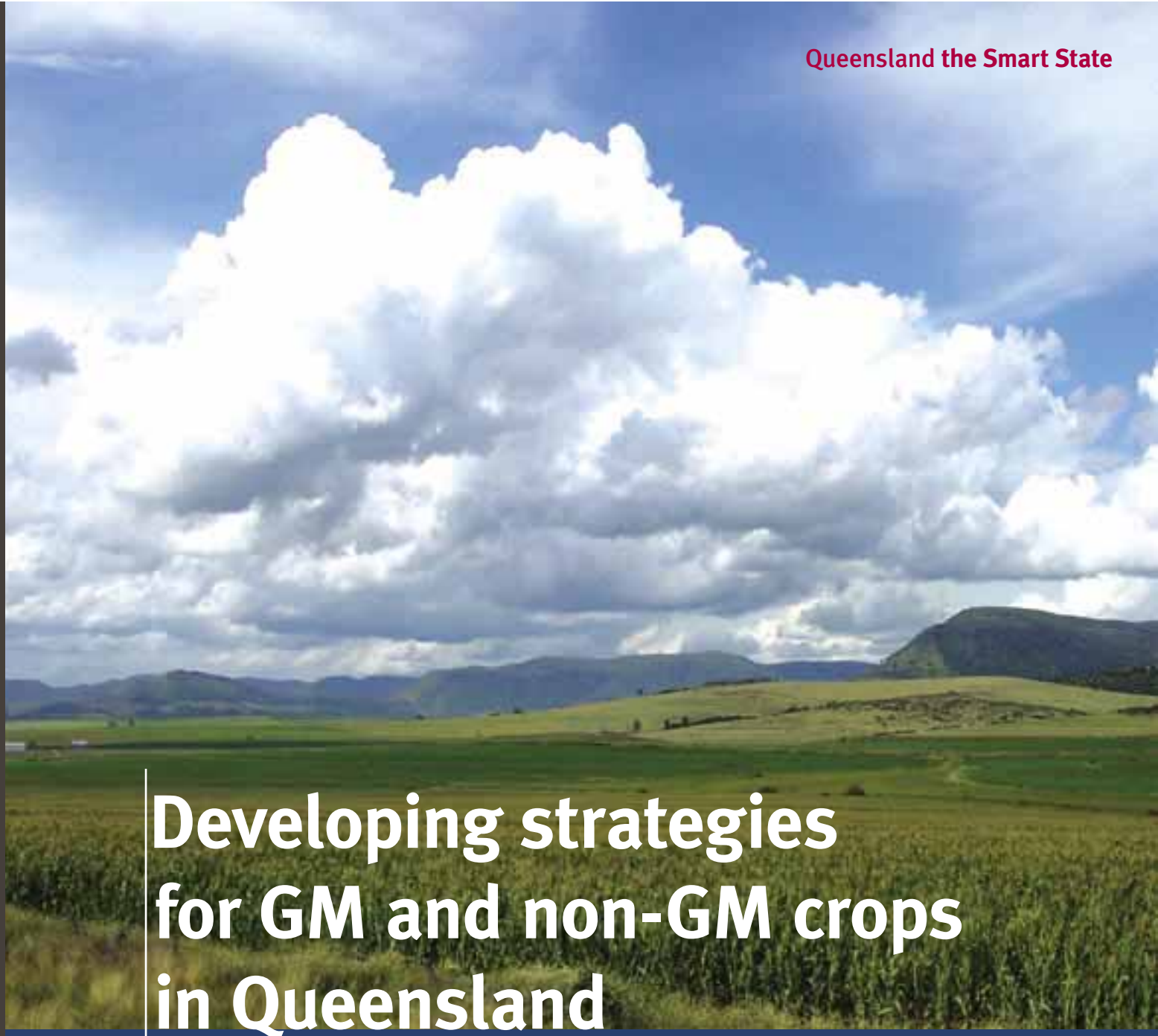

Queensland the Smart State

Developing strategies for GM and non-GM crops in Queensland

A framework for co-existence

October 2005

Queensland Government
Department of Primary Industries and Fisheries

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The Department of Primary Industries and Fisheries (DPI&F) seeks to maximise the economic potential of Queensland's primary industries on a sustainable basis.

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Summary

With the advent of genetically modified (GM) crops in agriculture comes the risk of unintentional mixing of harvested GM and non-GM material that may compromise the integrity of products in the market-place. To achieve the full commercial potential of industries that utilise GM crops, participants in supply chains may need to consider the implementation of effective and rigorous strategies that focus on maintaining product integrity.

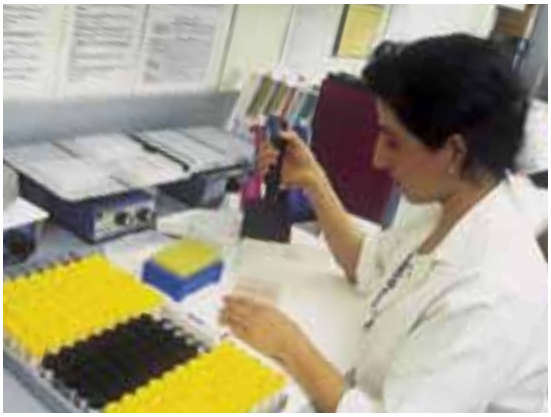
The concept of co-existence is not new to Australian primary producers. Co-existence strategies for harvested products may be applied in the same way for GM and non-GM crops as for any other harvested product.

This framework was produced by the Queensland Government to provide a basis for the development of effective co-existence strategies for agricultural cropping industries. The document identifies six fundamental principles that will assist industry to actively prepare for any new commercial release of GM crops. These co-existence principles include measures that:

1 offer freedom of choice to farmers, supply chain participants and consumers;
2 are transparent and enable consultation;
3 are based on science and practical process management;
4 minimise impacts on others;
5 can be assessed on a case-by-case basis; and
6 can be monitored and reviewed.

It is intended that the co-existence strategies developed from these principles will enable participants along the supply chain to competitively meet the requirements of their chosen markets, and give consumers the ability and freedom to select products according to their preference.

1 Introduction



Scientific innovation has always been a driving force behind advances in agriculture and food production. Gene technology, in particular, offers exciting opportunities for the agriculture sector. Benefits are clearly seen in the cotton industry, where modified varieties have resulted in significant environmental, economic and production gains. However, one of the key concerns of both supply chain participants and consumers is the risk of unintended mixing of the harvested products from genetically modified (GM) and non-GM crops and the integrity of the final product.

The Queensland Government is strongly supportive of the national gene technology regulatory scheme, which imposes a stringent, science-based licensing regime to protect the environment, and health and safety, of people. It is acknowledged that for industry to realise the full commercial potential of GM crops, marketing and trade implications of the technology also need to be considered.

To achieve the potential of GM crops, participants along the entire supply chain may need to implement effective and rigorous strategies that focus on maintaining product integrity at all stages, from pre-farm gate activities to processing and export. The concept of co-existence is not new to Australian primary producers, and may be applied to the co-existence of harvested products of GM and non-GM crops in the same way as for any other harvested product.

In this publication, co-existence is defined as the ability to grow and manage along the supply chain both GM and non-GM crops in a way that avoids unwanted mixing and delivers products below predetermined market thresholds.

The Queensland Government has developed this framework to guide in the development of effective co-existence strategies. This document provides a number of fundamental principles that will assist both government and industry to actively prepare for any new commercial release of a GM crop.

The co-existence strategies developed using these principles will enable participants along the supply chain to competitively meet the requirements of their chosen markets, and ensure consumers have the ability and freedom to select products according to their preferences.

2 Context

2.1 Australia's gene technology regulatory system

The national regulatory scheme for gene technology was introduced with the enactment of the Commonwealth *Gene Technology Act 2000* (CGTA) which came into force on 21 June 2001. As required by the Commonwealth legislation and the Queensland *Gene Technology Act 2000*, all gene technology research and its products are regulated to identify and manage any risks to human safety and the environment. The scheme is a scientifically-based risk assessment process overseen by the independent Gene Technology Regulator. All applications involving laboratory work or the release of genetically modified organisms (GMOs) into the Australian environment, including GM crops, are evaluated on a case-by-case basis and are subject to stringent public safety and environmental risk assessment.

2.2 Status of GM crops in Queensland

GM crops have been grown in Queensland since 1996, with the commercial release of insect resistant cotton. Since that time, GM cotton has become widely accepted by the industry and the community due to its reduced need for insecticide input and environmental benefits. No other GM crop is currently grown in Queensland, although trials are underway for papaya, pineapple and sugarcane (Table 1).

2.3 Market risk

One area not addressed by the national scheme is the economic implications associated with the marketing of GM products and the potential impacts on export markets, should the integrity of supply chains be compromised (e.g. the presence of GM material in consignments marketed as non-GM products could affect market access). In considering market risk, the Primary Industries Ministerial Council (PIMC) determined on 7 May 2002 that risks to agricultural production and trade should be self-regulated by industry and be supplemented by government monitoring. However, this process was not adopted, as some states chose instead to implement moratoria on the commercial release of GM crops (specifically canola).

Despite the fact that the PIMC determination was not implemented by a number of states, the Queensland Government is of the view that industry self-regulation is both desirable and necessary.

Table 1. Current status of dealings with GM crops in Queensland.

Crop	Genetic modification	Current status	Organisation	Comments
Cotton	Insect resistance and herbicide tolerance	Commercially released plus ongoing field trials of new varieties	Monsanto Australia Ltd, CSIRO, Hexima Ltd, Dow AgroScience Australia Pty Ltd	Grown commercially by the majority of the industry. Large scale field trials underway
Papaya	Delayed fruit ripening, disease resistance	Field trials only	University of Queensland	Early stage, small-scale trials
Pineapple	Black heart tolerance and synchronising flowering	Field trials only	Department of Primary Industries and Fisheries	Early stage, small-scale trials
Sugarcane	Altered sugar content	Field trials only	University of Queensland, BSES Ltd	Early stage, small-scale trials

2.4 Threat of litigation

A commercial reality of not segregating GM and non-GM crops is the risk of litigation. Although the inclusion of civil liability provisions for potential damage caused by GMOs were considered during the development of the CGTA, these options were ultimately rejected in favour of reliance on common law. The decision by the Queensland Government to introduce legislation that mirrors the Commonwealth *Gene Technology Act 2000* is confirmation that both the State and Commonwealth Governments agree that common law is adequate and appropriate for issues related to liability. This approach is consistent with that adopted in the United Kingdom, New Zealand, Canada and the United States, and would also be appropriate and adequate in shaping co-existence strategies developed under this framework.

The allocation of the costs of segregation and co-existence to individuals or entities is a contentious issue that is attracting considerable interest. ACIL Tasman (2004) reported that the introduction of canola into Australia in the 1970s and from the introduction of GM crops overseas has highlighted that the costs of segregation would fall mostly on GM users and handlers for the period in which GM crops remain the minor proportion of the total crop handled.

2.5 Co-existence through segregation

Marketing issues and the risk of litigation associated with the production of GM crops can be alleviated by development of co-existence systems aimed at maintaining segregation and identity preservation of products along supply chains within tolerances acceptable to particular markets. In the past, industry has implemented numerous management systems to ensure co-existence of different conventional production systems so that producers retain access and remain competitive in both domestic and international markets. In Australia and overseas, industry experience to date indicates that segregation thresholds for conventional commodity crops are being consistently met and that product handling systems would be technically and commercially capable of meeting a range of GM tolerance demands.

When conventional canola was first grown in Australia, grain handlers took extensive steps to manage its introduction. It is now, however, routinely handled in the grain supply chain to meet market grain purity specifications. For many years a tolerance of up to 0.6 percent of canola in wheat and malting barley has been specified in Australia's National Agricultural Commodity Marketing Association standards and the bulk handling companies which manage the storage. Handling of these grains indicate that this level is routinely met (ACIL Tasman 2004).

There are a number of other crops that are grown in Australia with quite specific product integrity and segregation requirements for the needs of individual customers. For example, pesticide residue-free grain is required by some of Australia's major wheat markets, including Japan and Korea. Furthermore, the organic sector achieves a price premium for their harvested products by the implementation of a completely closed system that enables segregation from those of conventionally-grown crops.

Australian growers, harvesters and exporters have been successfully segregating many bulk agricultural commodities for several years. Recently, this segregation capacity has extended to GM commodities. For example, GM cotton seed has been co-marketed and exported with other oilseed crops since 1997. The success of this segregation to meet market requirements has been demonstrated by the fact that there have been no reports of the presence of GM cotton seed in wheat, canola or other export grains, even though the seed is handled through the same bulk facilities. The access and competitive position that Australia maintains in export markets is evidence of the ability of agricultural industries to meet the requirements of markets by responding to and delivering on product specifications.

In the international context, GM corn co-exists with non-GM corn varieties in Spain (PG Economics 2004) and highlights the fact that such production systems can operate in parallel. There has been no evidence of loss of market share as a result of the cultivation of genetically modified crops.

2.6 Ethical practice

The Queensland Government has recognised that for Queensland to be a leader in biotechnology it needs to progress the development of robust and workable standards relating to safety and bioethics. In achieving this end, the Queensland Biotechnology Code of Ethics declares the fundamental ethical framework and legislative controls that will guide the development of biotechnology in Queensland. The Queensland Government believes that the general principles of the code are applicable to all dealings involving the use of GMOs, and therefore, the principles are relevant to this co-existence framework.

3. The Framework

3.1 Scope

The Queensland Government believes that the development of co-existence strategies may not be necessary for all agricultural industries and will only occur when the marketplace demands that the distinction be made for commercial/economic reasons. For example, although the cotton industry has not identified a need to adopt co-existence measures, other agricultural industries may require such measures. The degree to which measures for segregation should be employed may ultimately depend on the importance of the industry (planted area, production, economic value) and market requirements (product integrity, demographic use).

However, if required, co-existence measures should also be:

- non-discriminatory;
- science-based; and
- process management based.

Producers and those overseeing the integrity/purity of crops should be consistent in their behaviour towards the unintended presence of all unwanted material, including GM material.

It is unrealistic and scientifically impossible to expect or maintain 100 percent purity along the supply chain. The Queensland Government does not believe a GM-free standard can be achieved for any crop and supports the adoption of threshold levels for unintended presence of unwanted material.

The maintenance of thresholds is standard industry practice. For example, the Australian Oilseeds Federation has set an impurity threshold limit of 0.9% GM canola in non-GM canola consignments.

3.2 Objectives

The objective of this framework is to maximise economic returns to participants along supply chains by:

- allowing GM crops to be grown and managed either separately from, or combined with non-GM crops along the entire supply chain if appropriate;
- allowing supply chain participants to meet the requirements of their chosen market, recognising that these requirements will ultimately be determined by consumer preference and regulatory requirements;

- minimising the risk of unintended presence in the supply chain;
- enabling farmers to utilise technologies most appropriate to their chosen farming system; and
- enabling the production of GM crops with minimal unintended effects on the activities of other operators and on the environment.

3.3 Principles

The Queensland Government believes that co-existence of GM and non-GM crops is achievable and that the development of any crop-specific co-existence system developed by industry and government should include consideration of the following six principles:

3.3.1 Freedom of choice

The Queensland Government supports the right of producers to choose production systems and supply chains that best suit their needs for an identified market. Furthermore, the Queensland Government advocates that consumers have the right to access the products of their choice.

For the producer, gene technology has the potential to develop crops with superior agronomic performance and with benefits to the environment through a reduced need for chemicals, water inputs, and fuel. For the consumer, GM crops may result in the production of foods with augmented health benefits or with other desirable traits.

Systems have been in place for many years to segregate commodities on the basis of product characteristics, food safety or legislative requirements. Quality assurance systems enable the delivery of standardised and certified products to the marketplace using environmentally responsible protocols. These systems can be employed or adapted to meet the requirements for the co-existence of products derived from GM and non-GM cropping systems. Segregation of GM and non-GM cotton or cotton seed (Australia's only broad-scale GM crop) is not undertaken in Australia. However, an example of a segregation strategy for canola is provided in Figure 1.

Within any market or industry, a number of supply chains may exist, with their requirements determined by a combination of consumer preference and regulatory standards. Based on market demand, individual supply chains can fall broadly into one of three categories:

1. Non-discriminating markets, where specifications do not require GM and non-GM material to be differentiated, hence the products may be combined for marketing purposes.
2. Markets for non-GM crops, where regulatory authorities or commercial customers accept products combined below a specified threshold for the unintended presence of GM material in non-GM material. For example, European and Australian regulations specify a threshold of up to one percent impurity with GM product, whereas Japan specifies a threshold of up to five percent impurity.
3. Identity-preserved markets, where the preservation of unique characteristics of a product considered desirable by a customer or consumer is guaranteed (i.e. product integrity), such as a specific product or a product based on a production system.

Therefore, measures implemented to meet market requirements will vary according to each individual supply chain and the market being targeted.

3.3.2 Transparency and consultation

Consistent with the principles developed in this framework, agricultural industry sectors have the opportunity to contribute to the development of specific industry co-existence guidelines that:

- define the needs of each supply chain equitably;
- ensure transparency to participants within and between other supply chains; and
- communicate clearly the production system and the supply chain requirements.

All stakeholders should have the opportunity to contribute to the development of industry initiatives and to work cooperatively in developing, implementing, and monitoring these initiatives. Adopting a cooperative approach involves:

- clearly communicating production system and supply chain requirements;
- helping to resolve debates on industry issues;
- assisting industry-wide communication through the dissemination of information on industry initiatives; and

- a commitment or statement of intent by industry to adopt the specific strategies developed for a particular industry.

3.3.3 Practicality

Co-existence measures should be based on science and practical process management. Measures that may be implemented to ensure development of effective co-existence strategies would need to:

- be based on customer requirements;
- be flexible, practical and cost effective;
- be science-based and supported by risk assessment; and
- incorporate relevant regulatory requirements.

3.3.4 Minimising impacts

Participants in one supply chain are responsible for implementing measures that prevent their activities and products from unduly interfering in the operation of another supply chain. To be equitable, either through act or omission, measures implemented by one supply chain should not impose material demands or costs onto other supply chains or other participants within a supply chain.

There is a clear requirement for all participants in a supply chain to work together to prevent, as practicably as possible, the presence of unwanted material from exceeding the levels determined by the market and/or regulators.

3.3.5 Case-by-case assessment for co-existence

Appropriately detailed plans should be developed to address identified risks associated with the introduction of GM crops into a particular agricultural industry sector. The interests of the majority of producers will be protected from the introduction of this co-existence framework, but will also allow the adoption of new technologies by those producers who wish to do so.

As required, specific co-existence strategies should incorporate the following elements:

- marketing standards;
- risk management strategies;
- inter-relationships between various cropping systems;
- the crop management plans developed by technology providers;
- systems that provide for traceability or identity preservation, with these systems varying in rigour in accordance with product, market and regulatory requirements;
- access to sampling and testing regimes, with the aim of confirming, or providing evidence, that market and regulatory requirements are being met;
- provision for remedial action as required;
- market dynamics that reflect changing product specifications, together with changing supply and demand scenarios; and
- education of supply chain participants to ensure understanding of the co-existence framework and associated industry initiatives.

Implicit in the development of case-by-case guidelines is the recognition that each agricultural industry has specific growing, harvesting, storage, marketing and export characteristics, and, therefore, requires a separate industry response. In addition, different traits (e.g. herbicide tolerance, insect resistance, nutritional enhancement) will also raise different industry management issues.

3.3.6 Development, monitoring and review

To ensure that the objectives of the co-existence framework are met, industry and the Department of Primary Industries and Fisheries, Queensland (DPI&F) will work together to develop specific co-existence strategies. Both parties will monitor and review practices, attitudes and market requirements relevant to specific circumstances.

Any consideration of market impacts will be done in a transparent, independent and consistent fashion. Issues arising in all dimensions of the scope of this framework — marketing, environmental, agronomic and technological — will change over time. As such, industry, with input from DPI&F, will need to ensure that it constantly monitors and periodically reviews the measures that are in place.

4 Application of Framework

In collaboration with the DPI&F, each agricultural industry is responsible for the development, assessment and monitoring of specific co-existence guidelines for GM and non-GM crops arising from this framework.

Use of the framework to develop co-existence strategies is voluntary, and no regulatory controls are envisaged or proposed. Market forces will ultimately determine the level to which strategies would be implemented.

For further information on this framework and its implementation contact the DPI&F Call Centre on 13 25 23

5. References

The following people and reports were consulted and referred to in the formulation of this framework:

ACIL Tasman (2004). Genetically Modified Canola: Market Issues, Industry Preparedness and Capacity for Segregation in Victoria.

Avcare. National Association for Crop Production and Animal Health.

Gene Technology Grains Committee (2002). A strategic framework for maintaining co-existence of supply chains. December 2002.

Hudson, David. Agricultural Consultant.

National Farmers Federation Limited – Biotechnology Position Statement 2003

PG Economics Ltd (2004). Co-existence of GM and non-GM crops: current experience and key principles.
Graham Brookes PG Economics Ltd, Dorchester, UK. October 2004.
http://www.pgeconomics.co.uk/pdf/Coexistencekeyprinciplesdocument.pdf

Figure 1 – Industry segregation along the supply chain for GM canola*

Grain is sampled as required along the supply chain to classify grain and ensure product integrity is maintained. The primary sampling points usually occurs where ownership transfers (quality and weight is assessed for payment).

Supply Chain	Supply Chain Activities	Industry arrangements to ensure physical separation	Quality Assurance Systems
Pre-farm Gate	Seed cultivation Seed retail Seed wholesale	• Seed growing requires stringent separation distances to maintain purity. This is already a routine activity for seed growers. • Seed merchants, as with conventional varieties, clearly label bags of seed including batch numbers. • Retail agronomists trained by GM companies work with farmers to gain compliance with technology agreements.	OECD ASF CISP TSS
On Farm	Receival of seed Storage of seed Transport to seeder Planting harvest Transport off farm	• GM seed is made available only to farmers who have signed technology user agreements. These agreements require growers to undertake training and keep detailed records. • Growers are required to institute separation distances (i.e. buffers) between GM and conventional crops. • Growers test grain samples before and during harvest for purity. • Harvest contractors required to verify cleanliness of headers. Headers may require additional cleaning. Potential for dedicated GM headers if GM crop usage expands. • Transport off farm requires levels of machinery hygiene similar to those required for header contractors.	Graincare Great Grain SQF 1000^{CM} SQF 2000^{CM} Tech. Developers CISP TSS
Bulk Grain Handling	Receival of grain at regional delivery site Transfer to storage Transfer to truck/rail Transport to central delivery site Receival of grain at central delivery site Transfer to storage Transfer to truck/rail Transport to crusher	• Each truck is sampled and directed to appropriate delivery point at country silos. • Country silos also test samples brought in by farmers prior to truck departure from farm or even prior to harvest beginning. • Dedicated trains to be used initially for any rail transport of GM crops. • Rail operators to use existing internal procedures and protocols to maintain separation ensuring wagon hygiene practices would be maintained.	ISO 9001 HACCP SQF 2000^{CM} CISP
Processing (and Export)	Receival of grain Transfer to storage Oil extraction (press) Filter/purify Transfer to storage Transfer to truck Transport to refinery	• Dedicated storage, testing and quality assurance protocols are used for all incoming grain. • Canola oil to food customer within labelling requirements. • Canola meal (of known GM status) delivered to stock feed customer. • Export — QA and hygiene practices maintained and export documentation to accompany each shipment (as with conventional crops).	ISO 9001 HACCP SQF 2000^{CM} CISP

** Chart and information has been adapted from ACIL Tasman (2004) Genetically Modified Canola: Market Issues, Industry Preparedness and Capacity for Segregation in Victoria; and Gap Analysis in relation to Quality Management for the Supply Chain Management of Genetically Modified products. Tasmania Quality Assured (for AFFA).*

Descriptions for quality assurance systems are provided by the relevant organisations on following page.

Quality Assurance Systems

OECD – the Organisation for Economic Cooperation and Development Seed Scheme for the Varietal Certification of Planting Seed Moving in International Trade is the principal international genetic quality management program for sowing seed traded on the global seed market.

ASF – the Australian Seeds Federation released guidelines for managing adventitious presence in the production, processing and marketing of canola seed. The Guidelines identify management processes required to maintain seed purity. ASF has also implemented Codes of Practice for the labelling and marketing of seed and the use of seed treatments.

TSS – Technology Stewardship Strategies are based on best practice management principles and aim to ensure growers are sufficiently trained to enable the sustainable and lawful use of GM canola technology in a manner that increases productivity and does not adversely affect other production systems or the environment. These strategies form the basis of recommendations for farmers to use the prescribed technology in conjunction with the recommendations of regulators such as the Office of the Gene Technology Regulator and the Australian Pesticides and Veterinary Medicines Authority.

CISP – The Gene Technology Grains Committee developed the Canola Industry Stewardship Principles to ensure different canola production systems and supply chains co-exist. The Principles are science-based and represent best practice management in the grains industry. The Principles are designed for use as a reference at appropriate points along the supply chain – from the supply of seed to the end use of the resulting grain products (e.g. in foods and feeds).

Graincare – an on-farm code of practice that has been developed by the Grains Council of Australia to provide a simple, cost effective quality assurance program for growers. The four management sections of the Code include training, internal audit and corrective action, quality records and document control.

Great Grain – the Great Grain Program is an on-farm quality assurance program that has been developed by Quality Wheat CRC, Pulse Australia and the Australian Oilseeds Federation to provide a coordinated approach to the implementation of on-farm quality management practices in the grains industry. It has been specifically designed to cater for identity preservation and segregated markets as well as addressing food safety, quality to the customer and legislative requirements.

SQF 2000CM – developed by the Western Australian Department of Agriculture in 1994 to increase the marketability and market access of WA produce. The system provides the tools for enterprises to demonstrate compliance with food safety standards and customer quality requirements. It has been widely adopted in Australia and overseas.

SQF 1000CM – developed by the Western Australian Department of Agriculture in 2000 following the success of SQF 2000CM and in response to demand for a less complex approach to food safety and quality. It is designed for use by primary producers that do not supply products directly to the consumer but rather to a packing shed or for further processing.

Australian Oilseeds Federation Codes of Practice – developed to standardise hygiene, cleaning procedures and minimise contamination of product.

HACCP – Hazard Analysis Critical Control Point is a system that identifies, evaluates and controls hazards which are significant to food safety. It is widely used throughout Australian agribusiness to address quality issues.

ISO 9001:2000 Quality Management System – widely recognised as the original reference standard for quality systems. The Standard promotes the adoption of a process approach when developing, implementing and improving the effectiveness of quality management systems to enhance customer satisfaction by meeting customer requirements.

Technology developers – Monsanto and Bayer have developed stewardship programs and specific on-farm crop management plans to support the effective integration of GM canola varieties into farming systems and their sustainable use. These systems include contracts and audit/compliance provisions (including financial incentives). The Regulator, by imposing licence conditions, may also enforce aspects of the crop management plans.

Notes