Fast Facts

No. 5 (update of No. 2)

Market Implications with GM Canola

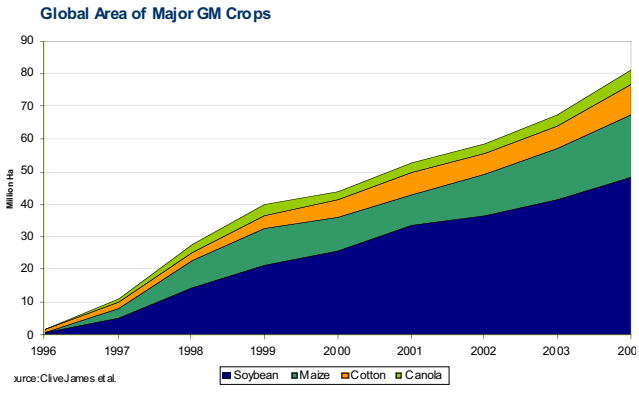
Global Production of GM Crops

Commercial GM crops have now been in production for a decade and have quickly gained a significant share of the total world plantings. GM crops were first commercialised in the mid 1990's and have continued to expand, reaching 81 million hectares in 2004. The technology has been rapidly embraced in major grain and oilseed exporting countries with the US, Argentina and Canada accounting for 85% of all GM production in 2004.

Soybeans are the largest GM crop accounting for 48 million hectares in 2004 or 60% of the worldwide area planted to GM crops. Corn was the next largest with 24% of the global GM area followed by cotton (11%) and canola (5%). In 2004, the area planted to GM soybean varieties exceeded the area planted to conventional varieties for the first time.

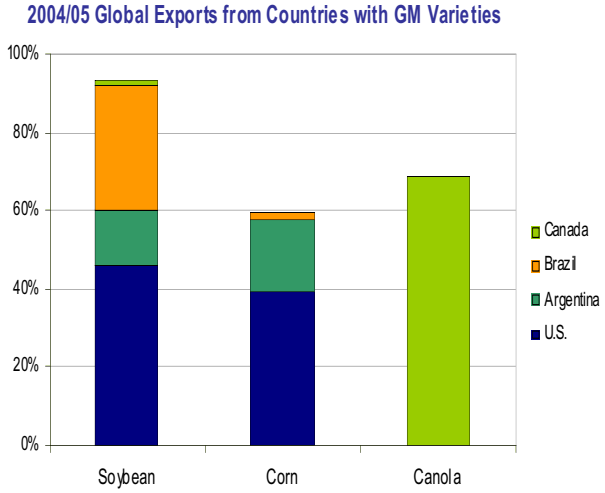
The five major adopters of GM crops, the US, Argentina, Brazil, Canada and China, accounted for 97% of total plantings in 2004. Of this, the US represented 59% of worldwide GM plantings. Other countries, such as the European Union and Australia have struggled with consumer resistance surrounding the use of biotechnology in grain and oilseed crops.

There is evidence indicating the technology is becoming more widely used. Brazil saw the largest increase in area planted to GM crops last year, less than three years after the Government officially approved the technology in 2003. Provisional 2005 figures show the area planted to GM crops in Brazil was 9.4 million hectares, an increase of 4.4 million hectares on the previous year. India showed a three-fold increase in GM area to 1.3 million hectares in 2005 based on provisional figures.



World Trade in GM Crops

GM crops are widely traded throughout the world with the majority of global soybeans, corn and canola exports now coming from countries that produce GM varieties. With the exception of China, all the countries that have widely adopted GM crops are also major grain and oilseed exporters.

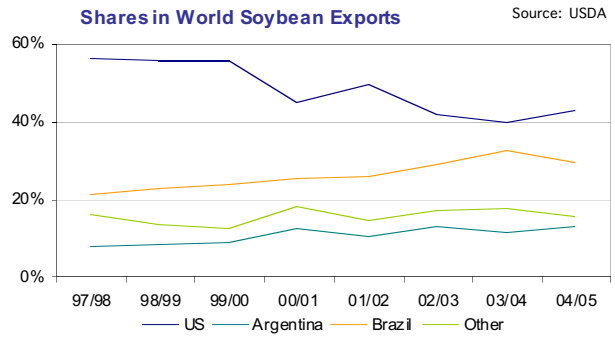


Source: Clive James et al.

The vast majority of soybean exports come from countries that use GM varieties. In 2004/05, 94% of global soybean exports came from GM producing countries; namely Canada, Brazil, Argentina and the US. Sixty percent of global corn exports came from countries that produce GM varieties in 2004/05 and 69% of global canola exports in 2004/05 came from Canada, where the bulk of canola is grown from GM varieties. Almost all Canadian GM and non-GM canola varieties are commingled for export, with the exception of small quantities of non-GM canola for niche markets.

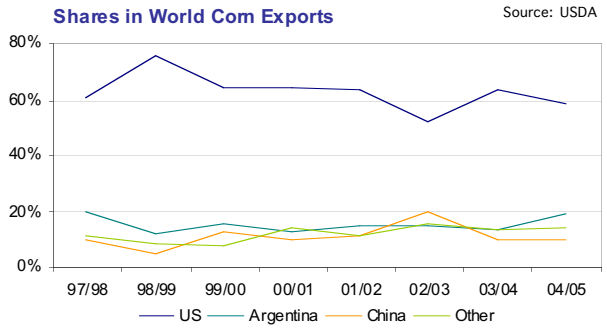
Widespread exports of GM crops means that all major importing countries consume significant quantities of GM grain and oilseeds. China is by far the world's largest soybean importer accounting for 40% of world imports in 2004/05 followed by the EU-25 with 24%, Japan (7%) and South Korea (2%).

The US share of world soybean exports dropped from 56% in 1997/98 to 43% in 2004/05 as South American soybean production rapidly increased. However these exports have been displaced by Argentina and Brazil, countries that have also embraced GM varieties.



Japan is a major buyer of corn taking 22% of global corn with 16.5 million tonnes of imports in 2004/05. South Korea is also an important buyer of corn taking 11% of 2004/05 corn imports followed by the EU-25 with 4%.

Despite the US growers' widespread uptake of GM varieties, the US still maintains 60% of world corn exports. Rapidly increasing domestic corn demand in the US, largely driven by the increasing use of corn for ethanol, has seen exports trend lower in recent years.



The Canadian Canola Example

Canada grows around one fifth of the world canola crop, but accounts for around two thirds of all global exports. Australia is a significant producer of canola and the second largest exporter behind Canada. Canada's importance as a canola exporter makes it a logical test case for Australia in order to understand the advantages and disadvantages that have followed the introduction of GM canola.

Demonstrated Benefits

GM canola varieties were introduced into Canada in 1996 and have expanded to account for 82% of area planted to canola in 2004. Clearfield varieties were grown on 14% of the canola area in 2004 and conventional canola varieties account for 4%.

Growers have rapidly adopted the new technology because the new varieties provide increased profitability and greater management flexibility.

A 2001 study conducted for the Canola Council of Canada found that growers reported an average 10% yield increase from GM canola above conventional varieties. The factors that contributed to the yield improvement were higher yielding varieties, earlier seeding and better weed control. Admixture was also lower in GM varieties by 1.27% which resulted in higher canola prices. The study also showed growers used less fuel with GM canola varieties compared to conventional canola as they increased direct seeding and reduced summer fallow practices. In addition, Canadian storage companies have reported increased storage and freight efficiencies because of the lower admixture levels in canola.

GM canola varieties allowed growers to use significantly less herbicide than conventional canola. The Canola Council of Canada study found that GM varieties allowed growers to lower their herbicide costs by 40% compared to conventional canola varieties.

Canadian growers participating in the study reported an average increase of $5.80 per acre in the net return for GM canola compared to conventional canola in 2000. Economic modelling used in the study calculated a $10.62 per acre benefit over conventional canola.

Opponents of the technology claim the increased profitability and other benefits resulting from GM canola are overstated. However, the final measure of benefits from the technology will not be assessed in reports, but will be measured in grower adoption of the GM varieties. Growers will not incur and maintain the additional expense of using GM varieties if they cannot achieve increased profitability and/or improved management flexibility. The fact that 82% of the Canadian canola crop was planted to transgenic varieties in 2004 suggests growers are seeing substantial benefits from these characteristics.

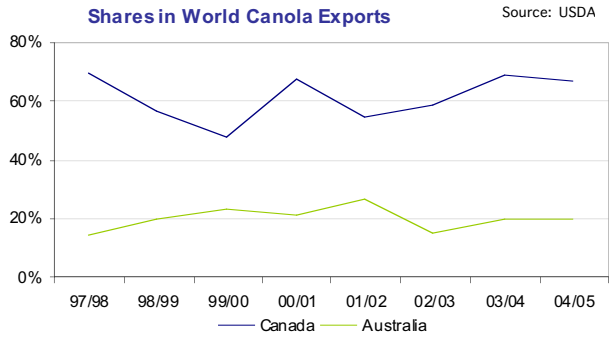
Little Impact on Export Markets

Canada's rapid adoption of GM canola has meant that nearly all exports are co-mingled with GM varieties. By comparison, Australia's stance of not permitting the commercial production of GM canola allows exports to be marketed as non-GM canola into discerning markets. It is reasonable to expect that Australian exports would have benefited if international buyers had a strong preference for non-GM canola. However, a decade after the introduction of GM canola varieties, Canada has maintained it's dominant share of world canola exports despite its widespread use of GM varieties and there has been no noticeable increase in Australia's share of global canola export

GM varieties as percentage of all planted area, 2004

Country	Crop	Percent
USA	Corn	47
USA	Soybean	85
USA	Cotton	76
Canada	Canola	82
Australia	Cotton	80

Canada retains two-thirds of global canola exports and sells into most major destinations.



The EU's decision to place a moratorium on the approval of new GM varieties in 1998 meant that Canada cannot sell canola into Europe. This has had a negligible impact on Canadian canola exports as Europe is a comparatively small and intermittent importer.

Japan, the world's largest canola importer, regularly purchases 50 to 60% of Canada's annual canola exports. Canada has maintained annual exports of 1.6 to 1.8 million tonnes to Japan or around 75% of its canola imports despite the introduction of GM canola varieties.

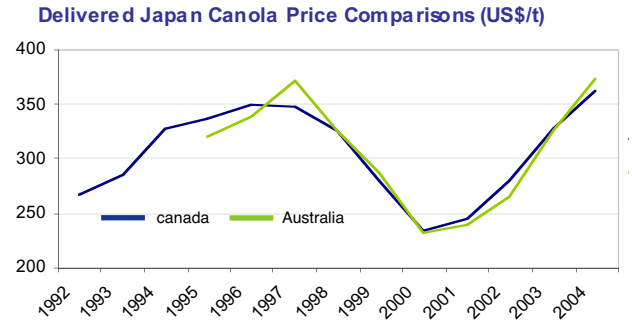
No Evidence of Price Discounting

Canadian Canola Exports by Destination

	95/6	96/7	97/8	98/9	99/0	00/1	01/2	02/3	03/4	04/5
Europe	322	163	11	1	1	-	2	1	8	0
Japan	1,679	1,734	1,829	1,815	1,801	1,874	1,590	1,562	1,675	1,746
China	-	-	110	1,269	1,211	1,890	214	-	401	275
Pakistan	-	-	-	-	-	-	-	173	274	-
Mexico	531	356	593	529	570	846	631	450	1,068	944
USA	272	265	391	278	280	249	88	195	317	430
Others	1	2	29	9	22	-	8	187	11	17
Total	**2,804**	**2,519**	**2,964**	**3,900**	**3,885**	**4,859**	**2,524**	**2,394**	**3,755**	**3,412**

Source: Canola Council odCanada

Japan is a good benchmark to assess impacts on canola prices from the introduction of GM varieties because it is the world's largest canola importer and it is a quality discerning market where there has been widespread consumer concerns regarding GM material in foods. Canada and Australia consistently account for over 95% of Japan's canola imports. Japan is known to pay premiums for some significant quantities of non-GM soybeans and corn, although there is little evidence to suggest this has, or will occur, for canola.



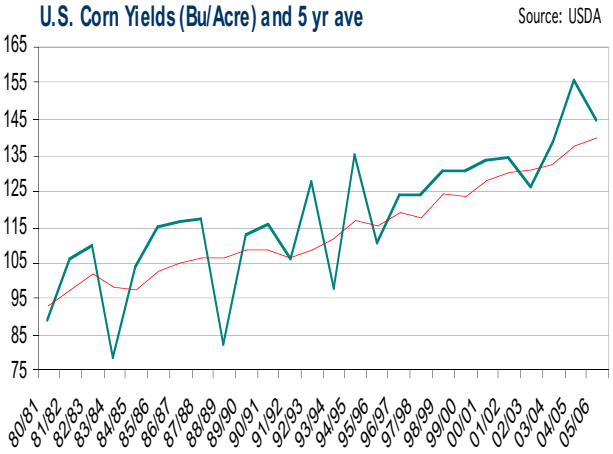
Source: US Ag Attache, Japanese Minst. of Finance

Import prices for canola indicate there has been no noticeable change in price relationships for Canadian and Australian canola sold to Japan, despite Canada's general use of GM varieties. Annual average import values (measured by the Ministry of Finance, Japan) show that the price relationship between Australian and Canadian canola has been relatively consistent in the decade after Canada's adoption of transgenic canola varieties. From 1998 to 2004 the average annual price for Australian canola delivered to Japan was US$291.43 per tonne compared to an average price of US$292.29 per tonne for Canadian canola

Further potential yield benefits

The Canadian canola industry is optimistic that further GM varieties can provide more yield benefits to growers. Some canola breeders expect a quantum shift in canola productivity in the next few years as hybrids take over from open pollinated varieties.

Parallels have been drawn to the US corn industry where yields more or less doubled following the introduction of hybrid corn varieties and almost all corn was planted to hybrid varieties 10 to 15 years after these varieties were first introduced.



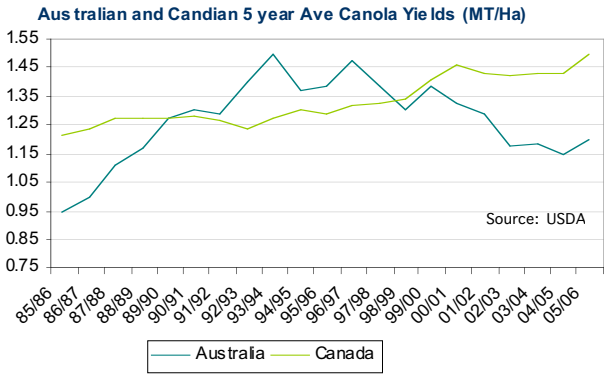
Analysis shows that growth in US corn yields has increased significantly with the use of GM varieties. In the decade following the introduction of GM corn varieties in 1995/96, the five year average for US corn yields increased by 20.5% compared to the previous decade where corn yields only increased by 12.2% on average.

The use of GM canola varieties may also improve drought tolerance. It is noticeable the corn yield variability has decreased significantly after the introduction of biotech varieties. Anecdotal evidence also supports this observation. U.S. corn yields in 2005/06 were the second highest on record at 144 bushels per acre despite widespread drought conditions across much of the Corn Belt during the growing season.

Australian Canola Yields Lagging

Declining yields for Australian canola has become a significant issue for the canola industry. Five year average yields for Australian canola have declined from 1.47t/ha in 1996/97 to 1.19t/ha in 2005/06. Reasons for the decline in yields are likely to include several dry years, increased disease prevalence from sclerotinia and black leg as well as the uptake of TT cultivars to improve weed management which have a lower yield potential than conventional canola varieties.

Also of concern is the widening gap between canola yields in Australia and Canada. In the decade following the introduction of GM canola varieties in 1995/96, five year average canola yields in Canada have increased from 1.29t/ha to 1.49t/ha in 2005/06. Whereas the five year average canola yields in Australia have declined from 1.38t/ha in 1995/96 to 1.19t/ha in 2005/06 (-13.9 %).



Access to GM varieties has helped Canada increase canola yields. In the decade prior to the introduction of GM varieties the five year average Canadian canola yields increased by 6.1% whereas they increased by 15.8% in the decade following 1995/96 when GM canola varieties were introduced.

Premiums for non-GM

Some markets have shown a willingness to pay premiums for limited quantities of non-GM grains and oilseeds to accommodate consumer preferences. Consumer concerns towards GM foods and the introduction of labelling laws has created a market for some quantities of non-GM grain and oilseeds. Japan is the best example where they import significant quantities of non-GM soybeans and corn.

Japanese imports of non-GM grain and oilseeds are largely restricted to processors of food products like soy foods such as tofu, miso and natto as well as corn foods such as corn snacks. These premiums have not extended into oilseeds used in oilseed processing for vegetable oil and protein meal or products used for animal feeds.

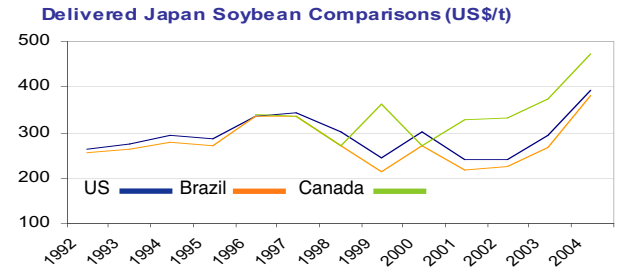
An example of where a non-GM premium was developed is for food grade soybeans into Japan. Around three quarters of Japan's 5 million tonne soybean demand is used for crushing, with one quarter for food. Following the widespread introduction of GM soybean varieties in the US, which accounts for around 75% of Japan's soybean imports, food buyers in Japan began purchasing identity preserved non-GM soybeans. Canada has emerged as the major supplier of non-GM soybeans to Japan although the US has also actively marketed identity preserved non-GM soybeans following Canada's successes.

Demand for non-GM beans has meant a noticeable increase in sales and premiums for Canadian soybeans. Even though Canada's soybean exports are still comparatively small, sales to Japan have increased by 160% to 259,000 tonnes from 1998 to 2004. Canada now receives a premium of US$80-90 per tonne above US soybean values on a delivered Japan basis.

Identity Preservation systems

Greater importance has been placed on identity preservation (IP) systems as market segmentation has increased. Some customers are willing to pay premiums for food products with special characteristics (such as high oleic canola, chemical free, organic crops or non-GM) and food manufacturers require practices that allow them to preserve specific characteristics through the supply chain.

Canadian soybean growers developed an IP system to satisfy Japanese food manufacturers that the integrity of their non-GM soybeans would be maintained through the supply chain. The IP system allowed Canadian growers to achieve a 20% price advantage over US soybeans despite GM soybean varieties also being grown in Canada.



Source: US Ag Attache, Japanese Minst. of Finance

Part of this premium is likely to reflect higher costs associated with segregating and transporting IP soybeans.

Whilst the balance of evidence indicates there are relatively few non-GM premiums for Australian canola into overseas markets, there are still likely to be smaller niche markets that may want to buy non-GM varieties and will pay a premium. As with the Canadian non-GM soybean example, identity preservation systems will play an important role in allowing niche customers to purchase grain for their specific market requirements.

It is important to make clear distinctions between niche markets and major markets where the bulk of the crop is sold. Misinterpreting the market drivers or overstating the size of potential niche market sizes could have long term impacts on the international competitiveness of the Australian canola industry.

International Labelling Laws

The increased production of GM crops combined with consumer safety concerns about GM foods has seen the implementation of labelling laws in many countries. These policies specify under what circumstances GM foods and in some cases GM feeds, must be labelled.

Approaches taken to labelling GM foods vary considerably between countries. The European Union has implemented very strict labelling laws for GM foods and this also covers some animal feed ingredients. Canada, Argentina and the United States, on the other hand have implemented voluntary labelling laws.

European Union regulation requires that any food ingredient or derivative with 0.9 percent or more GM material has to be labelled. Labelling will be required on vegetable oils and other highly refined products. However, this relies on strict identity preservation systems as genetic material is removed during processing.

Mandatory labelling is required in Australia and New Zealand for food products that containing GM material although up to 1% unintended contamination is permitted. Highly processed products such as vegetable oils and sugar do not require labelling.

Japan requires labelling of food products if the DNA can be scientifically detected in the finished foods where it exceeds 5% of the total weight. Highly processed products such as vegetable oils are excluded from labelling as the DNA is removed during processing.

Summary of International Labelling Laws

Country	Labelling Scheme	% Threshold for unintended GM Material
Canada	Voluntary	5
Anited States	Voluntary	N/A
Argentina	Voluntary	N/A
Australia	Mandatory	1
European Union	Mandatory	0.9
Japan	Mandatory	5
Korea	Mandatory	3
Indonesia	Mandatory	5

Korea requires labelling for processed foods that contain GM corn, soybean or soybean sprouts where these three goods are among the top five ingredients in the finished product. Minor ingredients are exempt. The threshold for the unintended contamination of the top three products is 3 percent.

Recently a WTO dispute settlement panel found the EU had imposed unfair restrictions on the import of GM crops. The WTO dispute panel backed a complaint from the United States, Canada and Argentina that the EU's moratorium on the import of GM crops amounted to business protectionism rather than health concerns for consumers or the environment. It remains to be seen if this ruling will change the EU's stance towards approving imports of GM crops.

Key Points

- GM crops have now been grown commercially for a decade. With the exception of GM cotton, Australia has opted to adopt a cautious approach with most state governments introducing moratoriums on the commercial production of GM crops. Ten years is a sufficiently long time frame to assess agronomic benefits of the technology as well as customer reactions to GM crops in order to make decisions on technology.
- GM varieties now comprise a significant proportion of the total area planted to crops around the world. Biotech varieties now account for more than half the global soybean area, a quarter of global cotton and around one twelfth of the corn and canola area. Production of GM crops is concentrated in North America and South America with Brazil, Argentina, Canada and the US accounting for 92% of the global area planted to GM crops
- Growers have rapidly adopted GM varieties where they are available to them. In the United States, GM varieties now account for 85% of the area planted to soybeans, 76% of cotton area and 47% of corn area. In Canada 82% of canola is planted to GM varieties and 80% of the Australian cotton crop is planted to GM varieties.
- Opponents of the technology have long debated the benefits that growers obtain from growing GM varieties, but the widespread use of these varieties across several continents is confirmation that growers have achieved significant benefits.
- Trade in GM grains and oilseeds is now widespread. The vast majority of world soybeans, corn and canola exports come from countries that use GM varieties. Major exporting countries where GM crops are widely used have seen minimal trade impacts following the introduction of GM varieties still maintaining large market shares into major markets. However, the introduction of GM varieties has created opportunities for small niche markets for non-GM products such as food grade soybeans.
- Evidence from Canada, the world's largest canola exporter and Australia's major export competitor, supports these findings. Canadian growers have rapidly adopted the technology with over 80% of all canola area now planted to GM varieties. Canada has maintained its large market share into Japan, even through most of their canola is commingled with GM varieties.
- Although Japan is known to pay non-GM premiums for food grade soybeans and corn, there is no evidence of widespread and significant premiums for Australia's non-GM canola status.
- Analysis indicates Australian canola yields lagged behind Canada following their introduction of GM varieties. The five year average Canadian canola yields increased by 15.8% in the ten years following the introduction of GM canola varieties in 1995/96 which is nearly 10% greater than improvements seen in the decade before. By comparison, the five year average Australian canola yields declined by 13.9% from 1995/96 to 2005/06.

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