

Biotech Bulletin 3

Beyond Canola – Research Roundup

Welcome to the third edition of Agrifood Awareness Australia Limited's (AFAA) Biotech Bulletin. The Biotech Bulletin, produced on a monthly basis, aims to cover relevant topical gene technology issues.

This edition of the Biotech Bulletin, entitled "Beyond canola - research roundup", will focus on the large amount of agricultural gene technology research currently undertaken in Australia. Over the last nine months the Office of the Gene Technology Regulator (OGTR) has granted approval for the limited and controlled release (field trials) of a number of agricultural and horticultural commodities. This Bulletin aims to provide an overview of these, and further Australian research in this area.

BEYOND CANOLA

Much of the current discussion on gene technology in Australia is focused on the introduction of genetically modified (GM) canola. While it is critical for these discussions to take place, particularly within rural Australia, it is important to recognise that GM canola represents only one example of the considerable amount of agricultural gene technology research currently underway in Australia.

A significant amount of the research in progress in Australia is primarily undertaken by organisations such as Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) and Universities, as was highlighted in the recent "Report on the cost recovery options for the operation of the gene technology regulatory system" (August 2002) undertaken for the OGTR.

The primary focus of current research programs include developing crops with:

- greater tolerance to environmental stresses such as drought, frost and salt;
- in-built protection against major pests, viruses and diseases; and
- quality traits for improving flavour, colour, taste and ripening.

Field trial licences have, in the past, been issued for GM crops including apples (Kanamycin resistant), barley (herbicide tolerant), field pea (pea weevil resistant), lettuce (virus resistant), subterranean clover (one variety herbicide tolerant and the other for increased nutrition), tomato (herbicide tolerant and quality traits) and white clover (alfalfa mosaic virus resistant).

The following highlights recent applications made to the OGTR for licences to conduct field trials.

HORTICULTURE **CARNATION**

One of the two commercially grown GM crops in Australia is carnations. Field trials commenced in 1992 with commercial release ongoing since 1996. The licences were authorised under the previous gene technology system overseen by the Genetic Manipulation Advisory Committee (GMAC). The four GM carnation lines have been modified to produce purple, mauve, or blue flower colour.

In December 2002, Florigene Limited (the developer) applied for a continued licence for the general release of GM carnations as previously granted under the GMAC system. In June 2003, the OGTR issued Florigene Limited a licence to continue with the commercial release of GM carnations. The release covers the propagation, growth and distribution of both GM plants and cut flowers Australia-wide.

To date, GM carnations have been extremely popular and continue to be in high demand both in Australia and overseas where they are also grown.

For further information on the OGTR licence application see: www.ogtr.gov.au/ir/dir030.htm or Florigene Limited's website visit: www.florigene.com.

GRAPEVINES

The OGTR issued a licence in June 2003 to CSIRO in South Australia for the continuation of field trials of GM grapevines, previously approved under the GMAC system.

The aim of the field trial is to evaluate the agronomic performance of the GM grapevines, which have been modified to improve berry colour, evaluate the form and structure of the fruit and flower, and study the pollen flow of grapevines. These trials comprise of four grapevines with decreased fruit browning, three with altered fruit pigmentation, one with altered fruit sugar composition, one with altered flower and fruit development, and two with reporter gene expression.

CSIRO also proposes within the licence to conduct taste-tasting of dried seedless sultanas and wine from GM grapevines. No other fruit or by-products from the release are intended for animal or human food.

With the licence being granted, the final Risk Assessment and Risk Management Plan (RARMP) was released. This risk assessment process (which is undertaken by the OGTR for all field trial applications) evaluates potential hazards that might be posed by the release of the GM grapevines based on the likelihood of a hazard occurring and the likely impact of the hazard if it were realised. In summary, the Regulator considered that the hazards posed by this proposed release are unlikely to present a significant risk to the health and safety of people or the Australian environment that cannot be managed and therefore, the Regulator issued a licence.

The licence for field trials of GM grapevines is valid from June 2003 through to December 2008. The evaluation of the GM grapevines planted in 1999, under GMAC approval, will also continue as part of this licence.

For more information on CSIRO's application see: www.ogtr.gov.au/ir/dir031.htm or the CSIRO website: http://genetech.csiro.au/research/crops_fruit_pastures/designer_grapevines_short.htm

PAPAYA

The OGTR issued a licence in June 2003 to the University of Queensland (UQ) to undertake field trials of GM papaya. Approval of the application enables the continued evaluation of three types of GM papayas planted under field trials since 2002 in Australia, previously authorised under the GMAC system.

The papaya fruit have been modified to delay the process of fruit ripening and test the expression of the introduced gene. Papaya fruit have poor storage qualities and delayed ripening modification may prevent spoilage during transportation and storage.

None of the GM papaya plants from the release, or their by-products, will be used for human or animal feed. Fruit and some other plant tissues generated in the release will be analysed in the laboratory for physiological, nutritional and quality attributes and for expression of the inserted genes.

The licence for the GM papaya field trials extends from June 2003 through to December 2006 and includes the continued evaluation of the 20 papayas planted since 2002 and release, in August 2003, of up to 300 new papaya plants.

For more information visit: www.ogtr.gov.au/ir/dir026.htm

PINEAPPLE

The University of Queensland (UQ) and the Queensland Department of Primary Industries (QDPI) are both involved in the genetic modification of pineapples. Field trials of GM pineapples were previously approved under the GMAC system and recently, licences have been granted, for the continuation of trials.

The UQ pineapple plants have been modified to control flowering. The organisation was granted its original licence to conduct field trials in 1999. With the current licence granted under the OGTR, the proposed field trials will continue until 2007.

The QDPI have modified pineapple plants for blackheart reduction (browning of the heart) and to delay flowering. The approval of this application enables continuation of the trials that commenced in 2000 under the GMAC system, until 2008.

For further details on the UQ's application visit: www.ogtr.gov.au/ir/dir027.htm and the QDPI application visit: www.ogtr.gov.au/ir/dir028.htm

OTHER COMMODITIES

POPPY

Two organisations applied to the OGTR to conduct field trials of GM oilseed poppies. CSIRO applied to conduct field trials of GM poppies in Tasmania, modified by altering the alkaloid (one of the basic nitrogen organic compounds occurring in plants) productive pathway and the addition of an antibiotic resistance gene. The Agriculture Western Australia which has a variety of GM oilseed poppy similar to CSIRO's variety, applied to conduct field trials in Western Australia. Both organisations previously held field trial licences under the GMAC system.

The Agriculture Western Australian field trial licence was issued in July 2002 with CSIRO's licence issued in November 2002.

It should be noted that, even though a licence for the limited and controlled release has been issued by the Regulator for Tasmanian trials, the applicant also requires approval from the Tasmanian State Government under the Plant Quarantine Act 1997 (Tasmania), due to Tasmania's current state gene technology moratorium.

For the CSIRO licence information see: www.ogtr.gov.au/ir/dir018.htm or the Agriculture Western Australian licence see: www.ogtr.gov.au/ir/dir007.htm

COTTON

Genetically modified cotton has been commercially grown in Australia since 1996. Insect resistant GM cotton (known as Ingard or Bt cotton) has delivered significant environmental benefits, by reducing pesticide applications on average by approximately 45 per cent per season in cotton growing regions.

The GM cotton variety, Bollgard II received approval for commercial release earlier this year. This is the second insect-resistant GM cotton to be approved commercially in Australia. This variety contains two, rather than one gene from the soil bacteria Bt and CSIRO believes the variety offers greater insect protection and will further reduce pesticide applications by up to 75 per cent. Field trials of Bollgard II have shown that the cotton performs as well as non-GM varieties in relation to yield and quality. This information can be found on the CSIRO website at: www.csiro.au/index.asp?type=faq&id=Bollgard&stylesheet=divisionFaq, alternatively for information on the licence application see: www.ogtr.gov.au/ir/dir012.htm.

Roundup Ready cotton and Roundup Ready/Bt cotton, both GM cotton varieties, were commercially available for the first time in Australia in 2001. The Roundup Ready trait makes the cotton plant resistant to the herbicide glyphosate. Herbicide tolerant crops are not harmed by the herbicides applied to the weeds and grasses around them, providing growers with greater weed control, plus a number of other environmental and crop management benefits.

Currently, there are a number of GM cotton applications with the OGTR. The Regulator has invited public comment on the RARMPs on a number of varieties prior to considering a licence. Applicants include Dow Agrosiences Australia, CSIRO, Monsanto and Syngenta. The cotton varieties under development are genetically modified for various insect and herbicide tolerances. In addition, one of the CSIRO varieties is modified to contain a modified cotton gene which increases the oleic acid content in cottonseed oil. Cottonseed oil is relatively high in saturates that can raise blood cholesterol and is also high in polyunsaturates, which, although healthy, are unstable and not suitable for commercial cooking. However, this variety of GM cotton under development by CSIRO is naturally low in polyunsaturates

and cholesterol-raising saturates and CSIRO believes it is ideal for commercial cooking applications and does not require hydrogenation, therefore improving the nutritional value of foods.

For further information on the oleic acid cotton see: www.ogtr.gov.au/ir/dir039.htm or the CSIRO website: <http://www.csiro.au/index.asp?type=activity&id=oils&stylesheet=aboutCSIROActivity>

For further information about the GM cotton field trial applications with the OGTR see:

- Dow Agrosiences Australia variety: www.ogtr.gov.au/ir/dir040.htm
- CSIRO varieties: www.ogtr.gov.au/ir/dir038.htm
www.ogtr.gov.au/ir/dir036.htm
- Monsanto variety: www.ogtr.gov.au/ir/dir035cfc.htm
- Syngenta variety: www.ogtr.gov.au/ir/dir034.htm

SUGARCANE

The Bureau of Sugar Experiment Stations, (BSES) was granted a licence in December 2002, to conduct field trials of GM sugarcane. The sugarcane has been modified with a reporter gene expression and antibiotic resistance gene.

The aim of the field trial is to test the GM sugarcane's agronomic performance as well as the level of expression of the introduced green fluorescent reporter gene. One site in Queensland has been chosen to conduct the field trials.

For further information visit: www.ogtr.gov.au/ir/dir019.htm

PASTURES

LUPINS

The University of Western Australia has applied for a licence to conduct field trials of GM high sulphur lupins. The GM lupins contain a sunflower seed gene that increases the levels of sulfur amino acids in the seed. Increasing the levels of these acids in the seed should increase the nutritive value of seed for animal feed.

Sheep fed the previous GM lupin lines from field trials (approved under the GMAC system) gained live weight faster and grew wool faster than those fed conventional lupins.

It is anticipated that the RARMP will be released in mid December 2003 for public comment. For further information visit: www.ogtr.gov.au/ir/dir043.htm or for information regarding the field trial results see: http://genetech.csiro.au/research/crops_fruit_pastures/wool_growth_short.htm

We look forward to your feedback on this newsletter.

For further information, please contact the AFAA office on (02) 6273 9535 or via email – info@afaa.com.au

October 2003
