



# Genetically Modified Canola: a resource guide

## RESOURCE GUIDE 1

**The following is a reference guide, providing information about the commercial release of genetically modified (GM) canola in Australia. The guide provides a brief summary of the information available on the GM canola varieties available in Australia, including the history of their development, industry guidelines for managing GM canola in the supply chain, agronomic and market issues, the science behind the canola and the overseas experience.**

### 1 Current status

Genetically modified (GM) herbicide tolerant canola has been grown commercially in New South Wales (NSW) and Victoria since 2008, and in Western Australia since 2009, as a trial, and then more widely since 2010. The area of GM canola has grown from 9600 hectares in 2008, to approximately 176,000 hectares in 2012. GM varieties now represent almost 10 per cent of the nation's canola crop.

All of the GM canola commercially grown in Australia to-date is Roundup Ready® canola developed by Monsanto Australia.

Monsanto Australia's website provides specific Roundup Ready® canola product information including pricing, independent variety trial results, and technical documents including the Roundup Ready® canola crop management plan; and machinery hygiene and roadside weed control. See: [www.monsanto.com.au/products/canola/default.asp](http://www.monsanto.com.au/products/canola/default.asp).

Bayer will officially launch its first GM canola hybrid in Australia in 2013, with the variety currently being grown on a limited scale by growers in Eastern and Western Australia, and it has shown rapid growth and a high, early vigour to out-compete weeds. In recent national variety trials, the GM canola has been impressive in terms of yield and oil production, and according to the developers, the variety's moderate height means that lodging is not an issue, which is advantageous during harvesting. The variety currently has a provisional rating of resistant to moderately resistant against the fungal disease blackleg.



## 2 Regulation

After six years of field trials, two companies, Bayer CropScience and Monsanto Australia, applied to Australia's Gene Technology Regulator for the commercial release of GM canola for use in the Australian cropping system. The applications were lodged at the Office of the Gene Technology Regulator (OGTR) in June and July 2002.

In late July 2003 following an extensive evaluation and public consultation, the regulator announced the commercial release of Bayer CropScience's InVigor® hybrid canola, a variety tolerant to the herbicide glufosinate-ammonium.

The regulator concluded during the assessment period that the Bayer CropScience variety of GM canola is as safe to human health, safety and the environment as non-GM canola. The regulator's full determination on the Bayer licence can be found on the OGTR website: [www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/DIRo21-2002](http://www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/DIRo21-2002).

In December 2003, the regulator also approved Monsanto's Roundup Ready® GM canola variety for commercial release, concluding that Monsanto's GM canola was as safe to human health, safety and the environment as non-GM canola. The variety can tolerate applications of the glyphosate herbicide. The documentation relating to the regulator's decision about the Monsanto licence can be found on the OGTR website [www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/DIRo20-2002](http://www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/DIRo20-2002).

As part of the regulatory process the Office of the Gene Technology Regulator compiled a document titled, The biology and ecology of canola (*Brassica napus*), which covers topics such as growth, agronomy, pests, diseases, weeds, cultivation, pollen movement, outcrossing and gene transfer.

For further information: [www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/canola-3/\\$FILE/brassica.pdf](http://www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/canola-3/$FILE/brassica.pdf)

Other agencies involved in the regulation of GM products include Food Standards Australia New Zealand (FSANZ), which is responsible for the safety of GM foods and ingredients derived from such foods.

The issue of food safety is often raised as one of the major concerns people have about GM foods. The FSANZ brochure, Safety Assessment process for genetically modified food explains FSANZ's role in assessing the safety of GM foods — an assessment all GM foods must undergo before they are allowed to be sold in Australia and New Zealand: [www.foodstandards.gov.au/\\_srcfiles/GM%20Foods\\_text\\_pp\\_final.pdf](http://www.foodstandards.gov.au/_srcfiles/GM%20Foods_text_pp_final.pdf).

In December 2001 Australia adopted new labelling laws for food produced using gene technology. Standard 5.1.2 (food produced using gene technology) ensures that all GM crops, animals and microorganisms are assessed and approved by FSANZ as safe before they can be used for food or in food processing.

Food or ingredients labelled 'genetically modified' either contain new genetic material or protein as a result of genetic modification or have altered characteristics — for example, changed nutritive values compared to conventional food. Under these labelling laws, oil from GM canola is not required to be labelled as the genetic material/DNA is removed in the refining process and the oil from a GM crop cannot be differentiated from conventional (non-GM derived) crops.

Food products from seven GM commodities may be in Australian supermarkets. These are soybean, canola, corn, potato, sugar beet, cotton and rice. Of these, only GM cotton and canola are grown domestically in Australia.

For more information: [www.foodstandards.gov.au/consumerinformation/gmfoods/labelling.cfm](http://www.foodstandards.gov.au/consumerinformation/gmfoods/labelling.cfm)



### 3 State government decision-making

Under Australian gene technology legislation the OGTR regulates for human health, safety and the environment, but not for marketing issues. There is, however, provision within Australia's federal gene technology legislation to create zones free of GM crops. Under the *Commonwealth Gene Technology Act 2000*, the Ministerial Council, comprising of federal, state and territory ministers, has the opportunity to issue a policy principle, 'Recognising areas, if any, designated under state law for the purpose of preserving the identity of one or both of GM or non-GM crops for marketing purposes.'

The Ministerial Council agreed in 2003 to issue a policy principle to recognise the rights of state and territory governments to designate zones for GM or non-GM crops for marketing purposes.

Following this, all canola-growing states in Australia (NSW, Victoria, South Australia, Western Australia and Tasmania) imposed bans on the commercial production of GM canola for marketing purposes. These bans were lifted in NSW and Victoria in 2008 following government reviews, however they remain in place in the other canola producing states.

In NSW, the GM canola ban was lifted after a review undertaken by the NSW Government in 2007. The review is available at: [www.dpi.nsw.gov.au/agriculture/field/field-crops/oilseeds/canola/gm](http://www.dpi.nsw.gov.au/agriculture/field/field-crops/oilseeds/canola/gm).

The Victorian Government also conducted a review of its GM canola legislation, available at: [www.dpi.vic.gov.au/agriculture/innovation-and-research/biotechnology/genetically-modified-crops/moratorium/review](http://www.dpi.vic.gov.au/agriculture/innovation-and-research/biotechnology/genetically-modified-crops/moratorium/review) and announced that the bans in place would be allowed to lapse in February 2008.

The South Australian Government also conducted a review of its GM Crop Management Act legislation in 2007, but decided to maintain the ban on GM food crops and introduced new legislation, see: [www.legislation.sa.gov.au/LZ/C/R/GENETICALLY%20MODIFIED%20CROPS%20MANAGEMENT%20REGULATIONS%202008.aspx](http://www.legislation.sa.gov.au/LZ/C/R/GENETICALLY%20MODIFIED%20CROPS%20MANAGEMENT%20REGULATIONS%202008.aspx). GM canola trials continue in the state.

In 2008, the Office of the Gene Technology Regulator released a fact sheet on the status of GM canola in Australia to clarify the Commonwealth/state powers in relation to the commercial introduction of the two GM canolas and to reaffirm that the moratoria were not a Commonwealth issue and that they were not related to the protection of human health and safety or the environment. See: [www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/envirorelease-3/\\$FILE/factcommcan.pdf](http://www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/envirorelease-3/$FILE/factcommcan.pdf).



### 4 Managing canola in the supply chain

As mentioned above, the OGTR does not consider marketing issues in the regulatory process. As a result a number of industry and government industry organisations have sought to address this issue.

Since 2002, the grains industry has been considering the introduction of GM grain into Australian farming systems. In 2007, the industry's commitment to managing GM canola in the grain supply chain was released. *Delivering Market Choice with GM Canola* outlines the grains industry's ability and commitment to incorporate GM canola into the supply chain with a certainty and confidence that it can be managed to meet market and customer requirements. See: [www.abca.com.au](http://www.abca.com.au).

This industry approach to the introduction of GM canola in Australia was endorsed by 29 organisations representing the entire grain supply chain.

The above document is supported by *Principles for Process Management of Grain within the Australian Supply Chain* which details all the principles and protocols available to the industry to deliver products which meet market requirements. This 102-page report covers all phases of the cropping process from research, breeding, on-farm, storage, transport, marketing and exporting to manufacturing and the consumer, and the management practices required to meet market specifications for both GM and non-GM crops. See: [www.abca.com.au](http://www.abca.com.au).

### 5 The marketplace

There have been various resources released on the market issues surrounding GM canola. Following is a brief summary of these resources, including links for further information.

### Resource A

As a result of the Market Choice Framework surrounding the commercial introduction of GM canola into the Australian grain supply chain (as outlined above), a canola standard of relevance to GM canola was established by the industry in 2008 in order to meet customer requirements for canola and non-GM canola in both domestic and export markets.

The canola standards as at 1 August 2008 are:

- CSO1: canola, being either GM or non-GM canola at any level of admixture of OGTR approved events — all other parameters are as previously listed
- CSO1-A: non-GM canola is developed as a new standard. All parameters are to be as per CSO1, except in the description reference is made to GM events approved by the OGTR at levels below 0.9 per cent.

Canola standards are available from:

[www.australianoilseeds.com](http://www.australianoilseeds.com).

For background information see:

[www.afa.com.au/news/news\\_pdf\\_056\\_briefing\\_note\\_canola\\_standards\\_april\\_2009.pdf](http://www.afa.com.au/news/news_pdf_056_briefing_note_canola_standards_april_2009.pdf).

### Resource B

The Australian Oilseeds Federation has addressed a number of topics of relevance to GM canola in the marketplace as outlined below:

- 1 *Adventitious presence in Canola* — features information about the unintentional mixing of trace amounts of seed, grain or other products of one plant variety with another (adventitious presence), established thresholds, and management implications.
- 2 *Trade implications of GM canola* — presented in a question and answer format, this resource looks at GM crop trading globally, Canada's GM canola experience, international GM food labelling tolerances, non-GM premiums and identity preservation systems.
- 3 *Identity preservation in oilseeds* — provides general information about identity preservation (IP) and some of the steps involved in implementing IP.
- 4 *Quality assurance in oilseeds* — looks at the growing use of QA systems in grain production, the reasoning behind QA implementation and sources for further information.
- 5 *Market implications with GM canola* — is an update of 2 outlined above.

For further information: [www.australianoilseeds.com/oilseeds\\_industry/fast\\_fact\\_series](http://www.australianoilseeds.com/oilseeds_industry/fast_fact_series).

### Resource C

This document titled, *Grains industry common GM declarations* contains three trade declarations for GM canola which have been developed by the Australian Oilseeds Federation:

- 1 'This commodity is not known to contain any approved genetically modified material in excess of the allowed adventitious presence of approved events of 0.9%.'
- 2 'This commodity has been tested for the presence of genetically modified material, and no genetically modified material was detected in excess of the allowed adventitious presence of approved events of 0.9%.'
- 3 'This commodity has been received into and stored in facilities run by a company which operates under an independently audited QA program. This commodity is of known varieties that are not known to contain any approved genetically modified material in excess of the allowed adventitious presence of approved events of 0.9%.'

For further information: [www.australianoilseeds.com/\\_data/assets/pdf\\_file/0020/5537/GM\\_Declaration\\_Update\\_Nov\\_o8.pdf](http://www.australianoilseeds.com/_data/assets/pdf_file/0020/5537/GM_Declaration_Update_Nov_o8.pdf).

### Resource D

A CSIRO report titled, *Segregating GM and non-GM grain in the Australian grain storage system, particularly sampling and testing regimes*, was released in 2005: [www.daff.gov.au/\\_data/assets/pdf\\_file/0003/182829/Final\\_GM\\_Report\\_July\\_04.pdf](http://www.daff.gov.au/_data/assets/pdf_file/0003/182829/Final_GM_Report_July_04.pdf). It concluded that the sampling and testing systems proposed are likely to perform well as far as evenly distributed GM grain is concerned, however, more research is required to establish models for predicting the dispersion of unevenly distributed GM material during normal grain handling operations under different circumstances.



### Resource E

In South Australia, the Eyre Regional Development Board compiled the *Development of a protocol for accreditation of non GM grain within a designated non GM region*, to investigate the process required should Eyre Peninsula grain growers seek to establish a GM free zone. The development of such a protocol, as a case study, was seen as an important step for the regions growers to understand the requirements should the region establish a designated GM free area for broad acre grain crop production. As South Australia has a GM crop ban in place, the protocol has not been tested: [www.daff.gov.au/\\_data/assets/pdf\\_file/0003/182838/eyre\\_peninsula.pdf](http://www.daff.gov.au/_data/assets/pdf_file/0003/182838/eyre_peninsula.pdf).

### Resource F

A report titled, *Gap Analysis in relation to Quality Management for the Supply Chain Management of Genetically Modified (GM) products*, was undertaken by Tasmanian Quality Assured (TQA) to provide an analysis of existing quality management systems with respect to their ability to address supply chain management of GM and non-GM products, particularly in relation to segregation and identity preservation. The report used canola, cotton, pasture and poppies as case studies.

### Resource G

The Productivity Commission, the Australian Government's principal review and advisory body on microeconomic policy and regulation, released their report, *Modelling Possible Impacts on GM Crops on Australian Trade* in November 2002. The report provides an analysis of the economic and trade implications of the introduction of GM technology in the grains sectors, excluding wheat and oilseeds. It contains a detailed review of the evidence of the on-farm benefits achieved from the main GM crops commercialised to date. It assesses the consumer and regulatory environments in which GM crops are being introduced, including any associated costs. For further information: [www.pc.gov.au/research/staff-research/gmcrops](http://www.pc.gov.au/research/staff-research/gmcrops).

## 6 Economic impacts

Over the past decade, the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) has released a number of reports regarding the marketing implications of adopting or not adopting GM canola. A brief summary of these reports is below.

### Report A

*Economic impacts of GM crops in Australia*, released in 2008 listed the potential benefits of GM crop adoption in Australia, and presented simulation scenarios examining the impact of adopting only GM canola crops. The most positive economic benefits are predicted for NSW (excluding the Murray Catchment Management Area which is considered separately), at \$273 million (in 2006–07 dollars) over 10 years to 2017–18. This is reduced to a benefit of \$121 million if adoption is delayed. Significant economic benefits of adopting GM canola are also projected for other states, including Western Australia (\$180 million) and South Australia (\$115 million). See the full scenarios at: [http://adl.brs.gov.au/data/warehouse/pe\\_abarebrs99001439/rro8.4\\_impacts\\_gm\\_crops.pdf](http://adl.brs.gov.au/data/warehouse/pe_abarebrs99001439/rro8.4_impacts_gm_crops.pdf).

### Report B

Also released in 2008, *GM crops in emerging economies*, claims 'Australia will potentially have to forgo significant economic gains by delaying the introduction of GM oilseeds and wheat in an environment where these emerging economies are increasing their GM uptake. If these crops are increasingly adopted by emerging economies but not Australia, Australia's export competitiveness will be adversely affected'. For more detail: [http://adl.brs.gov.au/data/warehouse/pe\\_abarebrs99001428/gmcrops.pdf](http://adl.brs.gov.au/data/warehouse/pe_abarebrs99001428/gmcrops.pdf).

### Report C

A report titled, *Potential impacts from the introduction of GM canola on organic farming in Australia*, released in 2007, concluded that if GM canola were commercialised in Australia, the direct impacts on organic canola production in Australia are likely to be negligible; the introduction of GM canola would have minimal impact on the organic livestock industry; and the impact on organic honey production is expected to be minimal. For more information see: [http://adl.brs.gov.au/data/warehouse/pe\\_abare99001362/organic\\_farming.pdf](http://adl.brs.gov.au/data/warehouse/pe_abare99001362/organic_farming.pdf).

### Report D

*Market acceptance of GM canola*, released in 2007, stated that 'In summary, the marketers of GM canola and of products based on livestock fed on GM materials, including GM canola, do not appear to be disadvantaged in the Australian and world markets — GM canola seems to be finding ready markets throughout the world at prices very similar to those received for conventional canola.' For more detail: [http://adl.brs.gov.au/data/warehouse/pe\\_abare99001343/arro7.5\\_gm\\_canola.pdf](http://adl.brs.gov.au/data/warehouse/pe_abare99001343/arro7.5_gm_canola.pdf).

### Report E

In 2006, *GM grains in Australia: identity preservation* was released. This report stated that the additional costs of grain segregation varied according factors such as the mix of grains being produced; the cost of certified non-GM seed; truck sizes, and grain storage capacity. It also noted, 'while it is evident that there are additional costs associated with the segregation of GM canola, in general terms it does not appear at this stage that there is a price premium in domestic and world markets for certified non-GM canola that is sufficient to offset the additional costs of segregation.' See: [http://adl.brs.gov.au/data/warehouse/pe\\_abare99001335/pc13602.pdf](http://adl.brs.gov.au/data/warehouse/pe_abare99001335/pc13602.pdf).

### Report F

Released in 2003, *Market access issues for GM products: implications for Australia*, outlines key market access conditions or restrictions that are affecting international trade in GM grains and assesses their impact on trade patterns, such as regulatory arrangements and labelling requirements. Copies of the report can be downloaded at: [http://143.188.17.20/data/warehouse/pe\\_abarebrs99000970/PC12559.pdf](http://143.188.17.20/data/warehouse/pe_abarebrs99000970/PC12559.pdf).

### Report G

In 2003, ABARE also released a report titled *GM canola — What are its economics under Australian conditions?* This report contained newly available data from field trials of GM canola in Australia, and used this data to analyse aspects of the economics of the commercial release of GM canola in Australia. The data can be downloaded at: [www.jcci.unimelb.edu.au/GMCanola2007/ABARE%20report%202003.pdf](http://www.jcci.unimelb.edu.au/GMCanola2007/ABARE%20report%202003.pdf).

### Report H

*Genetically Modified grains: market implications for Australian grain growers*, released in 2001 explored the pros and cons of adopting GM crops, and is available at: [http://adl.brs.gov.au/data/warehouse/pe\\_abarebrs99000702/PC12137.pdf](http://adl.brs.gov.au/data/warehouse/pe_abarebrs99000702/PC12137.pdf).

## 7 Science

A number of research projects were undertaken to provide further information for the regulatory progression of GM canola. The reports below complemented the information required by the Gene Technology Regulator during the field trial phase of the technology development.

### Pollination

The potential for canola to cross pollinate with other plants and create herbicide tolerant weeds or increase herbicide resistance is often raised as a concern. Comprehensive research has been carried out by various scientists Australia-wide on the gene flow of GM canola, and two reports are currently available.

The Bureau of Rural Sciences (BRS) produced a report investigating Australian and international literature in relation to the unintentional gene flow via cross pollination from GM crops. The report entitled, *Gene flow study: Implications for the release of genetically modified crops in Australia* can be found at: [http://adl.brs.gov.au/brsShop/data/12860\\_gene\\_flow\\_report.pdf](http://adl.brs.gov.au/brsShop/data/12860_gene_flow_report.pdf).

In 2000, a comprehensive study on the spread of canola pollen was undertaken by Dr Mary Rieger of the Cooperative Research Centre for Australian Weed Management and the University of Adelaide, to quantify at a landscape level the gene flow that occurs from herbicide-resistant canola crops to nearby crops not containing herbicide resistance genes.

The study found that canola pollen can travel considerable distances but that the amount of gene flow is minimal. The methods used were very sensitive, with the detection rate 100-fold lower than the proposed international standard of one per cent. Such a detection rate would comply with the current regulation of GM crops around the world. For further information: [www.sciencemag.org/content/296/5577/2386.abstract](http://www.sciencemag.org/content/296/5577/2386.abstract).

### Herbicide tolerance

A publication titled, *Agricultural Biotechnology: Herbicide Tolerant Crops in Australia* was released by the Department of Agriculture, Fisheries and Forestry (DAFF) in 2003.

The report examined herbicide tolerant crops, particularly GM herbicide tolerant crops, the reasons they are being developed and the rationale behind their use by farmers. The benefits and risks from growing these crops are investigated, along with the strategies used to manage the risks. The aim is to inform the public debate about the technology and its potential in Australian agriculture. To obtain a copy of the report visit: [http://adl.brs.gov.au/brsShop/data/13235\\_htcrop.pdf](http://adl.brs.gov.au/brsShop/data/13235_htcrop.pdf).

## 8 The agronomics of GM canola

### Field trial performance

According to a long-term trial, undertaken by Professor Jim Pratley at Charles Sturt University in NSW (2007), which compared the yield and economic performance of a GM herbicide tolerant canola variety with conventional canola varieties over a typical five-year crop rotation system, the GM canola consistently delivered superior weed control, higher yields and oil quality and better profits when compared to current common canola varieties grown under conventional weed management systems. For further information: <http://news.csu.edu.au/search/result.cfm%3FitemID%3D363C755FoFo3ED5034B67FEC742E1469%26module%3Dnewsreleases%26cat>.

### Weed control and environmental benefits

Canola is now the third most important winter grain crop grown in Australia, its beneficial effect on wheat yields as part of a rotation makes it critically important for the cropping belt. Weeds however are a significant issue for canola. The proposed introduction of two lines of GM canola with tolerance to either glyphosate or glufosinate-ammonium herbicides have the potential to provide farmers with other weed control options.

*Conservation Farming Systems and Canola*, a report by Dr Robert Norton in 2003 stated that the uptake of GM canola would result in an 'increase in canola and wheat production worth \$135 million to the Australian grains industry,' and that the 'increased production could be achieved while making the canola industry more sustainable through better integrated weed management and soil conservation practices.' For more information: [www.jcci.unimelb.edu.au/GMCanola2007/Conservation%2520Farming%2520R%2520Norton%25202003.pdf](http://www.jcci.unimelb.edu.au/GMCanola2007/Conservation%2520Farming%2520R%2520Norton%25202003.pdf).

The report above was updated in 2007, and according to the latest version, *Canola and Australian Farming Systems*, if half of the Australian canola crop was sown to GM canolas, 640 tonnes less triazine herbicides would be used each year and an extra 225,000 hectares of canola would be grown by direct drilling or minimum tillage; average national canola yields would increase eight per cent; an additional 200,000 hectares of canola could be grown in low rainfall areas; and, wheat production (following canola) would increase by 80,000 tonnes on the additional canola production area.

## 9 The Australian experience to-date

### Resource A

In October 2011, the Australian Oilseeds Federation (AOF) released its latest *Market Choice in the Australian Canola Industry 2010/11 Season: Performance Report*, which details the performance of the Australian grain industry in delivering market choice with GM canola.

According to the report, the national area under GM canola cultivation (in Victoria, NSW and WA) was 133,333 hectares in 2010. A further 971 growers undertook the required education and became accredited growers in 2010 bringing the total accredited growers to 1907.

### The breakdown of GM canola production by state for the 2010–11 season

State	Growers accredited	Area planted (ha)	Tonnes delivered
NSW	132	24,043	32,879
Victoria	96	36,497	58,713
Western Australia	743	72,793	47,491
<b>Total</b>	<b>971</b>	<b>133,333</b>	<b>139,083</b>

Source: AOF

Within NSW, the Urana/Lockhart/Corowa areas accounted for third of the state's plantings, while the Forbes/Parkes/Temora areas accounted for slightly over a fifth of all the state's plantings.

In Victoria, 20 per cent of the state's GM canola plantings occurred in the Ararat shire, while further west in the Wimmera, the Horsham area accounted for close to 13 per cent. The next most significant region was Strathmerton/Yarrawonga at around 10 per cent.

In Western Australia, GM canola plantings were concentrated in the Merriken and Esperence shires, which alone accounted for over 30 per cent of total state plantings. The remaining shires all accounted for less than five per cent of the total GM plantings, with most only having a few hundred hectares sown.

The AOF's market choice performance reports for the first three seasons of GM canola in the Australian grain supply chain (2008–09; 2009–10; 2010–11) can be found at: [www.australianoilseeds.com/Technical\\_Info/industry\\_reports/gm\\_canola](http://www.australianoilseeds.com/Technical_Info/industry_reports/gm_canola).

## Resource B

In its *Annual Report 2011*, bulk handler CBH also reported on its first season handling GM canola in Western Australia in the 2010–11 season.

According to the report, just over 70,000 hectares of GM canola were planted and GM varieties made up around seven per cent of total canola receivals of just over 700,000 tonnes. Seven receival sites were available to accept the GM crop and a robust sampling and testing system was introduced to ensure varieties were declared correctly and buyers received the type of canola grade purchased. More than 25,000 deliveries of non-GM canola were made during the 2010–11 season. For more information: [www.cbh.com.au/media/236727/cbh15853%20annual%20report\\_low%20res%20ofinal.pdf](http://www.cbh.com.au/media/236727/cbh15853%20annual%20report_low%20res%20ofinal.pdf).

## 10 Overseas experience

Genetically modified canola was grown in the USA, Canada, Australia and Chile in 2011.

In Canada, GM canola has been grown commercially since 1996, and according to the Canola Council of Canada, in 2010, approximately 93 per cent of the nation's canola crop was sown to GM herbicide tolerant varieties, with just seven per cent comprising of Clearfield and conventional varieties:

[www.canola-council.org/markets-stats/statistics/estimated-acreage-and-percentage](http://www.canola-council.org/markets-stats/statistics/estimated-acreage-and-percentage).

In 2000 the Canola Council of Canada undertook a survey of 650 members to assess their experience with GM canola. The Canadian experience with similar canola varieties to the those approved for commercial release by the OGTR in Australia, shows benefits such as improved yields, better returns, easier and better weed control, cost reductions and easier clean-up of paddocks. To access the grower responses go to: [www.canola-council.org/media/504430/17908\\_transgenic\\_canola\\_1.pdf](http://www.canola-council.org/media/504430/17908_transgenic_canola_1.pdf).

A study titled, *Assessing the economic and ecological impacts of herbicide tolerant canola in Western Canada*, published in 2010, looked at growers experiences over the first decade of GM canola use. Key findings of the study include:

- the new technology generated between C\$1.063 billion and C\$1.192 billion annual net direct and indirect benefits for producers over 2005–07 period, partly attributed to lower input costs and better weed control.
- More than 94 per cent of respondents reported that weed control was the same or had improved using GM varieties, and less than one quarter expressed any concern about herbicide resistance in weed populations.
- Sixty-two per cent reported no difference in controlling for volunteer GM canola than for regular canola and only eight per cent indicated that they viewed volunteer GM canola to be one of the top five weeds they need to control.
- Significant environmental benefits were also reported as producers removed summerfallow as part of their crop rotation and adopted zero tillage or minimum tillage practices. Tillage has dropped from being used on 89 per cent of canola acres, with 64 per cent of producers are now using zero or minimum tillage as their preferred form of weed control.
- When comparing canola production in 1995 and 2006 the toxicity of agro-herbicides applied to canola has decreased 53 per cent. There has been a decrease in producer exposure to chemicals of 55 per cent and a decrease in chemical active ingredient application of 1.3 million kilograms.
- If GM canola had not been introduced and Canadian canola farmers continued to use previous production technologies, the amount of active ingredient applied to control weeds in 2007 alone would have been 38 per cent above what was actually applied.

To see the full study:

[www.canola-council.org/media/504427/assessing\\_the\\_economic\\_and\\_ecological\\_impacts\\_of\\_herbicide\\_tolerant\\_canola\\_in\\_western\\_canada.pdf](http://www.canola-council.org/media/504427/assessing_the_economic_and_ecological_impacts_of_herbicide_tolerant_canola_in_western_canada.pdf).

Canada's canola (seed, oil and/or meal) is exported to the USA, China, Japan, Mexico, the European Union and India. For a general overview of canola in Canada go to: [www.canola-council.org](http://www.canola-council.org).

For general information about the GM canola varieties available in Canada, see: [www.canola-council.org/oil-and-meal/canola-innovation/herbicide-tolerant-canola](http://www.canola-council.org/oil-and-meal/canola-innovation/herbicide-tolerant-canola).

## 11 Feed

With GM crop adoption growing around the world, numerous scientific studies and reports have been completed to explore the topic of animal feed.

A report titled *GM Inputs to Feedlot Beef—A Scoping Study* has also been compiled by DAFF which provides a supply chain map of stockfeed produced for feedlot beef and quantifies the current volumes of major crop products in stockfeed. See: [www.daff.gov.au/\\_\\_data/assets/pdf\\_file/0011/182837/scoping\\_study\\_gm\\_feedstuffs.pdf](http://www.daff.gov.au/__data/assets/pdf_file/0011/182837/scoping_study_gm_feedstuffs.pdf).

According to the ABARE report previously mentioned, Market acceptance of GM canola, 'marketers of GM canola and of products based on livestock fed on GM materials, including GM canola, are unlikely to be disadvantaged in the Australian and world markets.'

Further, the report states, 'the preference for products from livestock not fed on GM materials seems to be very much a niche market and is largely confined to dairy products. With meat products, for example, Canada's export trade has grown strongly since the introduction of GM grains and oilseeds in the United States and Canada in 1996, despite a dependence on the use of GM feedstuffs, particularly GM canola meal. Even in the European Union, a major exporter of meat and dairy products, livestock production is heavily dependent on the use of GM feedstuffs, particularly soybean meal and corn gluten feed.'

See: [http://adl.brs.gov.au/data/warehouse/pe\\_abare99001343/arro7.5\\_gm\\_canola.pdf](http://adl.brs.gov.au/data/warehouse/pe_abare99001343/arro7.5_gm_canola.pdf).

## 12 Liability and insurance

One area which has received much attention in the GM canola debate is that of liability relating to presence of GM content in non-GM crops. A report titled, *Managing GM crops in Australia* concluded that 'The use of legal remedies by farmers or the grains industry has been rare... The ability of farmers to manage spillovers, and the ability of those damaged to seek redress through the courts if necessary, strongly suggests that special legal regimes, and strict liability in particular, are not warranted for GM crops in Australia. This is also the view of legislators in the United States, United Kingdom, Canada and New Zealand.' [www.croplifeaustralia.org.au/default.asp?V\\_DOC\\_ID=1609](http://www.croplifeaustralia.org.au/default.asp?V_DOC_ID=1609).

A report has also been produced by DAFF on this topic, titled *Liability Issues Associated with GM Crops in*

*Australia*, the report outlines the arguments for and against a liability regime specific to GM crops and products. The Australian Government has chosen not to implement a special liability regime for damage caused by GMOs. Recourse for those affected by the unintended presence of GMOs in Australia is to the common law and existing statute. This approach is consistent with the approaches adopted in a majority of countries, including the United Kingdom, Canada and the United States. The report can be downloaded from: [http://daff.gov.au/\\_\\_data/assets/pdf\\_file/0004/182821/liability\\_issues\\_paper\\_final.pdf](http://daff.gov.au/__data/assets/pdf_file/0004/182821/liability_issues_paper_final.pdf).

*Farmer's liability and GM crops* is a fact sheet produced by the Australian Centre for Intellectual Property in Agriculture, it provides a brief overview of the issues that may affect both those wishing to grow GM and those who want to remain GM free. See:

[www.daff.gov.au/\\_\\_data/assets/pdf\\_file/0008/197081/factsheetliabilityandgmcropsweb.pdf](http://www.daff.gov.au/__data/assets/pdf_file/0008/197081/factsheetliabilityandgmcropsweb.pdf).

This one page issue brief titled, *GM Crops—Insurance Aspects*, provides a short summary of issues relating to insuring GM crops. It states, 'presently, insurance coverage generally exists for damage to GM crops...cover relating to liability for GM crops is a more complex matter requiring discussion'. See: [www.insurancecouncil.com.au/media/54877/current%20issues%20brief%20-%20ogm%20crops%20updated%2002010.pdf](http://www.insurancecouncil.com.au/media/54877/current%20issues%20brief%20-%20ogm%20crops%20updated%2002010.pdf).

## 13 General and other references

A report looking at all aspects of canola production in Australia and overseas, GM canola, and the regulation, market acceptance, liability, grain handling, research and development of GM canola, was recently released by DAFF. Titled *GM Canola: An Information Package*, it provides a strong summary of many of the issues considered over the past years regarding the place of GM canola in the Australian and global grain supply chain: [www.daff.gov.au/\\_\\_data/assets/pdf\\_file/0010/539443/gm-canola-info-package.pdf](http://www.daff.gov.au/__data/assets/pdf_file/0010/539443/gm-canola-info-package.pdf).

Agricultural Biotechnology Council of Australia: A regularly updated website providing factual, easy to understand about biotechnology in Australian agriculture, see: [www.agbiotechcouncil.org.au](http://www.agbiotechcouncil.org.au).

Issue Paper 4: GM canola, bees, pollen and honey, Agricultural Biotechnology Council of Australia.

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