



# GM Carnations in Australia

## A Resource Guide

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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.

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### 1. INDUSTRY BACKGROUND

Five genetically modified (GM) carnations developed by Melbourne-based company, Florigene Ltd, for Australia's \$350 million cut-flower market, are commercially available.

The carnations have been modified to exhibit blue/violet-purple colouring.

More than 10 billion carnations are produced around the world each year. The Australian carnation industry, established in 1954, produces approximately 60 million flowers across South Australia, Western Australia, New South Wales and Victoria.

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### 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', launched in 1998. Three additional blue-violet/purple coloured carnations have since been commercialised.

Since they were launched, approximately one million 'Moonshadow' carnations have been sold throughout Australia. The demand for these flowers is increasing from florists, growers and consumers alike.

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### 3. LONGER VASE LIFE CARNATIONS

Carnations with a longer vase life are also being 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.

In the laboratory, 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. These carnations are yet to receive commercial approval in Australia.

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#### 4. GROWERS, CONSUMERS AND THE ENVIRONMENT BENEFIT

Longer vase life technology may mean a big savings for growers, retailers, consumers and the environment.

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 may one day enjoy flowers that last longer, and retailers may no longer need to be concerned about whether growers have applied the correct treatment solutions to the flowers.

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#### 5. 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; and

- 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.

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#### 6. BLUE ROSES IN THE FUTURE

Researchers are currently developing carnations in further shades of blue, and hope to release them commercially over the next two to three years. It is also intended that the technology will be applied to species such as rose, gerbera, lily and chrysanthemum in the future.

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.

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 Suntory rose needs further development to exhibit bright sky blue colours, and it will be several years before it meets regulatory approvals and can be marketed.

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#### 7. FURTHER INFORMATION

More information about this research can be found at:

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