

Biosafety Clearing-House (BCH)

LIVING MODIFIED ORGANISM (LMO)

BCH-LMO-SCBD-101077-7

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

LAST UPDATED: 24 JUL 2013

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.



ACS-BN004-7 X ACS-BN003-6
InVigor™ canola

<https://bch.cbd.int/database/record?documentID=101077>



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

Name

InVigor™ canola

EN

Transformation event

MS1(B91-4) x RF3

Unique identifier

ACS-BN004-7 x ACS-BN003-6

Developer(s)

- **ORGANIZATION:** BAYER CROPSCIENCE (AVENTIS CROPSCIENCE (AGREVO)) | [BCH-CON-SCBD-47516-1](#)

ORGANIZATION

Bayer CropScience (Aventis CropScience (AgrEvo))
Bayer CropScience AG Alfred-Nobel-Str. 50 Monheim am Rhein D-40789
Germany
Phone: +49-(0)2173-380
Website: <http://www.bayercropscience.com>

Description

The stacked canola line ACS-BN004-7 x ACS-BN003-6 was obtained through the conventional cross breeding of each of the parental organisms. This results in a line with male-sterility, fertility restoration, pollination control system displaying glufosinate herbicide tolerance.

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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-9845-4 ORGANISM | BRASSICA RAPA (CANOLA PLANT) |

Crops

BCH-LMO-SCBD-14756-5 LIVING MODIFIED ORGANISM | ACS-BNØØ4-7 - INVIGOR™ CANOLA |

Changes in physiology and/or production - Reproduction - Male sterility Resistance to antibiotics - Kanamycin
Resistance to herbicides - Glufosinate

BCH-LMO-SCBD-14755-7 LIVING MODIFIED ORGANISM | ACS-BNØØ3-6 - INVIGOR™ CANOLA |

Changes in physiology and/or production - Fertility restoration Resistance to herbicides - Glufosinate

Related LMO(s)

BCH-LMO-SCBD-14757-7 | ACS-BNØØ4-7 x ACS-BNØØ1-4 - InVigor™ canola | Changes in physiology and/or production - Reproduction - Male sterility Resistance to antibiotics - Kanamycin Resistance to herbicides - Glufosinate

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

BCH-LMO-SCBD-14758-7 | ACS-BNØØ4-7 x ACS-BNØØ2-5 - InVigor™ canola | Changes in physiology and/or production - Reproduction - Male sterility Resistance to antibiotics - Kanamycin Resistance to herbicides - Glufosinate

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

Characteristics of the modification process

Vector

pTTM8RE and pTHW118

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Techniques used for the modification

Cross breeding

Genetic elements construct

P-ta29-TOBAC 1.500 kb	CS-barnase-BACAM 0.340 kb	T-nos-RHIRD 0.250 kb
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P-rbcS-ARATH 1.840 kb	TP-rbcS 0.160 kb	CS-bar-STRHY 0.500 kb	T-tr7-RHIRD 0.200 kb
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P-nos-RHIRD 0.400 kb	CS-nptII-ECOLX 1.000 kb	T-ocs-RHIRD 0.900 kb
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P-ta29-TOBAC 1.510 kb	CS-barstar-BACAM 0.270 kb	T-barstar 0.040 kb	T-nos-RHIRD 0.260 kb
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P-rbcS-ARATH 1.730 kb	CS-bar-STRHY 0.550 kb	T-tr7-RHIRD 0.210 kb
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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-14972-12 PHOSPHINOTHRICIN N-ACETYLTRANSFERASE GENE |

Protein coding sequence | Resistance to herbicides (Glufosinate)

BCH-GENE-SCBD-14973-6 BARNASE |

Protein coding sequence | Changes in physiology and/or production (Reproduction, Male sterility)

BCH-GENE-SCBD-15001-5 NEOMYCIN PHOSPHOTRANSFERASE II | (BACTERIA) |

Protein coding sequence | Resistance to antibiotics (Kanamycin)

BCH-GENE-SCBD-14974-7 BARSTAR |

Protein coding sequence | Changes in physiology and/or production (Fertility restoration)

BCH-GENE-SCBD-101407-6 PTA29 POLLEN SPECIFIC PROMOTER | (TOBACCO PLANT) |

Promoter

BCH-GENE-SCBD-100269-8 NOPALINE SYNTHASE GENE TERMINATOR |

Terminator

BCH-GENE-SCBD-103851-5 RBCS PROMOTER | (THALE CRESS) |

Promoter

BCH-GENE-SCBD-101902-4 RBCS TRANSIT PEPTIDE | (THALE CRESS) |

Transit signal

BCH-GENE-SCBD-103067-9 TRANSCRIPT 7 GENE 3' UNTRANSLATED REGION |

Terminator

BCH-GENE-SCBD-100270-6 NOPALINE SYNTHASE GENE PROMOTER |

Promoter

BCH-GENE-SCBD-100271-5 OCTOPINE SYNTHASE GENE TERMINATOR |

Terminator

BCH-GENE-SCBD-101409-2 BARSTAR GENE TERMINATOR |

Terminator

Notes regarding the genetic elements present in this LMO

DNA insert from ACS-BN004-7 vector pTTM8RE

ACS-BN004-7 is a male-sterile canola line that cannot produce viable pollen due to the presence of the barnase gene. The line also contributes a copy of the bar gene which confers tolerance to the herbicide glufosinate.

DNA insert from ACS-BN003-6 vector pTHW118

ACS-BN003-6 is a fertility restorer canola line that inhibits the action of the barnase ribonuclease through the expression of the barstar gene. The line also contributes a copy of the bar gene which confers tolerance to the herbicide glufosinate.

For additional information on this LMO, please refer to the records of the parental LMOs.

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LMO characteristics

Modified traits

Resistance to herbicides

Glufosinate

Resistance to antibiotics

Kanamycin
Changes in physiology and/or production
Reproduction
Male sterility
Fertility restoration

Common use(s) of the LMO

Food
Feed

Detection method(s)

External link(s)

- ? [ACS-BNØØ3-6 - EU Reference Laboratory for GM Food and Feed \(EURL-GMFF\)](#) (*English*)
- ? [Event-specific Method for the Quantification of Oilseed Rape MS1 using Real-time PCR](#) (*English*)

Additional Information

Additional Information

The transgenic line MS1 (B91-4) was produced by genetically engineering plants to be male sterile and tolerant to the herbicide glufosinate ammonium (as a selectable marker). The parental line MS1 contains the barnase gene for male sterility, isolated from *Bacillus amyloliquefaciens*, a common soil bacterium that occurs naturally in the soil and in various organisms including bacteria and plants, and frequently used as a source for industrial enzymes. The barnase gene encodes for a ribonuclease enzyme (RNase) expressed only in the tapetum cells of the pollen sac during anther development. The RNase affects RNA production, disrupting normal cell functioning and arresting early anther development, thus leading to male sterility.

The transgenic line RF3 (DBN212-0005) was produced by genetically engineering plants to restore fertility in the hybrid line and to be tolerant to the herbicide glufosinate ammonium (as a selectable marker). Transgenic RF3 plants contain the barstar gene isolated from *Bacillus amyloliquefaciens*. The barstar gene codes for a ribonuclease inhibitor (barstar enzyme) that is expressed only in the tapetum cells of the pollen sac during anther development. The ribonuclease inhibitor specifically inhibits barnase RNase expressed by the MS8 line. Together, the RNase and the ribonuclease inhibitor form a very stable one-to-one complex, in which the RNase is inactivated. As a result, when pollen from the restorer line RF3 is transferred to the male sterile line MS8, the resultant progeny express the RNase inhibitor in the tapetum cells of the anthers allowing hybrid plants to develop normal anthers and restore fertility.

[BCH-LMO-SCBD-101077-7](#)

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**

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