



Socio-Economic Benefits of Agricultural Biotechnology Canola and Australian Farming Systems

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Introduction

In 2003, two varieties of GM canola were approved for commercial release in Australia by the Federal regulator. In a rigorous assessment, Food Standards Australia New Zealand (FSANZ) and the Office of the Gene Technology Regulator (OGTR) found the two GM canola traits to be as safe as conventional canola, and were approved on the basis that they posed no risk to human health or the environment.

However due to concerns, (subsequently found to be unsubstantiated), that the introduction of GM canola could negatively impact on Australian markets, the State Governments in NSW, Victoria, South Australia, Western Australia and Tasmania introduced moratorium legislation effectively banning the growing of the approved varieties.

This is against a background where some 35 GM food applications such as oils, snack foods and beverages are already federally approved (by FSANZ) for sale in Australia, derived from crops such as canola, cotton, corn, potatoes, soybean and sugar beet. In addition, domestic GM cottonseed and imported GM soy, GM canola and GM corn are used in Australia to supply stock feed and food manufacturing industries. For example in 2006, approximately 60,000 tonnes of GM canola was safely imported into Australia using existing management protocols and all products were sold into the domestic market.

The moratorium legislation is currently being reviewed in Australia, and in anticipation of the relaxation of the legislation and return of normal market conditions, significant research has been conducted by independent academics, growers' organisations, marketers, consultants and government departments to determine the impact of the release of approved GM canola varieties.

This work conducted by a wide range of independent entities has clearly established that with the adoption of GM canola, significant economic and environmental benefits will be afforded to Australian growers and consumers.

Canola in Australia

First grown in Australia in the 1970's, canola is now the third largest winter crop grown in Australia, (by area sown), (ABARE 2007). The release of herbicide tolerant (HT) types in 1993 brought about a rapid rise in domestic production, which peaked at about 2.2 Mt from 1.85 Mha in 1999. Unfortunately, since then, a combination of poor seasonal conditions and changing terms of trade has seen canola areas reduce to less than 1.0 Mha, and the 5 year average yield decline to 1.18 t/ha. (Foster *et al*, 2003).

Much of the canola produced is herbicide tolerant with triazine tolerant (TT) and imidiazolinone tolerant (IT) making up about 75% of the Australian crop. (Norton RM, 2003).

In Australia, HT canola is particularly important to grain growers as there are no herbicides available to effectively control weeds such as wild radish and wild mustard in conventional canola, (Gene Technology Task Force 2002). These weeds compete with canola crops, contaminate canola seed and build up to significantly infest subsequent wheat crops.

TT canola has been the most popular canola variety grown, especially in Western Australia. Unfortunately however, because of the nature of its herbicide tolerance, this variety has an inherent yield penalty, estimated at 25% compared to conventional varieties, (Robertson *et al* 2002).

In 2003, a comprehensive review of the implications of adopting GM canola on half the current canola area in Australia concluded that the introduction of two types of GM canola with tolerance to either Roundup® or Liberty® herbicides would provide farmers with additional important weed control options.

Based on their impact in Canadian farming systems, these HT GM crops would give another set of vital herbicide management options for Australian growers and deliver substantial environmental and economic benefits, (CropLife Canada 2006, Glyphosate Sustainability Working Group, 2006). Most importantly, GM canola would allow farmers to sow earlier, achieve better weed control when compared to current canola weed control systems and avoid the inherent yield and oil penalties associated with TT canola.

Socioeconomic Benefits

In a review of more than 20 recent reports on the impact of GM canola in Australia, Norton and Roush (2007, University of Melbourne), quantified the agronomic and environmental benefits of GM canola to the Australian production system.

Table 1. Summary of the effect of replacing 50% of TT canola & 40% of conventional canola with GM canola, (Norton & Roush, 2007).

Factor	NSW	VIC	SA	WA	Total
Reduced Triazine use (tonnes)	100t	92t	80t	360t	632t
Increased Proportion of Canola of DD	9%	7%	9%	2%	6%
Increased Canola Area ('000 ha)	40	30	30	100	200
Increased Yield	8%	6%	4%	8%	7%
Increased Canola Production	19%	19%	20%	32%	23%
Increased Wheat Production ('000 t)	16	12	12	40	80
Increased Value of Production (A\$ million)	34million	26million	23million	74million	157million

In an agronomic analysis, the authors concluded that if half of the current canola types grown were replaced with GM canola, the impact in Australia would be:

- An extra 225,000 ha of canola could be grown by direct drilling or minimum tillage.
- 640 tonnes less triazine herbicide would be used each year.
- Average national canola yields would increase from 1.17 to 1.28 t/ha (8%).
- An additional 200,000 ha of canola could be grown in low rainfall regions.
- Wheat production (in rotation) would increase by 80,000 tonnes on the additional canola area.

A canola crop is used to produce oil and protein meal. However in Australia canola also produces significant additional benefits when grown in rotation with wheat and pastures. Because Canola acts to suppress diseases and pathogens of the other crops in the rotation, wheat crops following canola can generate up to a 20% increase in yield.

Table 1 shows the State by State breakdown of these benefits. The table shows that if half of the Triazine Tolerant (TT) canola in Australia was replaced with GM canola, there would be an estimated annual national benefit of nearly \$160 million, plus additional significant environmental benefits as a result of reducing herbicide (triazine) use and the facilitation of direct drilling (DD) techniques.

By international standards Australian farmers derive only a low percentage of their income from government support. Consequently it is critical that farm enterprises remain viable and efficient in a country that has one of the most variable climates in the world. This modelling demonstrates that GM canola offers growers a tool that can assist farms remain viable and competitive and thus also help retain the infrastructure of widely dispersed rural communities.

Concern over Market Issues Unfounded

In 2003, State governments, concerned that the introduction of GM canola could adversely impact on export grain markets introduced moratorium legislation on the cultivation of federally approved GM crops. Detailed research conducted over the last four years however, has shown that these fears were unfounded.

There are no significant price premiums for non-GM canola. The great bulk of GM canola is sold at very similar price to conventional canola in most major canola markets throughout the world, (Foster & French 2007). In fact biotech crop producing countries dominate world trade in maize, soybeans, cottonseed and canola and GM canola is now approved for import to Europe.

The Australian grains industry has a strong and recognised reputation for delivering products that meet specific customer requirements. The Australian grains industry supports the commercialisation of approved GM canola and has industry protocols and processes in place and/or will implement additional protocols and processes to meet the management requirements for GM canola.

There has been some premium paid in the past for Australian canola, however this cannot be attributed to being non GM, rather it is a premium for being an alternate supplier of canola as well as the result of relationship benefits in the marketplace between traders.

Conclusions

Recent detailed analysis has shown that GM canola offers significant agronomic, economic and environmental benefits to Australian farmers and communities. It has been estimated that GM canola would provide an annual national benefit of nearly \$160 million, plus additional significant environmental benefits as a result of reducing herbicide use and the facilitation of direct drilling techniques.

An environment where market choice prevails and growers are able to select the best crop varieties for their particular farm enterprise is supported by the Australian grains supply chain. The current moratoriums are having a negative impact on Australia's research and development effort, and Australia risks being left behind as other nations embrace innovations in transgenic crop development. It has been estimated by the independent Australian Bureau of Agriculture and Resource Economics, (Apted 2005) that Australia stands to lose between \$1.5 Billion and \$5.8 Billion in gross national product within the next 10 years if GM crops are not adopted.

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