes, conduct third-party certification of organic production and handling.

As indicated in section 2, the USDA National Organic Standards prohibit the use of GM varieties. However, *'the presence of a detectable residue of a product of excluded methods alone does not necessarily constitute a violation of this regulation. As long as an organic operation has not used excluded methods and takes reasonable steps to avoid contact with the products of excluded methods as detailed in their approved organic system plan, the unintentional presence of the products of excluded methods should not affect the status of an organic product or operation'*.

Also, if a certifying agent has reason to suspect that an organic product has come into contact with prohibited or unwanted substances, or has been produced using excluded methods, the certifying agent can call for testing, which under certain conditions could result in that product no longer being considered organic.

An important point to note in the regulations is the recognition that organic growers may need to implement practical procedures to minimise the possibility of adventitious presence of GMOs in their crops occurring and there is recognition that if an organic crop tests positive for a GM event that occurs unintentionally, the grower should not be penalised either by the down-grading of a crop (ie, loss of an organic price premium) and/or the de-certification of a specific field. Accordingly, any decision by an organic certifier or customer to apply a test-based regime for the

[34] See bibliography
[35] The Organic Foods Production Act of 1990, as amended (7 U.S.C. 6501 et seq.)

presence of GMOs in an organic crop is considered to be a commercial/marketing decision made by that certifier or customer, rather than a requirement of the legislation.

b) Canada
In Canada there is no formal federal regulation for organic certification although National Standards for Organic Agriculture have existed since 1999. The National Standards provide uniform guidelines for producers, assurances to consumers as to the authenticity of organic crops and are consistent with the standards in the USA (see above). These standards effective set the minimum criteria that must be met by organic producers in Canada. The sector is self regulating, with a diverse number of organisations providing certification services for the production, processing, handling and sales of organic products. Several of these organisations are primary producer-owned/operated and are locally based within each province, reflecting the diverse interests in the scope of certification. British Columbia and Quebec are the only two provinces that have legally-based certification requirements. For example, the province of Quebec has an organic regulation which is equivalent to the national voluntary standard and establishes labelling requirements for any product advertised as "biological", "organic", "ecological", or "biodynamic".

The national standards contain some guidance (eg, see Canadian Standards: section crop production) on measures to take to minimise the possibility of unintended contact with prohibited substances like GMOs, such as the use of buffer zones. A number of organic certifiers in the USA and Canada also offer advice on ways of ensuring product integrity. These require farmers to implement procedures/plans that incorporate the following type of measures:

- *Seed:* prior to planting, verifying that non-GM seeds are being used by obtaining statements from seed companies as to the non-GM status of varieties supplied and/or initiating testing of seed supplied;
- *Crop site selection*: knowing fields and prevailing wind direction so that crops can be located in places which minimise the risk of adventitious presence (eg, from cross pollination) occurring. Also, establish physical buffers, such as windbreaks and hedgerows;
- *Neighbour relations*: establishing good lines of communication with neighbours, especially those who directly adjoin organic fields is important and notifying them you are an organic farmer and where your organic fields are located. This also extends to gathering information from neighbours, seed dealers, and farm input suppliers on the types of crops being grown in the neighbourhood, especially if GM crops are likely to be planted. If neighbours are growing Bt crops, consider asking them to plant their non-Bt refuges in areas that adjoin or are near organic fields, to provide buffer protection. Also consider delaying planting dates so that organic crops do not pollinate at the same time as GM crops;
- *Equipment*: ensure that all equipment is clean (ie, seed drills, harvesting equipment, trailers, tractors). All equipment should be cleaned prior to use in organic fields and records kept to document cleaning activities. If equipment is shared, this is best done, only with other organic farmers;
- *Harvest:* submit samples prior to harvest for GM testing. If adventitious presence of GMs is considered a risk, collect samples along a grid pattern, going from areas with the highest risk to areas with low risk. Submit the samples separately, in case part, but not all, of the field is registering adventitious presence of GMs. Also, make sure samples are tested for all applicable GM events and keep copies of test results;
- *Storage:* Inspect storage units prior to use and thoroughly clean augers, bins, grain dryers and screen cleaners, especially if they might have previously been used for GM crops;

- *Transport:* ensure this is inspected and cleaned prior to loading with organic crops. Make sure that transport, including shipping containers, is free of dust and other foreign material. Keep records to document, including clean transportation affidavits and bills of lading;
- *Record keeping*: document all activities to minimise adventitious presence of GM material occurring. Good record keeping will help identify where problems may occur and are invaluable in case of claims;
- *Customers*: make sure you are aware of contract specifications, buyer sampling and testing protocols and thresholds for rejection and/or downgrading of produce with GM crop adventitious presence.

Relevance of condition/recommendations
There is little data available to fully assess the extent to which co-existence advice and recommendations (ie, measures to minimise adventitious presence of GM events in organic crops of corn, soybeans and canola) have been adopted by organic growers of these crops in the USA and Canada. Survey-based research conducted in the US (4th national organic farmers survey 2003) identified the following:

- 73% of respondents had never been subject to, or required to test for GM adventitious presence in seed used or their final crops. Of the 27% who had been subject to some degree of testing, the majority (76% of these farmers or 20% of all farmers) had been requested to test their final crop;
- of the farmers whose crops or seed had been tested for GM presence, 11% (2% of all farmers) found positive GM adventitious presence;
- 52% of farmers had not considered it necessary to carry out any specific changes to production practices in respect of possible adventitious presence of GM events occurring, and of those that had taken actions, the most common practice had been to consult with neighbours (24% of all farmers). Other actions taken included increasing the size of buffer crops on their land (19% of all farmers), not using non organic or non tested conventional seed (18%), altering cropping patterns (13%) or changing the location of crops grown (9%);
- 92% of all organic farmers had not incurred any direct, additional costs due to GM crops being grown nearby;
- of the 8% who had incurred additional costs, half of these (4% of all farmers) indicated that the additional costs had been for testing only. Of the balance (4% of all farmers), 3% had incurred loss of organic premia and 1% loss of organic certification.

Overall, this suggests that US organic farmers have had very limited co-existence problems with GM crops in an environment where GM crops are grown extensively and little, if any new, management procedures have been implemented to minimise the risk of adventitious presence.

5 Has the growth in the GM crop area impeded the development of organic crops?

5.1 USA

Analysis presented earlier in section 4.1 (Table 2) identified that between 1995 and 2001[36], a period in which the GM crop areas for corn and soybeans rose from zero to 28.7 million hectares (68% of the total soybean area and 26% of the total corn area), the organic area of these crops

[36] The latest available data

also increased. The organic area of soybeans increased by 270% and the organic area of maize increased from 187% - both from a very low base.

Examining the co-existence of the organic and GM crop areas in more detail (Table 3 and Table 4) explore the main locations in which each type of production can be found. The key features identified are:

- organic corn crop areas are highest in Minnesota, Iowa and Wisconsin. Two of these states are also regions with above average penetration of total plantings of corn by GM corn. Iowa and Minnesota are two of the leading states for GM corn plantings, with significantly above average penetration of GM crops (ie, 32% and 36% respectively of total corn plantings were to GM varieties in 2001, compared to the average of 26% of all corn);
- organic soybean plantings were highest in Minnesota, Iowa, Wisconsin and Michigan. This compares with the largest GM soybean growing states of Iowa, Illinois, Minnesota and Indiana. Iowa and Indiana were also states in which GM penetration of total plantings were above average for the country as a whole. Although, Illinois and Minnesota had below average GM penetration, the GM share was, nevertheless substantial at 63% and 64% respectively.

Overall, the expansion of the organic planted areas between 1995 and 2001, and the concentration of these organic areas in states, often with above average GM crop penetration, suggests that there have been very few, if any co-existence problems[37].

Table 3: Organic and GM corn areas in the USA by state: 2001 (hectares)

	Total corn area	Organic area	GM area	% share of organic	% share of GM
Minnesota	2,792,390	7,876	1,005,260	0.28	36
Iowa	4,815,860	6,164	1,541,080	0.13	32
Wisconsin	1,375,960	5,407	247,670	0.39	18
Ohio	1,375,960	2,276	151,356	0.17	11
Nebraska	3,318,490	2,047	1,128,290	0.06	34
Kansas	1,335,490	1,200	507,490	0.09	38
Missouri	161,880	603	51,800	0.37	32
Indiana	2,387,700	380	286,520	0.02	12
Michigan	890,330	1,776	151,360	0.20	17
Illinois	4,411,170	1,754	705,790	0.04	16
South Dakota	1,537,840	1,278	722,780	0.08	47
Other States	6,253,340	7,101	1,250,670	0.11	20
U.S. total	**30,656,400**	**37,860**	**7,970,670**	**0.12**	**26**

Source: USDA

Table 4: Organic and GM soybean areas in the US by state 2001 (hectares)

	Total soybean	Organic area	GM area	% share of organic	% share of GM

[37] Isolated examples may have occurred but these have been few in number

	area				
Arkansas	1,214,080	3,293	728,450	0.27	60
Illinois	4,451,640	2,784	2,849,050	0.06	64
Indiana	2,347,230	472	1,830,840	0.02	78
Iowa	4,451,640	11,018	3,249,700	0.25	73
Kansas	1,214,080	899	971,270	0.07	80
Michigan	890,330	6,837	525,290	0.77	59
Minnesota	2,913,800	12,124	1,835,690	0.42	63
Mississippi	526,100	n/a	331,440	n/a	63
Missouri	2,104,410	2,038	1,452,040	0.10	69
Nebraska	1,983,000	2,581	1,507,080	0.13	76
North Dakota	930,800	4,317	456,090	0.46	49
Ohio	1,902,060	5,340	1,217,320	0.28	64
South Dakota	1,740,190	3,557	1,392,150	0.20	80
Wisconsin	687,980	8,924	433,430	1.30	63
Other States	3,163,090	6,432	2,024,379	0.20	64
US	**30,520,440**	**70,606**	**20,753,900**	**0.23**	**68**

Source: USDA
Note: n/a = not available

5.2 Canada[38]

The court action bought by a group of organic farmers in Saskatchewan against the providers of GM (herbicide tolerant) canola technology that they had lost sales of organic canola because of the planting of GM canola implies that the two types of production have not been successfully co-existing in parts of Canada (from an organic perspective). However, the lack of available data and evidence makes assessment of these claims difficult. The passage of the court action may provide new data and an opportunity to assess the case further. At present, the main (limited) points of relevance that can be made are as follows:

- The organic canola area in Canada is extremely small (2,000 hectares or 0.04% of total plantings in 2003 - it peaked at 0.09% of total plantings in the period 1997/99);
- Some organic canola continues to be planted in Canada. This suggests that some organic farmers are managing to successfully co-exist with GM canola. It is, however not known whether this is due to organic crops being in locations far removed from GM canola plantings (ie, regions with limited GM canola penetration[39]), or is due to the application of a number of the measures recommended to organic farmers for minimising the possibility of adventitious presence of GMOs occurring (eg, using only organic seed/tested conventional seed, planting *brassica rapa* varieties that flower slightly earlier than the more commonly planted *brassica juncea* varieties);
- It is not possible to assess whether the organic canola area would have been higher in 2003, if GM (herbicide tolerant) canola had not been so widely planted. It is, however relevant to note that the organic canola area is unlikely to have risen significantly because of difficulties in growing organic canola and the limited nature of the market. More

[38] The lack of publicly available data on the organic canola area and its location in Canada means that it is not possible to undertake analysis comparable to that undertaken for the USA

[39] This is reported to be the case in Alberta

specifically, weeds are a major problem to canola growers and therefore organic growers need to use rotation, mechanical methods, hand labour and land with a low incidence of weeds to minimise weed establishment when the crop canopy is not well established. These organic practices are constrained by the availability of resources, such as land and labour, and lead to increased costs (which require price premia to maintain profitability). Soil nutrients, notably nitrogen are a key factor impacting on yield - this means that organic canola is not grown as readily as organic wheat or flax because it demands high levels of soil nitrogen which are limited in an organic rotation. In conventional arable production, canola is usually grown as a break crop in rotation with wheat and allows farmers to maximise the yield potential of first year wheat. Also levels of production risk tend to be higher in organic canola than conventional canola because of problems such as flea beetle and fungal diseases. Lastly, the market for organic rapeseed oil is relatively small. A significant proportion of rapeseed oil used is in the non-food sector where there is a virtually no organic market for any vegetable oil. Also, in the human food sector rapeseed oil has historically been considered by consumers to be an inferior product relative to alternatives like sunflower oil (even though its health profile may be superior). The high degree of substitution between different vegetable oils used as food ingredients also means that the lowest cost organic oils dominate market use and contribute to limiting the level of organic premia obtainable;

- There appears to be no formal (ie, at certification body level) crop stewardship conditions or recommendations made to Canadian organic canola farmers about minimising the possibility of GM adventitious presence being transferred from adjacent GM canola crops. There also does not appear to be any consensus across the organic sector as to what constitutes a violation of organic principles. Canadian organic canola growers can cultivate an organic crop by selecting/purchasing non organic GM-free seed, they can continue to use crop rotations to maintain soil fertility, they can apply mechanical and hand labour methods of weed control, they can identify preserve their crop and have it processed by a certified organic oil processor. However, by not setting a threshold for adventitious presence of GM events, in the same way as thresholds exist for the presence of other non-organic material, the absence of clarification is limiting the cultivation of organic canola rather than the presence of GM canola that has been widely adopted by Canadian canola growers due to its economic advantages[40].

6 Conclusions

The evidence to date shows that GM crops, which now account for the majority (60%) of total soybean, corn and canola grown in North America (because of the farm level benefits obtained such as yield gains, cost savings and greater convenience/flexibility[41]), have co-existed with conventional and organic crops without significant economic or commercial problems:

- Co-existence of GM and non GM crops has, to date, only been an issue of relevance to farmers where their crops are/have been sold to some users in the human food sector and/or for export to some markets where there is a distinct market for non GM products. Within the context of the total markets for these crops (domestic North American and exports onto world markets), the non GM market accounts for a small share. For example, the non GM market is probably largest in soybeans/derivatives, and within this,

[40] See Canola Council (2001)

[41] See PG Economics (2003) Consultancy support for the analysis of the impact of GM crops on UK farm profitability. www.bioportfolio.com/pgeconomics for a detailed review of literature on this subject

in the EU market – the level of non GM demand in the EU soy market was equal to about 2.6% of global soy oil use and 6.2% of global soymeal use in 2002/03[42];

- North American farmers have been successfully growing specialist crops (eg, seed production, nexera canola, waxy corn) for many years, near to crops of the same species (including GM crops), without compromising the high purity levels required;
- North American farmers have also been successfully growing and channelling some GM and non GM crops of the same species into different markets (usually differentiating between domestic and some export destinations);
- Survey evidence amongst US organic farmers shows that the vast majority (92%) have not incurred any direct, additional costs or incurred losses due to GM crops having been grown near their crops. Only 4% had any experience of lost organic sales or downgrading of produce as a result of GM adventitious presence having been found in their crops (the balance of 4% had incurred small additional costs for testing only).

A small number of instances of adventitious presence of GM events have been found in non GM and organic crops (and resulted in possible rejection of deliveries by buyers or imposition of contractual price penalties). Often this has been due to deficiencies in segregating/channelling crops once harvested, in storage or transport. Some instances may also have arisen from the use of conventional (non organic) seed with low levels of GM adventitious presence[43].

The only crop/sector where there appear to be disputes about the feasibility of co-existence between GM and non GM/organic crops[44] is canola, in Canada. However, the lack of publicly available information on key issues (eg, levels of adventitious presence of GMO material found in organic canola, frequency of testing of organic crops, location of crops relative to GM crops, origin of seed, measures taken to minimise adventitious presence occurring), means it is not possible to fully assess whether there have been, or may be co-existence problems between organic and GM canola in Canada.

Some also perceive that there is a lack of defined GM crop co-existence stewardship conditions, which if applied, would minimise the risk of neighbouring organic crops being down-graded due to the adventitious presence of GM events. It should however, be noted that GM crop stewardship conditions do apply to all GM crops grown in North America and that some of these (notably in relation to corn), specifically provide GM crop farmers with 'coexistence type' recommendations for minimising the chances of adventitious presence of GM crop material being found in non GM crops of the same species. Also, farmers of GM herbicide tolerant crops are provided with weed (volunteer) management practice guides. It is therefore probable that some changes to farming practices by some GM growers have already been made to facilitate improved co-existence with non GM growers.

Examination of trends in the planting of GM and organic crops also suggests that the growth of the GM crop area has not impeded the development of the organic sector in North America:

[42] Sources: PG Economics and Oil World

[43] Some perceive this to be a possible primary source of low level GM adventitious presence (Mellon & Rissler 2004)

[44] This refers to presence of GM material being found that may impact economically on the grower. In other words, GM material may be found in non GM crops grown on adjacent land to a GM crop, but is not of relevance to the non GM farmer if the market the crop is sold into (or its use) is indifferent to whether it is GM derived or not, or the level of GM presence is below a contractual or labelling threshold (eg, 0.9% in the EU)

- The US organic areas of soybeans and corn have increased by 270% and 187% respectively between 1995 and 2001, a period in which GM crops were introduced and reached 68% and 26% shares of total plantings of soybeans and corn;
- States with the greatest concentration of organic soybean and corn crops are often states with above average penetration of GM crops. For example, the leading organic corn growing states are Iowa, Minnesota and Wisconsin. Of these, Iowa and Minnesota have above average penetration of GM crop plantings (32% and 36% respectively of total corn plantings relative to the US average of 26% in 2001);
- Given the historically low area planted to organic canola[45] and the current existence of some organic plantings (about 2,000 hectares in Canada), this suggests that GM and organic canola can and is co-existing without causing significant economic and commercial problems for organic growers. These organic growers may have made some changes to farming practices in order to successfully co-exist (eg, ensuring reasonable separation distances, testing seed prior to use, operating rigorous control of volunteers and sowing *brassica rapa* varieties).

Overall, co-existence of GM and non GM, including organic, crops has been occurring in North America. The market has effectively facilitated this without government intervention since GM arable crops were first introduced in 1995. In effect there has been recognition that if producers wish to avoid GM events in their production systems the onus for implementing measures to facilitate this falls on the speciality producers (including organic) which are, in turn rewarded via price premia, for incurring costs associated with meeting the requirements of their customers and certification bodies.

In the organic sector, the onus placed on (organic) growers to implement measures to facilitate co-existence also reflects the lack of clarification by the organic certification organisations on what constitutes a violation of organic principals where adventitious presence of GM events is detectable at very low levels even though the crop has been cultivated in accordance with organic principles. Also, there appears to be recognition that any policy relating to acceptance or rejection of organic crop status (ie, its right to be labelled and sold as an organic crop) because of GM adventitious presence is a marketing issue and that, under organic regulations, organic producers should not be penalised for adventitious presence of GM events, if this occurs through no fault of their own. This practice is consistent with the practices and principles, applied by the organic sector, in relation to the adventitious presence of other unwanted materials and is proportionate to the perceived negative impact on the environment and the perceived risks to human health.

[45] This essentially reflects difficulties in growing organic canola and the limited nature of the market – see section 5.2

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