



# GM carnations in Australia: a resource guide

## RESOURCE GUIDE 2

**The following is a reference guide providing information about genetically modified (GM) carnations in Australia, and some of the research in the pipeline. The guide provides information on the carnation industry, an overview of GM carnations available and the regulation surrounding them. Information about the development of a GM blue rose is also featured.**

### 1 Industry background

Eight genetically modified (GM) carnations developed by Melbourne-based company, Florigene Ltd (now part of Japan's Suntory Group), for Australia's \$350 million cut-flower market, are commercially available.

The carnations have been modified to exhibit almost black, blue-purple, through to light violet colouring.

More than 10 billion carnations are produced around the world each year. The Australian carnation industry, established in 1954, produces approximately 140 million flowers annually across Victoria, South Australia, Western Australia and New South Wales. Victoria is the largest carnation producing state.

### 2 Blue, mauve and violet carnations

Traditionally, improvements to the shape, colour, vase life or disease resistance of flowers have been obtained by crossing existing varieties.

However, for some flower varieties, no amount of traditional breeding will achieve blue, violet or mauve flowers. Carnations, roses, lillies, chrysanthemums and gerberas, for example, represent 75 per cent of worldwide flower sales, but they do not produce the blue pigment called delphinidin.

Florigene researchers overcame this 'blue' hurdle using gene technology. The world's first GM carnation, 'Moondust', has been commercially available in Australia since October 1996. It contains genes from petunia and snapdragon flowers, which allow it to express mauve/blue colouring. 'Moondust' was followed by a violet carnation, 'Moonshadow', which was launched in 1998. Six additional blue-violet/purple coloured carnations have since been commercialised.

Since they were launched, More than one million 'Moonshadow' carnations have been sold throughout Australia, and more than 4.5 million of the GM carnation range have been sold within Australia since 1995. The demand for these flowers is increasing from florists, growers and consumers alike.

### 3 Longer vase life carnations

Carnations with a longer vase life have also been developed using gene technology. Once a flower is cut from a plant, it starts to deteriorate. The traditional life span of a carnation cut flower is around seven to eight days. This life-span can be prolonged for sale and transit purposes by the use of chemicals such as silver.

Silver is a preservative commonly used by the cut-flower carnation industry. Silver metal is mildly toxic, but silver nitrate, a salt commonly used to prepare preservative solutions, is both more toxic and a skin irritant.

Gene technology has allowed researchers to slow down the aging process of carnations by inserting an extra copy of a carnation gene into the plant. The added gene stops the plant from producing ethylene, which is responsible for the deterioration of flowers once they are cut from the plant. This removes the need for silver-based preserving solutions.

Carnations modified using the long vase life technology will last, on average, 16 days in water. This is double the life of non-GM varieties.

The potential benefits of long vase life flowers for growers include:

- an alternative to harmful chemicals such as silver — silver preservative solutions have already been banned in the Netherlands.
- reduced chemical and labour costs currently associated with changing the water and solutions.
- increased opportunities to expand export markets with flowers that better survive long distance transport.
- the environment benefits from this technology because the need for harmful chemicals such as silver is reduced.

Consumers and retailers can both enjoy flowers that last longer, and retailers no longer need to be concerned about whether growers have applied the correct treatment solutions to the flowers.

### 4 Safety and regulation

Like all gene technology research, these carnations have been subjected to regulatory scrutiny in Australia and overseas, and they have been approved for commercial use in many different countries, including Holland, the USA and Japan.

Apart from their appeal as one of the world's most popular flowers, GM carnations pose no greater risk to the environment than conventionally bred varieties.

This is because:

- they are not related to any significant weed species in Australia
- some carnation varieties are infertile
- there are no wild carnation populations established in Australia
- seed set cannot occur because the flowers are removed from the plant as tight flowers for shipment
- carnation pollen is not spread by wind, and bee access to the pollen is limited because the pollen is heavy and sticky and buried deep in the flower, and as carnations are picked as tight flowers this restricts insect access even further
- the high humidity environment of glasshouses, in which carnations are commonly grown, reduces the survival rate of carnation pollen
- carnations are propagated by cuttings, so they do not spread vegetatively, that is, by shoots, tubers, bulbs or runners, so the risk of spreading from garbage or waste is limited.

## 5 Safe to use by all

in 2007, four GM altered colour carnation lines were approved as the first entry on the GMO Register. Australia's gene technology legislation allows the Gene Technology Regulator to place GM products which have been previously licenced, pose minimal risks to people or the environment, and are sufficiently safe to be used by anyone without the need for a licence, on the GMO Register.

The GMO Register listing means that the GM carnations can now be sold as plants, not just cut flowers, to home gardeners, and there are no conditions imposed on the cut flower industry as far as containment, inspections and the other regulatory processes previously required by the Office of the Gene Technology Regulator. See: [www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/reg001-1](http://www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/reg001-1).

## 6 Blue roses in the future

Conventional breeding has resulted in 'blue' roses which appear purple and grey, however these colours come from red or orange pigments. Conventionally-bred roses cannot produce blue pigment.

The ultimate prize utilising this technology is the blue rose. In June 2004, Suntory Limited and Florigene Limited announced they had successfully developed the world's first blue rose. The rose contains a gene from pansies which allows it to produce its own blue pigment. See: [www.florigene.com/news/news.php](http://www.florigene.com/news/news.php).

In 2009, Florigene received commercial approval for a GM rose with purple/blue colouring. The rose needs further development to exhibit bright sky blue colours. See: [www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/DIRogo](http://www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/DIRogo).

## 7 Further information

*The biology and ecology of the carnation.* The Office of the Gene Technology Regulator. November 2006: [www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/carnation-3/\\$FILE/bioeco-carnation.pdf](http://www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/carnation-3/$FILE/bioeco-carnation.pdf).

*The biology and ecology of the rose.* The Office of the Gene Technology Regulator. December 2005: [www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/rose-3/\\$FILE/biologyrose1.pdf](http://www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/rose-3/$FILE/biologyrose1.pdf).

Florigene Flowers: [www.florigene.com.au](http://www.florigene.com.au).

Suntory Group: [www.suntory.com](http://www.suntory.com).

