



Know-how for Horticulture™

GMOs Guiding Meaningful Opinions



The Gene Technology Newsletter for the
Horticulture Industry

December 2006

Welcome to this edition of *GMOs*, the bi-monthly gene technology newsletter for the horticultural industry. *GMOs* is compiled by Agrifood Awareness Australia Limited in conjunction with HAL.

We welcome any comments or enquiries you may have regarding the content of this publication. We also encourage the use of this information in industry newsletters and web pages.

Knowledge Bank

KEY GENES FOR HORT MARKETS – GENES IDENTIFIED FOR SEEDLESS FRUIT AND FRUIT COLOUR

World-wide advances in bioscience are opening up new opportunities to develop exciting new fruit varieties that meet and exceed consumer expectations. Australia's competitors are embracing these technologies and are using gene-based tools in horticultural breeding programs. Further, large gene sequencing projects that will greatly accelerate the development of these tools are already underway in various countries in crops such as citrus, grapes and apples.

To ensure Australia's competitive position in this bioscience-driven new era, the Aushort Key Genes for Horticultural Markets project was established by HAL in 2001. This project focuses on identifying, isolating and characterising new genes that can be used to increase the consistency of quality and availability of fruit and vegetables in the market place and to enhance their novelty in terms of size, shape, colour, 'mouth feel' properties and antioxidant content. The strategy is to use target genes to alter these characteristics through conventional breeding.

This research has been conducted at CSIRO by Dr Steve Swain, Dr Mandy Walker, Dr Simon Robinson and Prof. Anna Koltunow, and the project has recently been reviewed and highly commended by one of the world's

leading researchers in plant biotechnology. Due to conclude in March 2007, the project will have delivered tools to enhance the ability to select accurately for two important fruit traits, namely **seedlessness** and **fruit pigmentation**. The crucial next step will be to ensure that Australian horticulture benefits from this research by using these tools to improve the efficiency in delivering improved new varieties through major Australian breeding programs.

Seedlessness – This project has led to the identification of genes that control the action of two plant hormones, auxin and gibberellic acid (GA), that are commonly used to modify fruit growth in a number of horticultural crops. In proof-of-concept experiments the auxin gene has been used to enhance the production of seedless fruit in tomato.

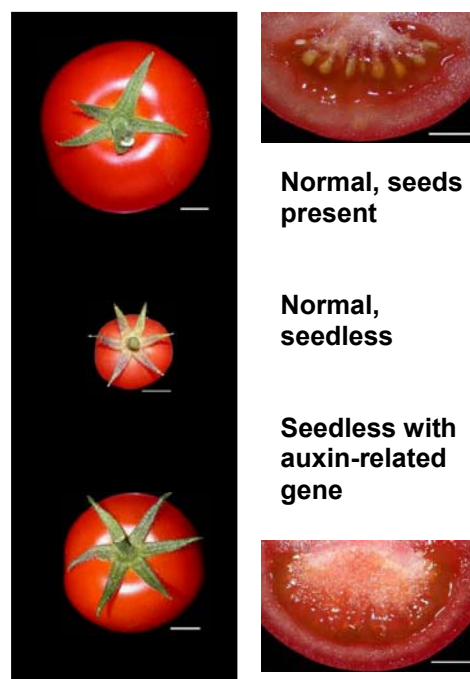


Figure 1. Researchers have shown that an auxin gene can enhance seedless fruit formation in tomato - the top image shows a large seeded tomato; the middle image shows the typical small tomato that forms when no seeds are present; the lower image shows a large seedless tomato fruit produced by a plant containing a modified auxin gene.

In terms of conventional breeding programs in which seedless fruit production is a key trait, for example citrus, table and dried grapes, this knowledge can potentially be used to develop gene-based markers. Markers can greatly improve the efficiency of existing breeding programs by allowing selection of the best progeny many years before fruit production occurs. For example, in the case of seedlessness, selection at the young seedling stage can ensure that only seedless progeny are evaluated in the field, increasing the likelihood of the successful development of new elite varieties.

Fruit pigmentation – A further strand of the project focused on flavonoids such as anthocyanin, which are involved in fruit colour and antioxidant levels, and tannins, which contribute to flavour and mouth feel. This research has identified genes that regulate the anthocyanin/tannin synthesis pathway in the model plant *Arabidopsis*, to enable the isolation of the appropriate genes from crop plants to alter colour, mouth-feel and antioxidant levels.

In fact, a parallel project funded by the WA Department of Agriculture and Food has built on the *Arabidopsis* work to identify the gene that controls colour, for example red versus green skin, in apples. Using this gene, a marker has been developed that enables apple skin colour to be predicted at the young seedling stage (Figure 2).

While this represents a significant advance in the use of gene-based markers in apple breeding, and could be used to improve breeding efficiency as described above, it also provides the ability to develop more sophisticated breeding tools. For example, with additional research it should also be possible to develop a marker for early selection of seedlings that will produce a pink hue similar to the highly successful Pink Lady™ apple, allowing breeding programs to target particular types of skin colour.

This fruit pigmentation research was released publicly on 30 November. CSIRO issued a media release announcing they had located the gene that controls the colour of apples, a discovery they claim may lead to bright new apple varieties.

The new knowledge about how apple colour is regulated will give plant breeders the opportunity to use these molecular marker tests to speed up apple breeding, select for improved fruit colour and breed new apple varieties. Apples with higher levels of healthy properties such as antioxidants may also be a future possibility.

Provided by CSIRO Plant Industry.

For more information:
www.csiro.au/files/files/pb5y.pdf or
steve.swain@csiro.au

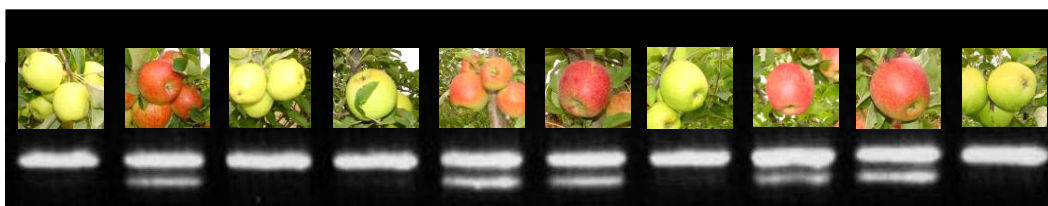


Figure 2. Researchers have identified a gene-based marker for apple skin colour. The result of the marker test for different individuals is shown by the white bands under the photos of fruit from each plant tested. Two white bands indicate the presence of the gene for red skin colour. This test could be used to predict eventual fruit colour in young seedlings several years before the trees set fruit in a breeding orchard.

Hot Issues

DROUGHT IMPORTS

Australia is experiencing a severe drought and crop production forecasts have been reduced significantly. The latest ABARE forecast states that current canola production is estimated to be 69 per cent lower than last year.

As a result of reduced production, import approvals have been sought to bring products into the country to meet local needs. The products coming in are from the American continent and are likely to be derived from gene technology.

All imports coming into Australia must adhere to Australian regulations, in particular, that of the Australian Quarantine and Inspection

Service (AQIS). Where the product is viable and is likely to contain genetically modified (GM) content, AQIS will liaise with the Office of the Gene Technology Regulator (OGTR). Licence conditions may be imposed on the imports. For example, previous GM grain imports were subject to conditions to address plant, pest and disease quarantine concerns.

These requirements included:

- That the grain must be transported in covered trucks to processing plants in metropolitan areas,
- That the grain must be processed so that it is no longer viable, and
- That any spillage must be cleaned up and spilt grain destroyed.

Recently, the OGTR has issued a licence for the import of Canadian canola seed which will be crushed in order to supply domestic oil and meal demands. The OGTR also issued another licence in 2003, which is still current, for the importation of soybeans for processing for oil and stockfeed.

Genetically modified canola and soy have been grown, traded and consumed globally for over a decade. As a result, the GM crops have regulatory approvals in numerous countries around the world.

Australia has GM food labelling laws which allow consumers to make informed choices about the products they purchase. Products containing introduced genetic material must be identified in the ingredient panel. In the case of oil, there is no genetic material or DNA present in oil, and as a result it is not required to be labelled under Australia's GM food labelling laws.

The same applies to products from animals fed GM animal feed. Numerous scientific studies have all concluded that meat, eggs and milk from animals fed approved GM feed, are no different to those fed non-GM feed and the feed cannot be detected in the end-products – meat, eggs and milk. Therefore, these products do not require labelling anywhere in the world.

For more information:

www.affa.com.au/n_whats_new.asp

WORLD HUNGER INCREASING

"Far from decreasing, the number of hungry people in the world is currently increasing – at the rate of four million a year," said Food and

Agriculture Director-General Jacques Diouf during the launch of the annual FAO report "The State of Food Insecurity in the World".

For more information:

www.fao.org/newsroom/en/news/2006/1000433/index.html

CONSUMERS DENIED BENEFITS OF GM BY FOOD COMPANIES

According to an academic at the US' Stanford University, food companies spurning GM foods may find themselves held accountable in the future for denying consumers access to safer and superior food products. In a recent issue of *Nature Biotechnology*, Henry Miller and his colleagues presented some of the positive effects of using biotechnology in food production and processing, and what food companies should know.

The article titled, "Why spurning food biotech has become a liability", highlights several examples to illustrate the litigation angles which could evolve in the future against those companies with policies of not using GM products or ingredients. One horticulture relevant example is:

- Insect resistant and virus resistant GM potatoes developed by Monsanto could have ultimately restricted greatly the use of an entire class of toxic pesticides, but the potatoes were withdrawn from the market after five successful years because of pressure from anti-GM activists on companies such as McDonald's, Burger King (Miami) and other restaurant chains who were major users of the potatoes for their fries.

Source: Nature Biotechnology

www.nature.com/nbt/journal/v24/n9/full/nbt0906-1075.html

KFC SWITCHES TO A HEALTHIER OIL DERIVED FROM A GM CROP

The current debate regarding trans fats has resulted in a change in the oil used by major takeaway icon KFC. The company has announced that it is converting all of its 5,500 restaurants in the USA away from trans fat cooking oil. The replacement oil, a low linolenic soybean oil developed by Monsanto, will replace the partially hydrogenated soybean oil in current use in KFC restaurants.

Low linolenic soybean was developed using conventional breeding, but it contains the Roundup Ready trait for agronomic

performance (see Monsanto link for more detail). This is an example of a product offering a health benefit and an agronomic benefit through the use of gene technology.

For more information:

KFC -

www.kfc.com/about/pressreleases/103006.asp;

Monsanto -

www.monsanto.com/monsanto/layout/media/06/10-30-06.asp

GM RICE IN US MARKET: UPDATE

In the previous edition of *GMOs* it was noted that trace amounts of an unapproved herbicide tolerant genetically modified (GM) rice variety had been detected in the USA in samples taken from commercial long grain rice supplies.

The US Government's Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) has now announced that it has now approved the rice variety in question, finding it as safe as its traditionally-bred counterparts.

For more information:

www.aphis.usda.gov/newsroom/content/2006/11/rice_deregulate.shtml

Regulatory Updates

REGULATOR REAPPOINTED

Australia's Gene Technology Regulator, Dr Sue Meek has been reappointed to the position for a further five years following a meeting by the Gene Technology Ministerial Council (GTMC), comprising of Ministers from the Commonwealth, State and Territory Governments, in October.

For more information:

www.ogtr.gov.au/new/index.htm

GENE TECHNOLOGY LEGISLATION REVIEW – GOVERNMENTS' RESPONSE

As noted in an earlier edition of *GMOs* an expert panel reviewed Australia's gene technology legislation during 2005. The panel's findings were released earlier this year for deliberation by the Commonwealth, State and Territory Governments.

The Gene Technology Ministerial Council has now released the Governments' response to the recommendations.

To access the response:

[www.health.gov.au/internet/wcms/publishing.nsf/Content/CE28398A33AF02E6CA25707400080A57/\\$File/Governments%20Response%2027%20Oct%2006%20Final.pdf](http://www.health.gov.au/internet/wcms/publishing.nsf/Content/CE28398A33AF02E6CA25707400080A57/$File/Governments%20Response%2027%20Oct%2006%20Final.pdf)

GM CARNATIONS FIRST EVER ENTRY ON THE AUSTRALIAN GMO REGISTER

The Gene Technology Regulator has approved four GM carnation lines as the first entry on the GMO Register.

Under the *Gene Technology Act 2000*, GMOs that have been previously licensed may be placed on the GMO Register if (a) any risks posed by the dealing are minimal and (b) the Regulator is satisfied that the dealings are sufficiently safe to be undertaken by anyone without the need for a licence.

The carnation lines were modified by the insertion of genes that affect flower colour and have over 10 years of history of safe use. The approved dealings included the Australia-wide propagation, growth, and distribution of GM plants and cut flowers.

For more information:

www.ogtr.gov.au/new/index.htm

OGTR RESEARCH LICENCE APPLICATION UPDATE

The OGTR has announced that the Risk Assessment and Risk Management Plans (RARMP) for the field trial applications below are now open for public comment.

Reference	Crop/characteristic	Developer
DIR 070/2006	Sugarcane with altered plant architecture, drought tolerance and nitrogen use efficiency.	Bureau of Sugar Experiment Stations Ltd (BSES)
DIR 068/2006	Torenia (ornamental plant) with altered flower colour.	Florigene Pty Ltd

Submissions for the torenia RARMP close on **13 December 2006**. The application proposes to trial nine GM torenia lines at a single site in the City of Darebin, Victoria, from October 2007 to May 2008. The purpose of the trial is to evaluate their outdoor performance.

For more information:

www.ogtr.gov.au/new/index.htm

Reports of Interest

EUROPEAN DEVELOPMENTS - SWISS STUDY FINDS NO SIGNIFICANT ENVIRONMENTAL IMPACT OF GM CROPS

A large literature study by Swiss Agroscope Reckenholz-Tänikon Research Station (ART), covering ten years of research, has concluded that GM crops are at least similarly safe as their conventional counterparts for the environment.

- Analyses of Bt crops found no significant impact on insects, birds, and soil microflora.
- For herbicide-tolerant (HT) crops, ART concluded that gene flow is unlikely - and that HT crops hardly can survive outside cultivated fields. Appearances of herbicide-tolerant, wild relatives have been registered only in areas where one complementary herbicide was used exclusively, causing immense pressure on wild plant populations. In regions where at least both complementary herbicides (glufosinate and glyphosate) were applied, farmers had no trouble with herbicide-tolerant weeds.

The literature study was ordered by the Swiss Expert Committee for Biosafety (SECB).

For more information:

www.gmo-compass.org/eng/news/messages/200611.docu.html#69 or
www.art.admin.ch/dms_files/03017_de.pdf

- TWO NEW EUROPEAN WEBSITES LAUNCHED

A new European Union (EU) website of importance to the GM food and crop debate has been launched. The site is a multidisciplinary EU research project focusing on developing tools for the tracing of GM products and the implementation of co-existence between GM, conventional and organic food and feed in the EU.

For more information: www.coextra.eu

A second site focuses on research into the safety of GM plants. Commissioned by the German Federal Ministry of Education and Research (BMBF), the site provides a comprehensive database with summaries of

research topics, methods and results is supplemented by background reports and interviews and insights into the day-to-day work of researchers.

For more information: www.gmo-safety.eu/en/

Research Updates

NZ - GM VEGETABLE TRIAL APPLICATION

Researchers from New Zealand's Crown Research Institute, Crop & Food Research, have applied to the country's Environmental Risk Management Authority (ERMA) for a licence to undertake field trials of a range of insect resistant Brassica crops.

The aim of the trials is to assess agronomic performance over a 10-year period of vegetable and forage brassicas, specifically cabbage, broccoli, cauliflower and kale, modified for resistance to caterpillar pests like cabbage white butterfly and diamond-back moth

The Brassica crops all contain a gene from the soil bacteria *Bacillus thuringiensis* (known as Bt). This enables the plants to resist attack from particular caterpillars. Bt has been used as a biological control for insects for more than 30 years. It is used by organic farmers worldwide as a spray. In addition more than 15 million hectares of GM Bt maize and cotton is grown around the world. Australia has grown insect-resistant cotton with this gene since 1996.

It has been three years since the last field trial licence application was made in New Zealand. Public submissions close on 12 December 2006.

For more information:

www.ermanz.govt.nz/news-events/archives/media-releases/2006/mr-20061031.html or
www.crop.cri.nz/home/news/index.jsp

Market Research

LATEST US CONSUMER RESPONSES TO GM FOODS

The US-based International Food Information Council (IFIC) has released the results of its 11th survey of consumer attitudes towards GM foods. The survey aimed to track public awareness and perceptions of food biotechnology; identify concerns related to foods that have been produced using biotechnology, within the context of broader

food safety and labelling issues; measure the extent to which consumers change their behaviour because of biotech foods; and measure the extent to which certain benefits of agricultural biotechnology resonate with the public.

Some of the general findings include:

- Seventy-two per cent of consumers say they are confident in the safety of the US food supply.
- Many consumers are neutral (33 per cent) or unsure (18 per cent) when asked specifically for their opinion on GM foods.
- Three-quarters (74 per cent) of consumers are unaware that GM foods are currently available in the supermarket, and the 26 per cent who are aware most often name “vegetables” as the food that is available.
- Learning of the benefits of GM foods has a significant impact on consumers’ likelihood to buy, particularly for a health benefit (77 per cent likely to buy for increased omega-3 content; 75 per cent for reduced saturated fat content) or insect protection/pesticide reduction (75 per cent), but also for improved taste or freshness (63 per cent).

IFIC's mission is to communicate science-based information on food safety and nutrition to health and nutrition professionals, educators, journalists, government officials and others providing information to consumers.

For more information:

www.ific.org/research/biotechres.cfm

Gene Technology Contacts

Regulation

Food Standards Australia New Zealand – FSANZ

www.foodstandards.gov.au

Phone: (02) 6271 2241

Office of the Gene Technology Regulator - OGTR

www.ogtr.gov.au

Phone: 1800 181 030

Science

Commonwealth Scientific and Industrial Research Organisation – CSIRO

<http://genetech.csiro.au>

Phone: 1300 363 400 - CSIRO Enquiries

Public Awareness

Agrifood Awareness Australia Limited - AFAA

www.afa.com.au

Phone: (02) 6273 9535

Biotechnology Australia – BA

www.biotechnology.gov.au

Phone: 1800 631 276 – Gene Tech Enquiries

Industry

Horticulture Australia Limited - HAL

www.horticulture.com.au

Phone: (02) 8295 2300



**Best wishes
for a safe and happy
festive season and a
Happy New Year.**

**From Agrifood Awareness
Australia Limited.**

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