potential impacts from the introduction of GM canola on

organic farming in Australia

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foreword

Experience of broadacre GM cropping in Australia beyond cotton is limited. Australia produces no GM crops grown primarily for food or feed. Although Australia's Gene Technology Regulator has approved GM canola varieties for commercial release, state government moratoriums have prevented farmers from taking up the option to grow these GM varieties. However, the future commercialisation of GM canola in Australia remains a possibility.

The potential commercialisation of additional GM crops in Australia raises questions for the organic farming sector:

- What are the implications for Australia's organic farm exports?
- What will be the economic consequences of implementing GM material avoidance measures?
- Will those consequences be different if nonzero thresholds are set for the unintentional presence of GM material?

These questions are addressed in this report against the potential commercialisation of GM canola in Australia. It is expected that the analysis contained in this report will contribute to the policy making process about the future of GM cropping in Australia, particularly when addressing the issue of the coexistence of organic farming systems with GM cropping.

This research was funded under Australia's National Biotechnology Strategy. The key objective of that strategy is to provide a framework for government and key stakeholders to work together to ensure that developments in biotechnology are captured for the benefit of the Australian community, industry and the environment, while safeguarding human health and ensuring environmental protection.

Phillip Glyde
Executive Director
May 2007

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summary

- Genetically modified (GM) broadacre crops have been grown commercially since the mid-1990s. GM crops have been adopted in the Americas, Europe, Asia, Africa and Australia, with significant areas of GM crops being grown relatively close to conventional and organic crops. Some consumers demand food that is free of GM material, even when the GM material has been approved for human consumption. The possibility that GM material may be inadvertently present in organic and conventional products has motivated assessment of the possibilities for coexistence of GM, conventional and organic farming systems.
- Organic standards in countries to which Australia exports organic products will also have implications for future trade patterns. In particular, an EU proposal to establish nonzero thresholds for acceptance of the unintentional presence of approved GM material in organic products has the potential to affect Australian organic trade.
- This report contains an overview of the treatment of genetically modified organisms (GMOs) in organic certification standards in Australia and Australia's main trade partners in organic products and an assessment of the potential economic impacts on the domestic organic industry of the adoption of GM canola crops in Australia.

organic industry overview

- The world organic market is a niche market. Global and Australian organic farm production has grown rapidly in recent years, albeit from small bases. Despite this growth, the organic sector remains a relatively small element of the total agriculture sector. Globally, only 0.74 per cent of agricultural land is estimated to have been under certified organic management in 2005. In Australia, an estimated 2.5 per cent of agricultural land is certified organic. Much of Australia's certified organic land is pastoral land in the low rainfall zone.
- While lack of data prevents a complete assessment of the value of organic production, organic products have been estimated to account for around 1–3 per cent of the value of food sales in countries that have the largest organic food markets. Organic food is estimated to have constituted around 0.5 per cent of the value of Australian food purchases in 2003.

treatment of GMOs in organic standards

- Australia exports organic products to the main global organic markets, the United States, the European Union and Japan. While organic standards in Australia and these markets are generally well aligned, proposed changes to EU standards have implications for trade in organic products. A summary of organic standards in Australia and overseas is provided at appendix A.
- The main conclusions from the analysis of the treatment of GMOs in the organic standards most relevant to Australian organic producers are:
  - All standards prohibit the intentional use of GMOs in organic agriculture.
  - All standards seek to minimise the level of adventitious presence of GM material in organic products. Australia's domestic standards for adventitious presence tend to be more stringent than the national standards that apply in Australia's main organic export markets. This raises two issues. First, Australian certified organic products are likely to be accepted in export markets as they exceed the certification requirements for organic products in overseas markets. Second, the additional stringency of Australian standards may result in Australian organic production costs being relatively higher than overseas organic production costs. Hence, while Australian organic products are likely to have access to export markets, their price competitiveness may be reduced.
  - Organic standards do not treat substances prohibited in organic production consistently in terms of their unintentional presence. The standards generally have nonzero thresholds for the unintentional or unavoidable presence of non-GM prohibited substances, such as petrochemical pesticides and herbicides, but do not stipulate a nonzero threshold for GM material. While the notion of unintentional presence thresholds for GMOs has been raised among organic industry stakeholders, debate on the desirability of such thresholds is ongoing.
  - The EU proposal to implement a 0.9 per cent acceptance threshold for the unintentional presence of approved GM material in organic products raises the prospect that, in the future, there may be significantly different standards for organic certification in Australian producers' main markets.

impacts of GM canola on Australian organic producers

- Assessment of the feasibility of organic and GM coexistence is important to the organic sector in Australia and globally. This is because certified organic farming standards prohibit the use of GMOs. The organic certification of products that unintentionally contain GM material is also prohibited in Australia. While GM cotton and carnations are already grown in Australia, the potential commercialisation of GM varieties of other crops, such as canola, raises the prospect of an increased risk of GM material being found in organic products.
- An assessment of the potential impacts on Australian organic agriculture of the commercialisation of GM canola in Australia was undertaken for this report. The assessment consisted of a search for evidence of the impact of GM cropping on the north American organic sector; examination of simulation studies of organic and GM crop coexistence in the European Union under existing and proposed organic certification standards; and application of the results of overseas studies to the Australian agricultural environment under existing certification standards.
- The main conclusions from the assessment of the potential impacts of the commercialisation of GM canola on the Australian organic production sector are:
    - If GM canola were commercialised in Australia, the direct impacts on organic canola production in Australia are likely to be negligible. The provisions under the Australian organic certification standards require that organic production is isolated from the production of nonorganic products, including GM canola.
    - Only very small amounts, even none, of organic canola oil and organic canola meal were produced in recent years. This indicates that the organic livestock industries use suitable feed other than organic canola meal. This suggests that an introduction of GM canola would have minimal impact on the organic livestock industry.
    - The impact on organic honey production is expected to be minimal. This is because GM canola is most likely to be planted as an alternative to conventional canola, which is also unsuitable for organic honey production. Planting a crop not permitted in organic agriculture in place of conventional canola, which for residue reasons cannot usually be grown in the vicinity of organic hives, would have no additional effect on organic honey production.

- While this study concludes that the commercialisation of GM canola would be expected to have very little, if any, direct impact on these organic sectors in Australia, this conclusion does not extend to the potential impacts of commercialisation of other GM crops. This is because this conclusion is largely based on organic canola being absent from Australian organic agriculture. Commercialisation of GM varieties of crops more extensively grown in Australia as certified organic would be more likely to have a direct impact on Australia's organic sector.

1

introduction

Organic farming and the farming of genetically modified (GM) crop varieties are both important in global agriculture. In 2006, global plantings of GM crops totalled 102 million hectares, while around 31 million hectares were under organic management. Organic farming was practised in 120 countries, while GM crops were grown in 22 countries (Willer and Yussefi 2007; James 2006). With the expansion of both organic and GM farming and the incompatibility of GM cropping with certified organic farming methods, the issue of coexistence of these two forms of agriculture is increasingly important.

Experience of commercial GM cropping in Australia is limited. Currently only GM cotton and carnations are grown commercially in Australia. Over 90 per cent of Australian cotton was from GM varieties in 2005-06 (Cotton Australia 2006). There is also a possibility that GM canola may be commercialised in Australia in the future (Apted, McDonald and Rodgers 2005).

Globally, the organic agriculture sector has addressed the issue of genetically modified organisms (GMOs) in agriculture by developing standards that prohibit the intentional use of GMOs in organic agriculture and by implementing measures designed to avoid the presence of GM material in organic agricultural products.

In most countries that have certified organic production systems, the organic sector maintains a zero tolerance stance on GMOs. This raises the prospect that organic products produced according to the organic standards, but unintentionally containing GM material, may lose their organic certification. This is likely to result in economic losses to producers of organic products.

In response to this situation, the European Commission has proposed thresholds for the unintentional presence of GM material in organic products. It is proposed to allow products to retain their organic certification if unintentionally present GM material is below certain low levels. This proposal is discussed further in chapter 3.

The potential commercialisation of additional GM crops in Australia raises the following questions:

- Are there likely to be implications for Australia's organic exports?

- What will be the economic consequences of implementing GM material avoidance measures?
- Will those consequences be different if nonzero thresholds are set for the unintentional presence of approved GM material?

The purpose in this report is to address these questions in relation to GM canola by examining the treatment of GMOs in organic certification systems and assessing the potential economic impacts on the organic industry of the adoption of GM canola crops in Australia.

2

overview of the organic industry

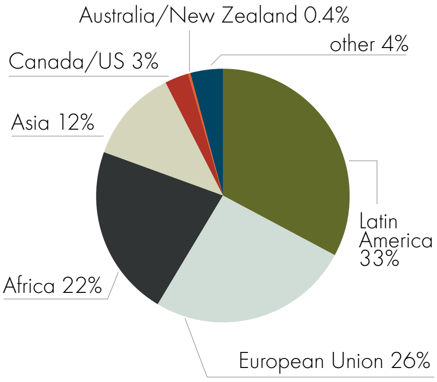
production

world

Certified organic agriculture has grown rapidly in recent years. Land under certified organic management worldwide increased from about 23 million hectares in 2002 to more than 31 million hectares in 2005. While organic farming has been expanding globally it still accounts for only a small proportion of total agriculture. Certified organic land accounted for only 0.74 per cent of world agricultural land in 2005. Globally, a large proportion of the certified organic farming area is located in Australia. Significant proportions of certified organic land are also found in the European Union and Argentina (Willer and Yussefi 2004, 2007).

Much of the certified organic land in Australia is located in low rainfall pastoral lands and principally involves the grazing of beef cattle on extensive areas of unimproved pastures. From a global perspective, it is perhaps more meaningful to note that the majority of certified organic farms are in Latin America and Europe (figure A; Willer and Yussefi 2005). The number of certified organic farms worldwide has increased from about 398 800 in 2002 to nearly 633 900 in 2005. Over the period 2002–05 the largest increases in the number of certified organic farms were in Asia (80 per cent), Africa (70 per cent) and Latin America (40 per cent) (Willer and Yussefi 2003, 2007).

fig A **location of certified organic farms**



Australia

Australia produces a range of organic products, including grains and pulses, fruit and vegetables, wine grapes, meat, honey, edible oils and processed food, and some nonfood products such as cosmetics and wool. As there is no census of organic farming in Australia, there are no precise data on the size of the sector. Nevertheless, there are some (highly variable) estimates that can be used as a guide.

In 2003, the certified organic land area in Australia was estimated to be 7.9 million hectares, with 75 per cent of this land located in Queensland and about 20 per cent in South Australia (Halpin 2004). The majority of the certified organic area in Australia is located in the Channel Country region of south west Queensland and north east South Australia. Organic beef, a significant proportion of which is produced in the Channel Country, represented around 0.5 per cent of Australian beef production in 2003, while organic sheep meat constituted around 0.5 per cent of total Australian lamb and mutton production (Halpin 2004).

Other studies have suggested that the area certified for organic production is larger than that indicated above. One recent study estimated that in 2005 there were around 12 million hectares under organic management in Australia (Willer and Yussefi 2007). In another paper, the area under certified organic management in Australia in 2003 was estimated to be 12.5 million hectares (ACO 2004). These two estimates indicate that 2.5–2.8 per cent of Australia's agricultural land is under certified organic management.

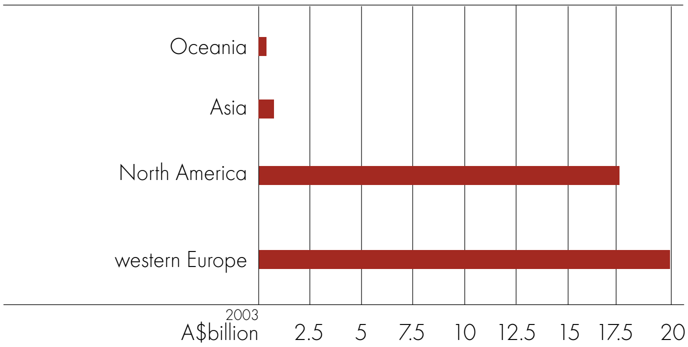
In 2003, there were an estimated 1511 certified organic farms in Australia (Halpin 2004). Around 72 per cent of these farms were involved in vegetable and fruit and nut production, around 22 per cent were involved in beef production and around 15 per cent were involved in the production of grains, including cereals, pulses and oilseeds (farms can be classified in more than one industry). This number of organic farms constitutes around 1.2 per cent of the total farms in Australia. Willer and Yussefi (2006) estimated that there were 1832 organic farms in Australia in 2005-06, while the Biological Farmers of Australia (BFA) estimated that Australia had 2220 certified organic farms in 2004 (ACO 2004).

organic market

world

The world organic market is a niche market. Sales in 2005 are estimated to have reached A$44 billion. About 95 per cent of the market is in north America and western Europe, while Japan and Australia account for most of the remaining share (Willer and Yussefi 2007). The market share for 2003 is represented in figure B (Willer and Yussefi 2005).

fig B **market value of organic food and beverages, 2003**



While organic production is increasing in many countries, the main markets for organic products remain in the affluent developed economies. The United States has the largest market for organic products, estimated at A$16.5 billion in 2003. In Europe, most organic sales occur in Germany and the United Kingdom – in 2003 these markets were valued at A$5.4 billion and A$2.8 billion respectively. The Asian organic market was valued at A$0.8 billion in 2003, with Japan constituting the majority of this market. About 99 per cent of the Oceania organic market is in Australia – this market was valued at A$370 million in 2003 (Willer and Yussefi 2005). These markets account for the majority of organic sales; however, organic food constitutes only 1–3 per cent of total food sales in these markets (FAO 2001).

Global demand for organic products is increasing, with the greatest demand for organic products being observed in north America and western Europe. Demand in north America has grown strongly, at around 21 per cent a year in the five years to 2002. The organic markets in western European countries are also expected to continue to expand, though at highly variable rates estimated as low as 1.5 per cent to 11 per cent. Although they remain relatively small, the Australian and New Zealand organic markets are estimated to be growing at around 15 per cent a year (Willer and Yussefi 2004).

Australia

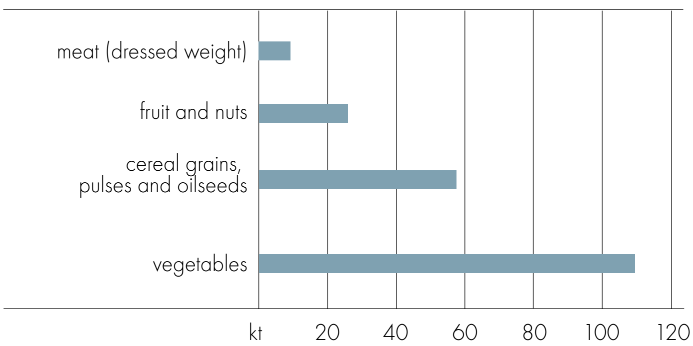
domestic market

The organic food and drinks market in Australia is a niche market. Sales of organic food and drink in Australia, at an estimated A$370 million in 2003 (Willer and Yussefi 2005), were equivalent to about 0.5 per cent of Australian retail food sales in that year. In 2003, vegetables were the most important products in volume terms, followed by cereals and then fruit and nuts (figure C; Halpin 2004).

imports

While Australia produces a range of organic products, imports of such products are an important source of supply. Australian imports of organic products were valued at A$13 million in 2003 (Organic Monitor 2004, cited in Halpin 2004). Half of the imports of organic food and beverages are in processed form and include biscuits, breakfast cereals, chocolate and pasta. Imports of nonfood items, such as organic cotton and personal care products, are also increasing. Most Australian imports of organic products come from New Zealand, the United States and the United Kingdom. Imports from the United States include soups, vinegar, rice drinks and tomato products, such as tomato sauce, tomato paste and pasta sauces. Organic imports from the United Kingdom include chocolate, biscuits and breakfast cereals, while New Zealand is an important source of organic kiwifruit, carrots and onions (Halpin 2004).

fig C **Australian certified organic production, 2003**



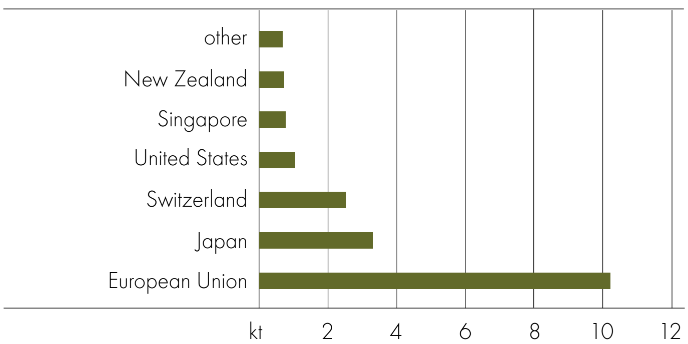
exports

Australian exports of organic products were valued at an estimated A$50 million in 2000 (Australian Trade Commission 2006). Australia mainly exports organic products to the European Union, Japan, Switzerland and the United States. In the period 2001–03, over 50 per cent of Australia's exports of organic products were destined for the European Union and around 17 per cent for Japan, while Switzerland accounted for 13 per cent. Only about 5 per cent of Australia's organic product exports went to the world's largest market for organic products, the United States (figure D; AQIS 2006).

According to export data provided by the Australian Quarantine and Inspection Service (AQIS), the volume of organic product exports varied significantly during the period 2001–03. The greatest volume (37 470 tonnes) was exported in 2001. In 2002, export volumes dropped to 16 195 tonnes. In 2003, Australia exported only 409 tonnes of organic products. This substantial drop in the volume of organic product exports was caused mainly by drought.

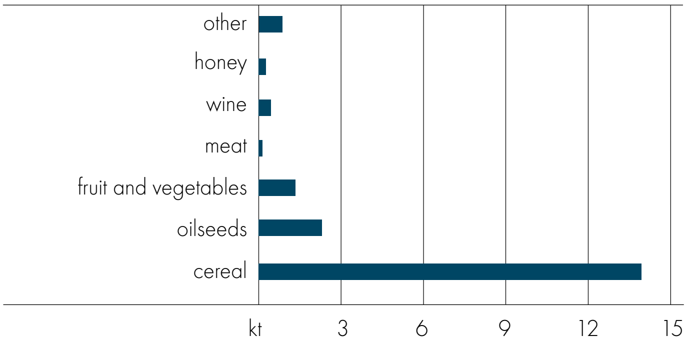
Cereal grains, mainly wheat, averaged over 70 per cent of the volume of Australian organic exports during the period 2001–03 (figure E; AQIS 2006). About 10 per cent of the volume of organic exports during that period was oilseeds and oilseed products, mainly sunflower and canola seeds and oil. Fruit and vegetable exports accounted for 7 per cent of the total, while meat and wine accounted for 3 per cent of the volume of certified organic exports; honey accounted for 1 per cent (AQIS 2006).

fig D **destination of Australian organic exports**
annual average 2001 – 03



Over half of Australia's exports of organic cereals were destined for the European Union, while Switzerland and Japan each accounted for around 20 per cent. The European Union was also the main destination for Australian organic oilseed products, taking about 60 per cent of the total. The second most important destination for Australian organic oilseed products was the United States, which accounted for about 30 per cent of exports (AQIS 2006).

fig E **Australian organic exports, by commodity**
annual average 2001 - 03



About half of Australia's organic fruit and vegetable exports were destined for Singapore, about 30 per cent were shipped to the European Union and about 10 per cent to the United States. Approximately, 40 per cent of exported Australian organic meat was shipped to Japan, about 30 per cent to the European Union and 15 per cent to the United States (AQIS 2006).

About 95 per cent of exported Australian organic wine went to the European Union. The European Union was also the main destination for Australian organic honey, with the United Kingdom and Germany being important markets for these exports. Those two countries purchased almost 70 per cent of total Australian organic honey exports.

price premiums

Price premiums for organic produce are an important consideration in assessments of the potential impact of GMOs on the organic agriculture sector. Organic price premiums are necessary to encourage the shift from conventional production methods to organic production methods.

If a product is organically produced, but cannot be marketed as organic, the producer will generally be forced to accept the price that is offered for the conventionally grown product. Where the presence of GM material in organic products results in the suspension of organic certification for those products the loss of the organic price premium constitutes a direct cost to the producer. Costs of this nature are discussed in greater detail in chapter 4.

Price premiums for organic products are likely to be a reflection of growing demand for such products combined with differences in supply costs between organic and conventional products. In the case of organic farm producers, price premiums provide the necessary incentive to meet the requirements of certification and to recoup higher unit costs of production.

Although there is a general lack of publicly available data on prices for organic products, some limited data are available. One study has found that the price premium for organic products is generally 20–40 per cent of the price of the conventionally produced alternative (FAO 2001).

A more recent study shows that the price premium for organic products varies over time, between countries and between products. For example, the farmgate price premium for organic broccoli in the United States in the period 2000–04 is estimated to have varied between 99 and 133 per cent, and the premium for organic carrots at between 75 and 117 per cent (Oberholtzer, Dimitri and Greene 2005). The price premium for organic products in Japan also varies significantly, but generally is between 20 and 30 per cent (FAO 2001).

table 1 **minimum and maximum farmgate price premiums for organic food, European Union, 2001**

		minimum		maximum
		%		%
wheat	Italy	19	Netherlands	189
apples	Italy	2	Denmark	333
potatoes	Sweden	71	Italy	239
pork	Germany/Austria	45	Netherlands	132
beef	Denmark	17	Spain	190
eggs	Austria	25	Great Britain	329
milk	Denmark	19	Great Britain	129

Source: European Commission (2005).

EU price premiums for organic products at the farmgate in 2001 ranged from 2 to 333 per cent (table 1). Generally, price premiums are smaller in countries where the organic market is relatively well developed, such as Austria, Denmark, Sweden and Italy (EC 2005).

On the Australian domestic market, organic produce can receive a substantial price premium at retail. For example, in 1999 and 2000, organic cereals and livestock products were estimated to attract a premium of 50–75 per cent, while fruit and vegetables were estimated to attract a premium of 50–60 per cent (Willer and Yussefi 2005). One study reported that the average retail price premium in Australia for organic food products in 2003 was 80 per cent (Halpin 2004). The study found price premiums greater than 100 per cent for wholemeal flour, muesli, olive oil, spaghetti, beans, zucchini, carrot, hard cheese and minced beef.

The fact that price premiums are obtainable in the organic market is an indication that consumers in this niche market value organically differentiated products more highly than conventional products. Among the drivers of consumer demand for organic products are health concerns related to conventional production methods and biotechnology in agriculture (FAS 2000). Hence, the expansion of domestic GM cropping may strengthen domestic demand and returns for organic products, especially if producers are not able to segregate conventional and GM outputs. At the same time, some exporters of Australian organic products are concerned that Australian organic products will be perceived to be less attractive in export markets if they are produced in an agricultural environment that also contains commercial GM crops. This perception could reduce returns to growers.

3

treatment of GMOs in organic standards

In order to market certified organic products in Australia, producers must meet Australian organic standards. Similarly, if Australian producers wish to export their products as certified organic, they must meet the standards that apply in the relevant export market. If a producer has products marketed in more than one trade jurisdiction, compliance with the standards in those jurisdictions is likely to be important. For example, if a domestic producer can market their product as organic both in Australia and export markets under the same organic standards, they will face no additional production costs associated with meeting the standard required of exports. An overview of the certification standards of most importance to Australian organic producers is provided in box 1.

While the possibility of further commercialisation of GM crops in Australia provides a reason for examining the treatment of GMOs under domestic organic standards, the fact that Australia engages in international trade in organic products provides motivation for comparing the treatment of GMOs under Australian organic standards and the organic standards of Australia's main organic trade partners.

box 1 **certification standards in Australia and Australia's main organic trade partners**

Organic certification of agricultural products is an indicator that those products meet a certain organic production standard. Certification plays an important role in domestic and international trade. It is a means by which organic products are differentiated from conventionally produced and GM products and is a signal to consumers that a price premium is likely to apply to the product. Organic certification also reduces transaction costs for marketers and consumers by providing a recognisable and consistent signal that the product has been produced according to a process that meets well defined standards. This signal means that the organic attributes of these products do not have to be specified for each transaction (Dimitri and Oberholtzer 2005).

continued...

box 1 **certification standards in Australia and Australia's main organic trade partners** *continued*

The standards that underpin organic certification are typically process based. The standards do not specify the characteristics of organic products, but specify the characteristics of the methods by which the products are grown, harvested, processed, packed, stored and shipped. The standards may also stipulate how organic products are labelled.

Regulation of certified organic production occurs at international, national and subnational levels. At the international level, the International Federation of Organic Agriculture Movements first published an organic standard in 1980 (IFOAM 2002), while the Codex Alimentarius Commission developed international guidelines for organic production in 1999 (FAO 2003). These documents provide a framework for certification bodies and organisations setting standards around the world to develop their own certification standards. The frameworks define the minimum requirements for organic certification (IFOAM 2005).

Some countries, including Japan, the United States and the European Union, have introduced organic standards that are regulated by law. In other countries, such as Canada, governments provide guidelines for organic certification, while in some countries there are no specific standards governing organic certification.

A number of different organic standards are potentially relevant to Australian organic producers, depending on where they intend to market their products. The linkages between the main certification standards in Australia and in Australia's main organic export destinations are vitally important to Australian producers' access to export markets.

Australia

Australia has a regulated organic certification system that applies only to exports of certified organic products and a voluntary system of certification for domestically marketed organic products.

The export certification system is an industry and government co-regulatory system. Under this system the Australian Quarantine and Inspection Service (AQIS) accredits organisations that are authorised to certify organic and biodynamic produce destined for export (Halpin 2004). Under this system, organic products are certified according to the Australian National Standard for Organic and Biodynamic Produce (OIECC 2005). The Australian National Standard forms the certification basis for equivalency agreements between Australia and some other countries. In particular, this facilitates Australian trade in certified organic products with the European Union. Japan and the United States do not recognise the Australian National Standard

continued...

box 1 **certification standards in Australia and Australia's main organic trade partners** *continued*

– they accredit Australian certifying bodies that are then able to certify Australian exports as meeting the national standards in those countries.

Seven bodies are accredited to certify Australian organic exports, the largest of these in volume terms are the Biological Farmers of Australia (which has a certifying arm called Australian Certified Organic) and the National Association of Sustainable Agriculture Australia. Other accredited certifying bodies are: the Biodynamic Research Institute, the Organic Food Chain of Australia, the Organic Growers of Australia, Safe Foods Queensland, and Tasmanian Organic Products (May and Monk 2001; Safe Foods Queensland, personal communication, 2006).

In addition to certifying organic products for export under the Australian National Standard, these organisations also certify domestically marketed products under their own standards, which are at least as stringent as the Australian National Standard (McCoy and Parlevliet 2001).

European Union

Labelling of agricultural and food products as organic in the European Union is governed by regulations (EEC) no. 2092/91 and (EC) no. 1804/1999. These regulations set the basic requirements for organic production, labelling and marketing in the European Union. Each member state is responsible for interpreting and implementing the rules, as well as enforcement, monitoring and inspection. Since December 2005, a consistent mark of identification for organic products has been compulsory (Dimitri and Oberholtzer 2005).

The European Commission has established a list of countries that have organic standards equivalent to the EU standard, meaning that certified products from those countries can be marketed as organic in the European Union without the need for additional certification or accreditation (FAO 2001). The Australian National Standard is recognised as equivalent to the EU standard, which means the European organic market is accessible to Australian products without additional certification.

United States

The US National Organic Standard (NOS) was implemented in 2002. Certifications under the NOS are conducted by certification agencies accredited by the US Department of Agriculture (USDA 2005).

Although the Australian National Standard has not been recognised as equivalent to the NOS, certifications under both the Biological Farmers of Australia and the National Association of Sustainable Agriculture Australia standards are recognised by the US Department of Agriculture as being equivalent to the NOS. This allows

continued...

box 1 **certification standards in Australia and Australia's main organic trade partners** *continued*

these two organisations to certify organic exports with the NOS certification mark (USDA 2006).

Japan

In April 2001, the Japanese Agricultural Standard (JAS) was amended to include updated criteria for organic certification (Ito 2004). The JAS organic requirements are based on the Codex guidelines for organic agriculture. According to this standard all products labeled as organic must be certified by a Registered Certification Organisation and must display the JAS logo and the name of the certifying organisation (FAO 2001).

In March 2006, changes to the JAS initiated the requirement for Registered Certifying Organisations to apply for accreditation under the amended JAS. Previously accredited organic certifying organisations are able to continue to certify existing product streams and producers until the end of 2007. The Biological Farmers of Australia certifying body, Australian Certified Organic, is the only Australian organisation currently accredited by the Japanese Ministry of Agriculture, Forestry and Fisheries under their new accreditation regime. The National Association of Sustainable Agriculture Australia and the Organic Food Chain of Australia are able to certify exports under their pre-existing accreditation and have also applied for accreditation under the new accreditation regime (AQIS 2006; NASAA 2006; OFC 2006).

GMOs in organic standards

A comparison of the standards for certified organic production in Australia, the United States, the European Union and Japan, as well as the international standards and guidelines, indicates that all adhere to the same principles and general criteria for organic production. Although this observation can be made generally, there are some specific differences between the standards in terms of how they deal with synthetic inputs such as herbicides and pesticides, veterinary medical products and GMOs.

Given the possibility that Australian agriculture could significantly increase its utilisation of GMOs in the future, the treatment of GMOs under the various organic standards is important for the future of Australia's organic exports.

Generally all seven standards (Australian National Standard, Biological Farmers of Australia standard, National Association of Sustainable Agriculture Australia standard, EU standard, US standard, Japanese standard, Codex standard) analysed in this report prohibit the intentional use of GMOs in organic production and seek to minimise the unintentional or adventitious presence of GMOs in certified organic products. While the standards are based on the same principle of zero tolerance to GMOs in organic production, there are some specific differences between standards that are potentially important. Appendix A contains GMO related excerpts from the organic standards. The Codex standard is included in the following comparison of standards as it provides a global standard that may form the basis of national standards yet to be developed in potential Australian organic export destinations.

use of GM seeds in organic production

The use of GMOs and GMO derivatives in seed for sowing is prohibited in all seven standards. In addition, the Codex standard, the three Australian standards and the EU standard specify that seeds for sowing for organic production should be from plants grown in accordance with organic production criteria for at least one generation and in the case of perennial crops, for two growing seasons.

treatment of GMOs in animal feed

The use of GM products and their derivatives in animal feed is prohibited in the Australian National standard, the BFA standard, the National Association of Sustainable Agriculture Australia (NASAA) standard and the Codex and EU standards. The draft Japanese standard for organic livestock production prohibits the use of GMOs produced using recombinant DNA techniques, as livestock feed.

While the US standard does not include any specific reference to the treatment of GMOs in animal feed, it clearly specifies that the use of GMOs in any aspect of organic production is prohibited.

use of veterinary medicines derived from GMOs

All three Australian standards and the EU standard specifically prohibit the use of GMOs and their derivatives in veterinary medical products. The Codex, United States and Japanese standards do not include any specific reference to the treatment of GMOs in veterinary products, but these standards clearly specify that the use of GMOs in any aspect of organic production is prohibited.

In the interests of animal welfare, all the standards allow veterinary use of prescribed drugs or antibiotics when treatments permitted under organic certification standards are ineffective. After treatment with veterinary medicines prohibited under the organic standards, products from those livestock cannot be sold as organic.

parallel genetically modified and organic production

All three Australian organic standards specify that GM crops and livestock are not permitted under a parallel production system on an organic farm. A parallel production system is one in which certified organic farming methods and conventional methods are applied on the same farm. Parallel systems are usually only permitted when a farm is converting to certified organic production methods. The other standards do not clearly specify their treatment of GMOs under parallel production systems.

buffer zones

The NASAA and BFA organic standards specify a 10 kilometre zone around organic crops, within which any GM crop is deemed to pose a risk of transferring GM material to the organic crop. This is in contrast to the buffer zone measures for other prohibited substances, for which minimum distances of 5 metres and 15 metres respectively are stipulated. The Australian National Standard does not specify buffer zones for crops, but does specify that organic honeybee hives must be sited at least 5 kilometres from any GMOs or their products. The NASAA and BFA organic standards also specify that honeybee hives must be sited at least 5 kilometres from conventional agriculture sources of nectar and pollen, GM crops and other possible sources of honey contamination such as urban areas and waste sites.

The US standard does not specify the size of the buffer zones that are required to minimise the risk of contact with prohibited substances. However, it does stipulate that buffer zones must be sufficient in size or have other features, such as windbreaks, to prevent the possibility of unintended contact with prohibited substances applied to land adjacent to a certified organic operation. The EU standard does not specify buffer zone distances for crop production, but does specify that beehives used for organic honey production should be sited such that pollen, nectar and honeydew sources within a 3 kilometre radius of the hive conform to the organic standard. The Japanese organic standard does not specify buffer zone distances.

The Codex standard does not address buffer zones for crops, but does stipulate that the relevant certification body must identify zones where honeybee hives should be placed, to avoid potential contact with prohibited substances, GMOs or environmental contamination.

conversion period

All seven organic standards examined for this report specify a two or three year conversion period for farms converting from conventional to organic production. During this period, production methods must be in accord with the certification standards, but products cannot be marketed as organic – they must be marketed as either 'in-conversion' or as conventional products.

Under the NASAA and BFA organic standards and the Australian National Standard the period to convert from GM production to organic production is five years. The EU, US, Japanese and Codex standards do not specify a separate requirement for the conversion period from GM cropping to organic production.

unintended presence of GMOs in organic production

current standards

While all seven standards examined for this report stipulate zero tolerance for the intentional use of GMOs in certified organic production, they are generally less clear in their treatment of the unintentional presence of GMOs in organic products.

The treatment of unintentional presence of GMOs in organic production is an important issue as the increasing use of GM crops increases the risk that organic crops will contain GM material. This material is most likely to enter organic crops through pollen drift from neighbouring fields, commingling during harvest and post-harvest handling or as a result of GM material in organic seed stock.

Generally, the standards refer to the adventitious or unintentional presence of GMOs in terms of the principle of minimising the risk of contact, but they do not provide specific guidelines to follow in order to minimise the unintentional presence of GM material in organic products. In keeping with the process based criteria for organic certification, the overseas standards examined do not generally require that organic products be tested for the presence of GM material unless there is a reason to believe that organically produced products came into contact with prohibited substances.

The NASAA and BFA standards differ from the other standards analysed for this report, in that they do stipulate that testing of organic products for the presence of GM material should occur when there is an identified risk that contamination may occur. In addition, these standards provide some guidance on what constitutes a risk of unintended presence of prohibited material, although the standards are not comprehensive in that regard (appendix A). These standards, as well as stipulating that organic products that contain GM material should not be certified organic, also stipulate that the producer of those products may have their organic certification withdrawn if that is deemed appropriate by the certifying body.

The stringency of the Australian standards potentially disadvantages Australian producers, who may face the costs associated with the loss of organic status for their products and their farms, under circumstances in which their international competitors face no such cost. This potentially reduces the trade competitiveness of the Australian organic sector.

None of the standards stipulate an allowable threshold for the unintended presence of GMOs in organic products. Although the EU standard allows for the establishment of a maximum allowable level for the unintentional presence of approved GM material in organic products, no threshold has yet been established.

The treatment of GMOs under the standards is significantly different from the treatment of other prohibited substances such as petrochemical pesticides and herbicides. The unintentional presence of other substances prohibited in organic production is generally allowed, provided certain low threshold levels are not exceeded — usually 5–10 per cent of the relevant food standard maximum residue limit. Not only is the absence of a tolerated level of unintentional presence of approved GMOs an inconsistency in the organic standards' treatment of prohibited substances, it is also a potentially costly stance. This issue is discussed further in chapter 4.

proposed changes

In keeping with the EU standard's provision for a threshold for the unavoidable presence of approved GM material in organic products, the European Commission has proposed a regulation that introduces such a threshold. The proposal is for a 0.9 per cent threshold for the adventitious presence of approved GM material in organic products and a 0.5 per cent threshold for approved GM material in organic seeds for sowing (European Commission 2005). If accepted, this proposal would align the treatment of the unavoidable presence of approved

GM material in organic products and conventional products in the European Union. It would mean, if the presence of the approved GM material in the organic product was unavoidable, if the threshold was not exceeded, and if the approved GM material were approved in the European Union, that the organic status of the product would be retained. The implications of nonzero thresholds for the adventitious presence of GMOs in organic products are discussed in the next chapter.

4

impacts of GM canola on Australian organic producers

As noted in chapter 1, Australia has commercial GM cotton and carnation crops, but has no commercial GM crops grown principally for food or feed. Despite several varieties of GM canola having been approved for commercial planting by the Office of the Gene Technology Regulator, no GM canola has been planted on a commercial scale in Australia because of state and territory government moratoriums. Approval to commercialise a GM food crop in Australia, added to the rapid global uptake of GM crops, presents a strong possibility that GM food and feed crops may be grown in Australia in the future (Apted et al. 2005).

The current standards for certification of organic production (as detailed in chapter 3 and appendix A), and overseas experience of the coexistence of GM, conventional and organic crops, suggest that an increase in the scale and scope of GM cropping in Australia, and elsewhere, may affect the organic sector. This is examined in this chapter.

Owing to a lack of Australian experience in the coexistence of GM and organic food and feed crops, and a relatively small body of Australian literature directly related to this subject, this report has drawn on overseas information sources. In particular, this report draws on the north American experience of coexistence of GM and organic crops (including canola) as well as a number of European studies on the potential impact of the commercialisation of GM crops (including canola) on conventional and organic agriculture.

To assess the potential impacts on the Australian organic sector of the commercialisation of GM canola, the potential costs and benefits that are likely to arise as a result of the introduction of GM canola are examined in this report. The costs and benefits are examined for different levels of acceptable adventitious presence of approved GM material in certified organic products – a zero tolerance level, such as applies in Australia currently, 0.5 per cent tolerance for seed for sowing and 0.9 per cent for organic products for consumption, as has been proposed for implementation in the European Union. The impacts of these adventitious presence thresholds are examined in case studies for the organic canola, beef and honey sectors.

overseas experience

north America

The north American experience of the coexistence of organic and GM crops has been mixed. In this section, the GM and organic coexistence experiences in Canada and the United States are summarised.

The Canadian organic canola experience, as detailed below, indicates that there are significant risks of organic canola products inadvertently containing GM material, especially when organic and GM canola crops are grown close together. These risks exist mainly in: contamination of seed for sowing; pollen drift from GM crops pollinating organic crops; commingling of organic and GM canola seeds at the harvesting, transport and storage phases of the supply chain; and commingling of materials in the processing phase.

The impacts of the commercialisation of GM canola have been subject to legal scrutiny in Canada. An action was brought against Monsanto and Bayer Cropscience in Saskatchewan, alleging that the introduction of GM canola had damaged the organic canola industry. The Court of Queen's Bench in Saskatoon found the allegations of damage were not proven – not only was no evidence proving damage tendered in the case, but there was evidence that the Canadian organic canola industry still existed despite the widespread adoption of GM canola varieties (Law Society of Saskatchewan 2005).

One recent study into the coexistence of organic, conventional and GM crops in north America concluded that it was not possible to determine the impact of GM canola on the production of organic canola in Canada. The study examined production trends and available evidence on the incidence of unintended presence of approved GM material in organic canola crops and the economic impacts of mitigation measures initiated by organic growers. The study found that organic canola was still produced in Canada, despite the widespread adoption of GM canola varieties. Although the production of organic canola had declined in recent years, the study found it was not possible to identify GM canola as the cause of the decline (Brookes and Barfoot 2004).

Canadian organic agriculture statistics show that around 860 hectares of organic canola was planted in 2005 (Macey 2006). This is around 0.02 per cent of US Department of Agriculture estimates of total Canadian canola area for 2004-05. The estimated peak in Canadian organic canola plantings is reported to have occurred in the late 1990s, when organic plantings peaked at 0.09 per cent of total Canadian canola plantings (Brookes and Barfoot 2004). This is equivalent to around 5000 hectares of organic canola, based on estimates of total Canadian canola (rapeseed) area contained in the US Department of Agriculture's production, supply and distribution database.

While the reduction in organic canola area in Canada is coincident with increased areas planted to GM crop varieties, it is clear that the area utilised for certified organic cropping is also increasing. The Canadian organic sector reported a 17.5 per cent increase in organic crop area in 2005, with the area of organic cereals growing by 16.5 per cent to 154 000 hectares. In addition, there were increases in the area of oilseeds (other than canola and soybeans) and strong growth in the size of the organic beef and broiler sectors, as well as in the number of organic beehives (Macey 2006). This suggests that the commercialisation of GM canola has not unduly hampered the development of these segments of the organic sector.

Another indication that broadacre organic farming has been able to survive despite the commercialisation of GM canola is the dominance of Saskatchewan in Canadian organic broadacre production. Saskatchewan is a major producing area of conventional and GM canola, accounting for around half of Canada's canola production in 2005 (Saskatchewan Agriculture and Food 2006; FAS 2006), while also accounting for 75 per cent of Canada's organic broadacre cropping area (Macey 2006).

The US experience of GM and organic crop coexistence has been mixed. A survey of 1034 US certified organic growers in 2002 found that cultivation of GMOs had affected a significant proportion of organic farms. Survey respondents indicated that they had implemented measures that were potentially economically costly, such as increasing buffer zone size (19 per cent of respondents), adjusting planting times (15 per cent) and changing cropping locations (9 per cent). A significant proportion of respondents (27 per cent) indicated that they had been asked to arrange GMO testing of either inputs or outputs, with 2 per cent of respondents reporting positive tests for unintended presence of approved GMOs (Walz 2004). The survey also asked respondents to indicate whether they had borne direct economic costs as a result of the existence of GMOs in agriculture. A relatively small proportion of respondents (8 per cent) indicated that they had – 4 per cent indicated that they had borne the cost of GMO testing, while 2 per cent indicated bearing the cost of lost sales (Walz 2004).

A recent study that reviewed trends in the production of organic corn and organic soybeans in the United States found that plantings had increased despite the adoption of GM varieties of these crops. The area planted to organic corn has increased from 17 000 hectares in 1997 to 38 000 hectares in 2001, while organic soybean plantings increased from 33 000 hectares to 71 000 hectares over the same period (Brookes and Barfoot 2004). However, the study was not able to quantify the impact of measures undertaken by organic producers to avoid GM material coming in contact with organic crops. It was also not able to determine whether the presence of GM varieties had constrained the growth in organic production or whether the presence of GM crops had motivated the increase in organic production as a result of increased demand for organic products. Despite the study's limitations, mainly the nonavailability of data, the authors concluded that organic, conventional and GM crops were successfully coexisting in the United States (Brookes and Barfoot 2004).

European Union

Although the European Union has little experience of commercial GM cropping, with the exception of GM maize principally grown in Spain (60 000 hectares in 2006) (SeedQuest 2007), the feasibility of coexistence of GM, conventional and organic crops has been the subject of a number of studies in Europe. As a result of the lack of data on the actual impacts of GM crops on conventional and organic crops, many of the studies have relied on simulations to estimate the potential impact of GM crops in European agriculture. A number of studies have examined the feasibility of and costs involved in having non-GM crops meet specific thresholds for the unintentional presence of GM material. These studies are reviewed below.

One European study examined the costs of organic rapeseed (hereafter referred to as canola) farms meeting 0.1 per cent and 0.3 per cent thresholds for the unintentional presence of GM material (Bock et al. 2002). The study simulated a number of different GM contact mitigation measures under two scenarios; the first being that 10 per cent of canola crops in the surrounding district were GM varieties and the second being that 50 per cent of the canola crops in the district were GM varieties. This study found that, in the European farming context, it would be possible for producers of both organic canola certified as seed for sowing and organic canola for oil, to produce crops that complied with the thresholds. The study estimated that to achieve compliance, changes to farming practices would be necessary – these changes were estimated to cost 194 euros per hectare. The study also examined the costs associated with monitoring non-GM crops for the presence of GM material. It was estimated that a monitoring system suitable for a small farm growing organic canola under a GM adventitious presence tolerance threshold of 0.1 per cent would cost 112 euros per hectare. With indicative insurance costs of 39 euros per hectare, the overall cost to organic canola producers of remaining below the 0.1 per cent threshold for the unintentional presence of GM material was estimated to be 345 euros per hectare – equivalent to 35 per cent of the typical organic canola gross margin, or 20 per cent of the farmgate price for that crop (Bock et al. 2002). Interestingly, the estimated costs under the 0.3 per cent threshold were estimated to be the same as under the 0.1 per cent threshold for the same farm size.

Given that it might not be possible to guarantee freedom from GM material if GM varieties are grown in the vicinity of non-GM varieties and given that 0.1 per cent was the practical lower limit of detection of the presence of GM material at the time of the study detailed above, these estimates provide an indication of the cost of producing a European organic canola crop that is approximately free of the unintentional presence of GM material (Bock et al. 2002).

A Danish study into the viability of organic and GM crops coexisting under Danish conditions came to similar conclusions. The study considered farms with average fields of 5 hectares, under a range of scenarios for the level of GM crop adoption. The study assessed the economic costs of maintaining a level of unintentional presence of GM material in organic crops below the level of detection –around 0.1 per cent. The authors of the study concluded that GM and organic crops could successfully coexist, with an 11 per cent increase in average production costs for organic canola. Additional costs for organic maize silage were calculated at around 1.5 per cent of the average production costs for conventional maize silage (in the absence of GM maize), the same as the additional costs estimated for organic cereal production. The additional costs for certified seed production were calculated to be lower than for production destined for food and feed; and for some crops (including field beans and lupins) there were no additional costs (Tolstrup et al. 2003).

If the proposal to establish a 0.9 per cent acceptance threshold for the unintentional presence of approved GM material in organic products is accepted in the European Union, the costs detailed above would be expected to fall. This is because less stringent standards typically require less stringent mitigation measures to be adopted; and these measures are typically less costly.

potential costs and benefits in Australia

The potential costs and benefits that Australian organic producers might face if a GM food crop were commercialised in Australia are discussed below. The potential costs and benefits for Australian organic producers will be examined more specifically in the case studies discussed later in this chapter. The case studies analyse the potential impacts of the commercialisation in Australia of GM canola on the Australian organic canola, beef and honey sectors.

potential costs

The potential costs faced by organic producers if GM canola were commercialised in Australia can be categorised as:

- the costs associated with avoiding the presence of GM material in organic products
- the costs associated with GM material being present in organic products.

avoidance costs

Avoidance costs are dependent on the particular circumstances of organic producers, especially the types of product that they market and the level of risk of GM material being unintentionally present in their farm outputs. These costs also depend on the permitted level of adventitious presence of approved GM material in organic products.

For crop producers, typically, avoidance costs are related to avoiding sowing seed containing GM material, avoiding pollination by GM pollen in the flowering phase of crop growth, avoiding commingling of organic seeds with GM seed residues in farm equipment and avoiding commingling in storage and transport of crops.

For livestock producers, GM avoidance costs are likely to be encountered mainly in ensuring that fodder crops and stock feeds do not contain GM material. Livestock producers also need to be alert to the possibility that veterinary medicines may contain or be derived from GMOs. Producers of organic products such as honey may face additional costs in avoiding the unintentional presence of GM material from inputs such as pollen.

costs of GM material in organic products

These costs are associated mainly with the loss of sales premiums as a result of having to market products as either conventional or containing GMOs, rather than marketing as certified organic. There may also be costs associated with removing GM material (where that is feasible) and there may be costs associated with marketing organically grown products if organic certification is suspended for all or part of an organic farm. The detection of unintentional presence of GM material in organic products would be expected to lower the profitability of organic enterprises.

The issue of who should meet costs associated with the unintentional presence of GM material is the subject of debate. In Australia, it has been argued that some costs may be recoverable as compensation from GM producers under existing Australian law. For example, it has been argued that cleanup costs and loss of organic premiums might be easily recoverable, but other costs might be more difficult to quantify and therefore more difficult to recover (Lunney 2004). This issue is yet to be tested in Australian courts.

potential benefits

Potential benefits to certified organic agriculture from the adoption of GM crops are rarely identified in the literature. It is possible that there could be environmental effects from the commercialisation of GM crops that could benefit the organic sector. For example, if the use of GM crops resulted in either the use of less persistent agricultural chemicals or a reduction in the volume of agricultural chemicals used, it is possible that organic producers might benefit from needing to implement less costly agricultural chemical contact avoidance measures.

case studies – potential impact of GM canola adoption

organic canola sector

In general, Australian organic standards place the onus of avoiding contact with prohibited substances on growers. The measures expected to be used to avoid prohibited substances entering the organic production process include obtaining guarantees of the organic status of seeds and other brought-in inputs, establishing buffer zones and windbreaks, establishing physical barriers to avoid contact with prohibited substances, cleaning of shared farm equipment, and inspection and cleaning of transport equipment and storage facilities. These criteria relate to contact with all prohibited substances, including GMOs.

To determine the impact of the adoption of GM canola on the production and marketing of organic canola in Australia, it is necessary to identify the additional measures, if any, that producers must implement in order to satisfy the requirements of certifying organisations. At the farm level, the presence of GM crops in the same district as organic crops means that there can be a risk of the organic crop inadvertently containing GM material. This could occur through pollen flowing from GM crops or GM volunteer plants and from the unintentional presence of GM material in sown organic seeds.

The main measures suggested for minimising pollen flow from neighbouring GM crops are: establishing buffer zones and windbreaks, changing the location of plantings, changing planting times or planting varieties with different flowering times, or planting different crops. Controlling volunteer plants in subsequent crops requires farmers to be able to identify the volunteers. In the case of the commercialisation of GM canola in Australia, this may mean that, in order to identify and eradicate GM volunteers, organic farms may not be able to plant canola for a number of years following GM crops being grown on neighbouring farms.

It is normal practice in organic cropping to establish buffer zones and windbreaks in order to protect susceptible land from windborne contamination by prohibited agricultural chemicals. It is also normal practice when growing seed for sowing that meet the criteria of seed certification schemes, to isolate seed crops with buffer zones and locate crops where they are unlikely to be exposed to pollen drift from similar crops. The actual costs of effective in-field contamination avoidance measures depend critically on the individual circumstances of the crop to be protected – quantification of these costs in the context of Australian organic agriculture is beyond the scope of this report.

Harvesting, transporting and processing also present opportunities for organic crop products to have contact with substances prohibited under organic certification standards. GM crops do not present a novel risk in these segments of the organic supply chain with respect to the commingling of organic and nonorganic crops.

Other costs that organic canola producers may face include those associated with testing crops for the presence of GM material. It is not possible to generalise the impact of testing costs, as the number and type of tests required is dependent on the individual circumstances of particular farms, the crops or inputs to be tested and the purpose of the test.

There may also be indirect effects faced by some certified organic farmers from the commercialisation of GM canola in Australia. Brassica crops such as canola have a beneficial effect on soil productivity in broadacre cropping rotations (Burnett 2006). Commercialisation of GM canola may increase the risk of unintended presence of GM canola in a non-GM variety used for crop rotation in organic farms. However, producers must use certified organic seeds, which would minimise this risk.

canola seed for planting

Producers of canola seed may be producing to sell the seed for oil production and/or to sell the seed for planting. The main organic standards in Australia do not differentiate between these end uses, but require all seed to be produced according to organic standards.

Despite the lack of differentiation in the end uses of canola seed in the organic standards, the NASAA standard does stipulate that growers who sell seed for planting should accept a 'duty of care' that their seed is free of weed seeds, soil, seedborne disease and is true to type. This is similar to the requirement for producing certified seed under the OECD seed schemes. Under these schemes, certified seed production must be isolated in both time and space from potential contamination and high degrees of seed purity are required (OECD 2005).

Assuming organic seed producers follow seed production guidelines, such as the OECD seed schemes and the South Australian state seed certification scheme, it appears that those guidelines would be adequate to avoid nearly all contact with substances prohibited in organic production. In European agriculture, simulations show that it is possible to meet unintentional presence of GM material thresholds of 0.3 per cent and 0.1 per cent, mainly by ensuring that the seed canola crop is isolated in time and space from other canola crops. The methods of ensuring purity of certified seed crops are the same in both the presence and absence of GM crops, it is likely that, in order to meet a 0.5 per cent unintentional presence of GM material threshold, producers of organic seed for sowing would face no additional prohibited substance contact mitigation costs. Similarly, identity preservation and segregation measures for certified seed in the absence of GM crops are likely to remain effective in the presence of GM crops.

Under a regime of zero tolerance of GM content in organic seed, the outlook for producers of organic canola seed for sowing may be different from the situation under an accepted positive threshold. Under the NASAA and BFA standards for organic farming, organic crops, especially those susceptible to cross-pollination, that are grown within 10 kilometres of a GM crop that has the capacity to pollinate the organic crop, are deemed to be at risk of contact with GM material. In these circumstances, testing the organic crop for the presence of genetic material can be required prior to organic certification of the crop. If the test for the presence of GM material was positive, under Australian domestic standards, the crop would not be certified organic. This means that the crop would not attract the price premium normally associated with that organic crop.

Under a zero tolerance standard that defines any detectable presence of GM material as failure to comply with the standard, it appears that a small risk of failure to meet the standard would remain, despite the implementation of measures designed to produce seed to a high degree of purity.

canola seed for oil and meal

In order to avoid the unintentional presence of GM material and meet the zero tolerance for GM material standard, producers of organic canola seed for oil and meal would need to take the same precautions as those producing seed for sowing. However, in the case of organic seed for oil being certifiable with an unintentional presence of approved GM material up to 0.9 per cent as being proposed by the EU, some producer costs may alter.

The main cost changes are likely to be cost reductions associated with having reduced crop isolation distances and possibly reduced costs of removing volunteers from previous crops, compared with the case for producers of certified seed for sowing.

One Australian study of pollen-mediated herbicide tolerance in canola showed that, although canola pollen moved significant distances (up to 3 kilometres), the incidence of successful pollination of non herbicide tolerant flowers by herbicide tolerant pollen was low. Surveys of canola in large commercial canola fields revealed that the frequency of herbicide resistance in nonresistant crops was generally less than 0.03 per cent, even in nonresistant crops adjacent to herbicide tolerant crops (Rieger et al. 2002). No frequencies greater than 0.07 per cent were found. This suggests that, for large fields, there is a very small risk of non-GM canola crops containing levels of GM material greater than 0.9 per cent as a result of pollen flow.

The main conclusions from this analysis of the potential impacts of approved GM canola on organic canola are that meeting a zero tolerance criteria may be costly or impossible for some producers, but may entail minimal or no additional costs for other producers. The impacts will depend on a range of factors including farm size, neighbours' cropping decisions, wind and insect activity, and farm topography.

Conversely, meeting unintentional presence of approved GM material thresholds of 0.5 per cent for seed for sowing and 0.9 per cent for seed for oil and meal is likely to involve relatively small, or no, additional costs.

While the preceding discussion identifies the potential costs faced by growers of organic canola in the presence of GM canola, discussions with oilseed crushers in Australia indicate that there has been no certified organic canola oil produced in Australia for a number of years. Although a lack of data makes it difficult to determine the size of the organic canola sector in Australia with any certainty, information from oilseed crushers suggests the sector may no longer exist or may be a transient sector. The drought may also have adversely affected the growing of organic canola.

organic beef sector

The Australian national organic standards for beef production require that certified organic beef cattle be fed on certified organic feedstuffs. The NASAA and BFA standards both promote the principle that livestock operations should be self sustaining in terms of animal feed. Despite this principle, the standards allow for supplementary feed to be brought onto farms to provide a minor proportion of animal diets under normal circumstances. It is expected that these feeds would be locally sourced in most cases.

Canola potentially plays a part in the organic beef sector when it is available, with canola meal being a protein-rich feed for livestock. The adoption of GM canola in Australia could mean that previously available domestic certified organic canola meal sources may not be available as a result of the unintentional presence of GM material. As discussed above, it may be either impossible or costly to produce canola seed for oil and meal that complies with the criteria of zero GM content. If this was the case, it is likely that a different protein meal source, for example soybean meal, would be used in place of canola meal.

Studies of the role of canola meal in livestock diets suggest that, while canola meal is a good source of vegetable protein, soybean meal is a superior ingredient in cattle diets. In addition to soybean meal being an alternative source of protein, lupins and barley are good sources of vegetable protein widely grown in Australia (Brennan, Singh and Singh 1999; Lardy 2002).

Given that organic beef producers have comparable alternatives to organic canola meal as a feed ingredient if required, it appears that the absence of certified organic canola meal would have only a minor effect (if any) on certified organic beef producers.

As noted previously, information from Australian oilseed crushers indicates that no organic canola oil has been produced in Australia for a number of years. This means that there has been no domestic source of organic canola meal in the recent past and organic beef producers if required, have been using alternative organic feed ingredients. Hence, the commercialisation of GM canola is unlikely to have a direct impact on organic beef producers.

organic honey sector

The Australian National Standard, NASAA standard and BFA standard note the principle that hives should be located where bees will forage only on organically managed crops or on natural flora. They also stipulate that hives must be placed at least 5 kilometres from crops treated with pesticides that are prohibited under the organic standard, GM crops, urban areas, industrial areas and waste disposal sites.

The adoption of GM canola in Australia is likely to have virtually no effect on organic honey production. This is because GM canola is most likely to be planted as an alternative to conventional canola, which is also unsuitable for organic honey production. Planting a crop not permitted in organic agriculture in place of conventional canola, which for residue reasons cannot usually be grown in the vicinity of organic hives, would have no additional effect on organic honey production.

Although organic honey producing hives are unlikely to deliberately be placed in the vicinity of either GM or conventional canola crops, it is possible that pollen drift by wind or insects might lead to bees from an organic hive coming in contact with GM canola pollen. It is also possible that organic hives might inadvertently be placed within foraging distance of GM canola crops. Under these circumstances, organic honey may inadvertently contain traces of GM material.

The unintentional presence of GM material in organic honey is most likely to be caused by the presence of pollen grains in the honey. Studies of pollen in honey products show that most honey products contain less than 0.03 per cent pollen by weight, although concentrations as high as 1.5 per cent have been reported (Malone 2002). This suggests that, even in the case of the highest pollen counts in honey, unless the hive foraged mainly on GM plants, the level of GM material in honey would likely be below 0.9 per cent (the threshold for adventitious presence proposed by the European Union). This also suggests that if reasonable measures to avoid bees foraging on GM crops were implemented, such as identifying and avoiding potential sources of GM material, the levels of unintentional presence of GM material in organic honey are likely to be very low.

The conclusion from this analysis of the potential impact of GM canola on Australia's organic honey sector is that, under current standards, avoiding the unintentional presence of GM material in organic honey is not likely to cause organic beekeepers to face additional production costs.

5

concluding comments

This report highlights a number of important facts and issues in relation to Australia's organic agriculture sector, the treatment of GMOs in organic standards and the potential impact of GMOs on Australia's organic producers.

Australia's organic agriculture production sector is important as a source of niche products (mainly food) for consumers who value the opportunity to choose an alternative to conventional products. It is a sector that has been expanding rapidly, but it remains a niche sector. While data limitations prevent an accurate assessment of the size and value of the sector in Australia, it is estimated to have accounted for less than 1 per cent of the value of food purchases in Australia in 2003.

Globally, the organic agriculture sector is small relative to conventional and GM agriculture, despite rapid expansion of the sector in the recent past. The largest markets for organic products are in north America and western Europe. Trade opportunities for Australian producers exist, with some domestic organic enterprises specifically targeting niche export opportunities in Europe, the United States and Japan.

Organic standards in Australia and Australia's main organic export destinations are similar in their treatment of GMOs, although the Australian standards tend to be more stringent than those that apply in our export markets. This means that Australian certified organic products generally are able to meet the certification requirements for export and domestic marketing at the same time. Although this means that Australian certified organic products for export have no additional production costs compared with those for the domestic market, it may mean that production costs in Australia are higher than if producing only to meet the less stringent standards in export destinations.

One area in which the standards in Australia, the European Union, the United States, and Japan do differ is in their requirements for testing of certified organic products for the presence of GM material. The Australian standards generally require testing of organic products for the presence of GMO material when there is reason to suspect that the organic products have had contact with GM material. This is not generally a requirement under the standards applying in Australia's main organic export destinations. If GM food crops were commercialised in

Australia, this might mean that Australian organic food products could fail to meet the Australian standards although they would continue to meet the standards in the main export destinations.

While the standards examined for this report tend to treat GMOs consistently in terms of prohibiting their use and specifying measures to avoid organic products coming in contact with GMOs, the European Union has recently proposed an amendment to allow a nonzero threshold for the unintentional presence of approved GM material in certified organic products. If adopted, this would be likely to lead to a reduction in cost competitiveness in EU markets of certified organic products that were grown in the presence of GM crops under a certification system with zero tolerance for the unintentional presence of GM material.

In Australia there are currently two commercialised GM crops – cotton and carnations. The GM crop most likely to be commercialised next is canola. State government moratoriums currently prevent the commercial planting of GM canola in Australia. If GM canola were commercialised in Australia, the direct impacts on the Australian organic canola sector are likely to be negligible. The provisions under the Australian organic certification standards require that organic production is isolated from the production of nonorganic products, including GM canola .

The commercialisation of GM canola is expected to have minimal impact on the organic livestock industry. Organic standards stipulate that feed for organic livestock should be organic. The lack of evidence that certified organic canola has been crushed in Australia since 2003 suggests that certified organic livestock producers are not currently using organic canola meal as part of livestock rations, and could continue to use alternative feedstuffs. The impact on organic honey producers is also expected to be minimal as GM canola is most likely to be grown in areas that are not suitable for organic honey production.

While in this study it is concluded that the commercialisation of GM canola would be expected to have very little, if any, direct impact on these organic sectors in Australia, this conclusion does not extend to the potential impacts of commercialisation of other GM crops.

specific treatment of GMOs in organic standards – Australia

Australian National Standard for Organic and Biodynamic Produce	National Association for Sustainable Agriculture Australia (NASAA)	Biological Farmers of Australia, General Standard – primary production (BFA)
intentional use of GMOs – general provisions		
section 3.1.5 The use of products comprised of or derived from genetic engineering is prohibited.	**section 3.2** Organisms, which are derived from recombinant DNA technology, are genetically modified organisms and have no place in organic production and processing systems. Even where evidence of GMOs is not detected in finished organic products, the deliberate or negligent exposure of organic production systems or finished products to GMOs is outside organic production principles. **section 3.2.1** Genetically Modified Organisms or their derivatives are not permitted under this Standard for use in organically produced and/ or processed products. This includes, but is not limited to: seed, feed propagation material, farm inputs such as fertilisers and compost, vaccines and crop protection materials.	**section 4.2.11** GMO products and genetically engineered (GE) processes are prohibited in all aspects of organic production systems and products. This includes prohibition of GE seeds and propagation material. 'Genetic pollution' may be a reality in some instances, and control of this contamination source shall require similar means of risk management as for other contaminants. Contamination detection in a given crop or product will lead to decertification of a given crop or product.
seed		
section 3.6.3 The use of genetically modified/engineered seed and transgenic plants or application of GMO derived substances for treating plants is prohibited in organic and biodynamic farming.	**see section 3.2.1**	**section 4.8.19** GMOs and their derivatives are prohibited in seeds. **section 7.2.17** Organic seed production shall not occur on sites where GMO seeds or crops have been produced within the past five years.

specific treatment of GMOs in organic standards – Australia *continued*

Australian National Standard for Organic and Biodynamic Produce	National Association for Sustainable Agriculture Australia (NASAA)	Biological Farmers of Australia, General Standard – primary production (BFA)
feed		
section 3.13.7 Use of GMO products and their derivatives in animal feed is prohibited.	see section 3.2.1	section 4.3.9 Feedstock shall be selected so as not to pose contamination risk on farm. This includes prevention of GMO feedstock into compost heaps on-farm.
veterinary medical products		
section 3.14.8 Caution must be applied when using allopathic veterinary drugs as some medications (especially vaccines) may contain GMO or GMO derived substances. Where such medications are derived from GMO production, the animal(s) and/or their produce will never regain in-conversion, organic or biodynamic certification status.	section 7.34.4 Vaccinations are permitted if diseases that cannot be controlled by other management techniques are known to exist in the region. Vaccinations are also permitted if they are mandatory under applicable legislation. Genetically engineered vaccines are prohibited.	section 4.8.19 GMOs and their derivatives are prohibited in vaccines used in livestock.
parallel production		
section 3.2.6 GMO products are not compatible with organic and biodynamic management practices and are not permitted under a parallel production system.	section 3.2.3 The certification of organic crops will be withdrawn where genetically engineered crops are grown on the same farm.	section 3.6.4 The production of GMO variety crops or stock shall not be allowed as a production activity on partially certified farm units.

specific treatment of GMOs in organic standards – Australia *continued*

Australian National Standard for Organic and Biodynamic Produce	National Association for Sustainable Agriculture Australia (NASAA)	Biological Farmers of Australia, General Standard – primary production (BFA)
buffer zones		
section 3.20.3 Operator must demonstrate that hive locations are in foraging areas more than 5 km distant from any prohibited substances which may be derived from, but not limited to: (a) flower-bearing crops that are treated with pesticides not permitted by this standard, or genetically engineered and/or modified organisms or their products; or (b) urban or individual activities; or (c) waste sites.	**section 3.2.10** Any certified production area within 10 km of a site used to grow genetically engineered crops is perceived to be at risk of contamination and certified operators must inform NASAA of any such sites known to be within the radius.	**section 4.8.18** Where cropping open pollinated or pollination contamination prone crops, identification of all GMO crops which may pose a risk – within a minimum 10 km radius from the certified operation – is required in the Organic Management Plan. This may require nonproduction of certain crops or similar risk management measures to ensure no GMO contamination.
conversion period		
section 3.1.12 Where genetically modified crops have been grown on a production unit, a minimum of at least five years must elapse before products grown or produced on said area can be certified according to this standard.	**section 3.2.8** Planting or sowing for organic production will not take place until five years after the harvest (or removal) of any genetically engineered crop that may have been planted on the land.	**section 4.8.17** The time period following the production of any GMO crops on coventionally managed operations shall at a minimum be 5 years prior to achieving organic certification for crops which may pose future contamination risk to certified areas.

specific treatment of GMOs in organic standards – Australia *continued*

Australian National Standard for Organic and Biodynamic Produce	National Association for Sustainable Agriculture Australia (NASAA)	Biological Farmers of Australia, General Standard – primary production (BFA)
risk assesment		
	section 3.2.7 Operator must conduct an assessment of risk from contamination with GMOs and take action where appropriate. These actions may include, but are not limited to: – knowing about contaminant risk; – implementing distances/buffer zones from potential contaminants; – implementing special handling, transport and storage arrangements; – maintaining samples; – testing of crops perceived at risk.	
unintended contamination		
section 3.1.9 Where product has been contaminated with non-permitted substances as a result of factors beyond the control of the certified operator, then: (a) chemical residue tests of the product must register below 10 per cent of the Maximum Residue Limit before the product can be sold as in-conversion, organic or biodynamic. (b) product subject to exposure from genetically modified organisms or their byproducts, must be excluded from sale as in-conversion, organic or biodynamic.	**section 3.2.11** Contamination of organic product by GMOs that results from circumstances beyond the control of the operator may alter the organic status of the operation.	**section 4.8.16** Residues or cross-contamination of GMOs into certified crops or produce is prohibited. Such residues shall deem crops or produce uncertifiable. Where there is known ambient risk of contamination of certified crops, residue testing shall be required to ensure no cross contamination has occurred, prior to sale of produce as certified.

specific treatment of GMOs in organic standards – Australia *continued*

Australian National Standard for Organic and Biodynamic Produce	National Association for Sustainable Agriculture Australia (NASAA)	Biological Farmers of Australia, General Standard – primary production (BFA)
chemical residue		
section 3.1.9 a Where product has been contaminated with non-permitted substances as a result of factors beyond the control of the certified operator, then: (a) chemical residue tests of the product must register below 10 per cent of the Maximum Residue Limit before the product can be sold as in-conversion, organic or biodynamic.	**section 3.1.3** Organic products sampled must not exceed 10 per cent of the maximum limit (ML) for chemicals for that product where historic contamination is present. Chemical residues that are detected at any level for a specified product that cannot be explained by historic practices will automatically disqualify the specified product from certification and may result in suspension and/ or decertification of the operator.	

specific treatment of GMOs in organic standards – international

United States	Japan	European Union	International
National Organic Standard (NOS)	Japanese Agricultural Standard (JAS)	Regulation (EEC) No. 2092/1991 Regulation (EC) No. 1804/1999	Codex Alimentarius Standard
intentional use of GMOs – provisions			
section 205.2 Excluded methods A variety of methods used to genetically modify organisms or influence their growth and development by means that are not possible under natural conditions or processes and are not considered compatible with organic production. Such methods include cell fusion, microencapsulation and macroencapsulation, and recombinant DNA technology (including gene deletion, gene doubling, introducing a foreign gene, and changing the positions of genes when achieved by recombinant DNA technology). Such methods do not include the use of traditional breeding, conjugation, fermentation, hybridisation, in vitro fertilisation, or tissue culture.	No materials other than materials for preparation (excluding those manufactured using recombinant DNA technology) shall be used for management of harmful animals and plants or quality maintenance and improvement during the process of transportation, selection, preparation, washing, storage, packaging, etc.	**EC No 1804/1999, preamble para. 10.** Genetically modified organisms (GMOs) and products derived therefrom are not compatible with the organic production method; in order to maintain consumer confidence in organic production, genetically modified organisms, parts thereof and products derived therefrom should not be used in products labeled as from organic production.	**section 1, para. 1.5** All materials and/or the products produced from genetically engineered/modified organisms (GEO/GMO) are not compatible with the principles of organic production (either the growing, manufacturing, or processing) and therefore are not accepted under these guidelines.

specific treatment of GMOs in organic standards – international *continued*

United States National Organic Standard (NOS)	Japan Japanese Agricultural Standard (JAS)	European Union Regulation (EEC) No. 2092/1991 Regulation (EC) No. 1804/1999	International Codex Alimentarius Standard
seed			
	article 4 Seeds and seedlings to be produced without using recombinant DNA technology (meaning technology preparing recombinant DNA by connecting DNA through the breakage and reunion using enzyme transferring it into live cells, and proliferating it; being the same hereafter)6.	**EEC No 2092/91 (amended by EC No 1804/1999) article 6, para. 2** The organic production method implies that for seeds and vegetative reproductive material, the mother plant in the case of seeds and the parent plant(s) in the case of vegetative propagating material have been produced: (a) without the use of genetically modified organisms and/or any products derived from such organisms.	
feed			
	article 4 Feed obtained through DNA recombination technologies shall not be used in organic production.	**EEC No 2092/91 (amended by EC No 1804/1999), annex 1, part B, para. 4.18** Feedingstuffs, feed materials, compound feedingstuffs, feed additives, processing aids for feedingstuffs and certain products used in animal nutrition must not have been produced with the use of genetically modified organisms or products derived therefrom.	**annex 1, part B, para. 18** If substances are used as feedstuffs, nutritional elements, feed additives or processing aids in the preparation of feedstuffs, the competent authority shall establish a positive list/s of substances in compliance with the following criteria: General criteria c) such substances: – do not contain genetically engineered/ modified organisms and products thereof.

specific treatment of GMOs in organic standards – international *continued*

United States	Japan	European Union	International
National Organic Standard (NOS)	Japanese Agricultural Standard (JAS)	Regulation (EEC) No. 2092/1991 Regulation (EC) No. 1804/1999	Codex Alimentarius Standard
veterinary medical products			
		EEC No 2092/91 (amended by EC No 1804/1999) article 6, para. 1 The organic production method implies that for the production of products referred to in Article 1(1)(a) other than seeds and vegetative propagating material: (d) genetically modified organisms and/or any product derived from such organisms must not be used, with the exception of veterinary medicinal products.	

specific treatment of GMOs in organic standards – international *continued*

United States National Organic Standard (NOS)	Japan Japanese Agricultural Standard (JAS)	European Union Regulation (EEC) No. 2092/1991 Regulation (EC) No. 1804/1999	International Codex Alimentarius Standard
buffer zones			
section 205.2 An area located between a certified production operation or portion of a production operation and an adjacent land area that is not maintained under organic management, a buffer zone must be sufficient in size or other features (eg, windbreaks or a diversion ditch) to prevent the possibility of unintended contact by prohibited substances applied to adjacent land areas with an area that is part of a certified operation.		**EEC No 2092/91 (amended by EC No 1804/1999), annex 1, part C, para. 4.2** The siting of the apiaries must: (a) ensure enough natural nectar, honeydew and pollen sources for bees and access to water; (b) be such that, within a radius of 3 km from the apiary site, nectar and pollen sources consist essentially of organically produced crops and/or spontaneous vegetation, according to the requirements of Article 6 and Annex I of this Regulation.	**annex 1, part B, para. 64** The certification body or authority must identify zones where hives, that meet these requirements, should not be placed due to potential sources of contamination with prohibited substances, genetically modified organisms or environmental contaminants.
unintended contamination			
		EEC No 2092/91 (amended by EC No 1804/1999) article 13 The following may be adopted in accordance with the procedure laid down in Article 14: – implementation measures according to scientific evidence or technical progress to apply the	

specific treatment of GMOs in organic standards – international *continued*

United States	Japan	European Union	International
National Organic Standard (NOS)	Japanese Agricultural Standard (JAS)	Regulation (EEC) No. 2092/1991 Regulation (EC) No. 1804/1999	Codex Alimentarius Standard
unintended contaminations *continued*			
		prohibition on the use of GMOs and GMOs derivatives with regard, in particular, to a de minimis threshold for unavoidable contamination which shall not be exceeded.	
chemical residue			
section 205.671 When residue testing detects prohibited substances at levels that are greater than 5 per cent of the Environmental Protection Agency's tolerance for the specific residue detected or unavoidable residual environmental contamination, the agricultural product must not be sold, labelled, or represented as organically produced. The Administrator, the applicable state organic program's governing state official, or the certifying agent may conduct an investigation of the certified operation to determine the cause of the prohibited substance.			

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