

## Biosafety Clearing-House (BCH)

LIVING MODIFIED ORGANISM (LMO)


BCH-LMO-SCBD-14831-8

[? Decisions on the LMO ? Risk Assessments](#)

LAST UPDATED: 15 OCT 2015


### Living Modified Organism identity

The image below identifies the LMO through its unique identifier, trade name and a link to this page of the BCH. Click on it to download a larger image on your computer. For help on how to use it go to the LMO quick-links page.



FLO-11959-4  
Moonshade™ carnation

Read barcode or type above URL into internet browser to access information on this LMO in the Biosafety Clearing-House © SCBD 2012

<https://bch.cbd.int/database/record?documentID=14831>


Name

Moonshade™ carnation

EN

Transformation event

959A (11959)

Unique identifier

FLO-11959-4

Developer(s)

- **PERSON:** STEPHEN CHANDLER | [BCH-CON-SCBD-4953-5](#)

#### PERSON

Stephen Chandler

Cosultant

Melbourne, VIC

Australia

Phone: +61 409 387 386

Email: [schandler@florigene.com.au](mailto:schandler@florigene.com.au)

Website: <http://www.florigene.com>

#### RELATED ORGANIZATION

Description

Carnation with a modified flower colour, a shade of light mauve, whereas the non-GM parent has cream-white flowers. The colour has been achieved by introducing into white carnation

EN

two genes of the anthocyanin biosynthesis pathway from Petunia and Viola sp. These genes, encoding dihydroflavonol 4-reductase (dfr) and flavonoid 3'5' hydroxylase (f3'5'h), together with other genes of the anthocyanin biosynthesis pathway already present in the non GM carnation, give rise to the anthocyanins delphinidin and cyanidin.

**Note:** This line was never commercialised

**NOTE: This LMO was formerly referred to with the UID FLO-11959-3.**

#### Recipient Organism or Parental Organisms

The term “Recipient organism” refers to an organism (either already modified or non-modified) that was subjected to genetic modification, whereas “Parental organisms” refers to those that were involved in cross breeding or cell fusion.

[BCH-ORGA-SCBD-4954-7](#) ORGANISM | DIANTHUS CARYOPHYLLUS (CARNATION, DIACA) |  
Crops

#### Related LMO(s)

[BCH-LMO-SCBD-14772-7](#) | FLO-11363-2 - Moonshadow™ carnation | Stephen Chandler Changes in quality and/or metabolite content - Pigmentation / Coloration Resistance to herbicides - Chlorsulfuron, Sulfonylurea

[BCH-LMO-SCBD-14829-8](#) | FLO-11226-9 - Moonshade™ carnation | Stephen Chandler Changes in quality and/or metabolite content - Pigmentation / Coloration Resistance to herbicides - Chlorsulfuron, Sulfonylurea

[BCH-LMO-SCBD-48219-6](#) | FLO-40689-6 - Moonaqua™ carnation | Dr Yoshikazu Tanaka Changes in quality and/or metabolite content - Pigmentation / Coloration Resistance to herbicides - Chlorsulfuron, Sulfonylurea

[BCH-LMO-SCBD-14835-11](#) | FLO-40685-2 - Moonvista™ carnation | Stephen Chandler Changes in quality and/or metabolite content - Pigmentation / Coloration Resistance to herbicides - Chlorsulfuron, Sulfonylurea

[Show detection method\(s\)](#)

[BCH-LMO-SCBD-14830-8](#) | FLO-11351-8 - Moonshade™ carnation | Stephen Chandler Changes in quality and/or metabolite content - Pigmentation / Coloration Resistance to herbicides - Chlorsulfuron, Sulfonylurea

[BCH-LMO-SCBD-14833-8](#) | FLO-11400-3 - Moonshade™ carnation | Stephen Chandler Changes in quality and/or metabolite content - Pigmentation / Coloration Resistance to herbicides - Chlorsulfuron, Sulfonylurea

[BCH-LMO-SCBD-14832-7](#) | FLO-11988-6 - Moonshade™ carnation | Stephen Chandler Changes in quality and/or metabolite content - Pigmentation / Coloration Resistance to herbicides - Chlorsulfuron, Sulfonylurea

### Characteristics of the modification process

#### Vector

pCGP1991

EN

#### Techniques used for the modification

Agrobacterium-mediated DNA transfer

## Genetic elements construct

P-35S-CaMV 0.200 kb	L-cab-PETHY 0.060 kb	CS-SuRB-TOBAC 3.770 kb	T-SuRB-TOBAC 0.000 kb
------------------------	-------------------------	---------------------------	--------------------------

P-DFR-PETHY 0.000 kb	CS-DFR-PETHY 4.960 kb	T-DFR-PETHY 0.000 kb
-------------------------	--------------------------	-------------------------

P-CHS 1.170 kb	CS-F35H-VIOLA 1.800 kb	T-D8 0.810 kb
-------------------	---------------------------	------------------

### Introduced or modified genetic element(s)

Some of these genetic elements may be present as fragments or truncated forms. Please see notes below, where applicable.

#### **BCH-GENE-SCBD-15009-4** DIHYDROFLAVONOL-4-REDUCTASE | (PETUNIA) |

Protein coding sequence | Changes in quality and/or metabolite content (Pigmentation / Coloration)

#### **BCH-GENE-SCBD-15177-7** ACETOHYDROXY ACID SYNTHASE GENE | (TOBACCO PLANT) |

Protein coding sequence | Resistance to herbicides (Chlorsulfuron, Sulfonylurea)

#### **BCH-GENE-SCBD-43793-4** FLAVONOID 3', 5'-HYDROXYLASE GENE | (PANSIES) |

Protein coding sequence | Changes in quality and/or metabolite content (Pigmentation / Coloration)

#### **BCH-GENE-SCBD-100287-7** CAMV 35S PROMOTER |

Promoter

#### **BCH-GENE-SCBD-101901-3** 5' UNTRANSLATED LEADER OF CHLOROPHYLL A/B-BINDING PROTEIN | (PETUNIA) |

Leader

#### **BCH-GENE-SCBD-100390-7** ACETOHYDROXY ACID SYNTHASE GENE TERMINATOR | (TOBACCO PLANT) |

Terminator

#### **BCH-GENE-SCBD-105798-1** DIHYDROFLAVONOL-4-REDUCTASE PROMOTER | (PETUNIA) |

Promoter

#### **BCH-GENE-SCBD-105799-1** DIHYDROFLAVONOL-4-REDUCTASE TERMINATOR | (PETUNIA) |

Terminator

#### **BCH-GENE-SCBD-103771-1** CHALCONE SYNTHASE GENE PROMOTER | (COMMON SNAPDRAGON, SNAPDRAGON) |

Promoter

#### **BCH-GENE-SCBD-103772-2** D8 GENE TERMINATOR | (PETUNIA) |

Terminator

## LMO characteristics

### Modified traits

Resistance to herbicides

Sulfonylurea

Changes in quality and/or metabolite content

Pigmentation / Coloration

### Common use(s) of the LMO

Ornamental

## Additional Information

### Additional Information

Transgenic line 959A was developed using recombinant DNA techniques to produce flowers with a unique deep purple colour by introducing two genes that function together in the biosynthesis of the anthocyanin pigment delphinidin. The transgenic line was derived from the parent cultivar 'White Unesco', which is a white coloured carnation that was selected for a mutation in the dihydroflavonol reductase (DFR) encoding gene that did not allow for expression of a functional enzyme, and thus did not produce the anthocyanin type pigments that give rise to blue and red coloured flowers.

The two genes introduced into the transgenic carnation line included a functional dihydroflavonol reductase encoding gene isolated from petunia (*Petunia hybrida*) and a gene encoding the enzyme flavonoid 3', 5'-hydroxylase (F3', 5'H), a member of the NADPH-Cytochrome P450 reductase family, isolated from *Viola*. Expression of the F3', 5'H encoding gene (bp40) allows for the production of blue coloured delphinidin anthocyanin pigments, which are not normally found in carnations.

Tolerance to sulfonyl urea herbicides was produced via the introduction of a chlorsulfuron tolerant version of the acetolactate synthase (ALS) encoding gene from tobacco.

### Other relevant website addresses and/or attached documents

? [OECD UID Database](#) ( *English* )

? [CERA GM Database](#) ( *English* )

[BCH-LMO-SCBD-14831-8](#)

## Further Information

Questions about the Cartagena Protocol on Biosafety or the operation of the Biosafety Clearing-House may be directed to the Secretariat of the Convention on Biological Diversity.

### **Secretariat of the Convention on Biological Diversity**

413 rue Saint-Jacques, suite 800  
Montreal, Québec, H2Y 1N9  
Canada

Fax: +1 514 288-6588

Email: [secretariat@cbd.int](mailto:secretariat@cbd.int)