

Biosafety Clearing-House (BCH)

LIVING MODIFIED ORGANISM (LMO)


BCH-LMO-SCBD-115910-1

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

LAST UPDATED: 23 FEB 2021

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.



Fertility restorer Indian mustard

CBD

<https://bch.cbd.int/database/record?documentID=115910>



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

Name

Fertility restorer Indian mustard

EN

Transformation event

modbs 2.99

Developer(s)

- [ORGANIZATION: UNIVERSITY OF DELHI](#) | [BCH-CON-SCBD-115908-1](#)

ORGANIZATION

University of Delhi

Academic or research institute

Centre for Genetic Manipulation of Crop Plants (CGMCP)

New Delhi

India

Website: <http://oldweb.du.ac.in/du/>, <http://oldweb.du.ac.in/du/index.php?page=contact-us>

Description

The Indian mustard (*Brassica juncea*) was modified for restoring male fertility and herbicide tolerance. For male fertility restoration, the mustard expresses *Bacillus amyloliquefaciens* barstar, a protein inhibitor of barnase, in the tapetum cell layer of the pollen sac during anther development. Barnase is an RNase, which degrades RNA in the pollen and prevents the pollen from developing. With barstar expression, the RNase is inhibited and the pollen develops normally. Thus, crossing barstar expressing lines with barnase expressing (male sterile) lines restores male fertility in the progeny.

EN

For glufosinate tolerance, the mustard expresses *Streptomyces hygroscopicus* phosphinothricin N-acetyltransferase, which inactivates the herbicide through acetylation.

To achieve the fertility restorer line EH-2 modbs 2.99 for hybrid seed production, the mustard variety Varuna was initially transformed with transgenic construct and then backcrossed into variety EH-2. Six backcrossings were performed to try to remove integration of vector backbone sequence.

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-115905-1](#) ORGANISM | BRASSICA JUNCEA - INDIAN MUSTARD, BROWN MUSTARD, CHINESE MUSTARD, LEAF MUSTARD, VEGETABLE MUSTARD, MUSTARD GREENS, BRAJU |

Point of collection or acquisition of the recipient organism or parental organisms

Varuna (T-59) is extensively cultivated in northern India. EH-2 was developed from east European material by University of Nagpur.

EN

Characteristics of the modification process

Vector

pPZP200

EN

Techniques used for the modification

Agrobacterium-mediated DNA transfer

Genetic elements construct

[T-ocs-RHIR](#)
0.000 kb

[CS-bar-ST](#)
0.000 k

[P-e35S-CaMV](#)
0.000 kb

[P-ta29-TOBAC](#)
0.279 kb

[CS-barstar-BACAM](#)
0.273 kb

[T-35S-CaMV](#)
0.000 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-100271-5](#) OCTOPINE SYNTHASE GENE TERMINATOR |

Terminator

[BCH-GENE-SCBD-14972-12](#) PHOSPHINOTHRICIN N-ACETYLTRANSFERASE GENE |

Protein coding sequence | Resistance to herbicides (Glufosinate)

[BCH-GENE-SCBD-100366-6](#) CAMV ENHANCED 35S PROMOTER |

Promoter

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

Promoter

BCH-GENE-SCBD-14974-7 BARSTAR

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

BCH-GENE-SCBD-100290-6 CAMV 35S TERMINATOR

Terminator

Notes regarding the genetic elements present in this LMO

The modified mustard contains two gene cassettes: *Streptomyces hygroscopicus* (*bar*) and *Bacillus amyloliquefaciens* *barstar*.

The *bar* coding sequence is under control of the *Cauliflower mosaic virus* (CaMV) enhanced 35S promoter and *Rhizobium radiobacter* octopine synthase terminator.

Barstar is under control of a *Nicotiana tabacum* TA29 pollen specific promoter and a CaMV 35S terminator. The TA29 promoter is active only in the tapetum cell layer of the pollen sac during anther development (male-specific expression). The coding sequence was codon optimized for expression in plants.

EN

Note:

- Southern blot and segregation analyses indicated that the genome contains a single insertion
- DNA sequence analysis indicated that the insertion occurred in the 'B' genome.

LMO characteristics

Modified traits

Resistance to herbicides

Glufosinate

Changes in physiology and/or production

Reproduction

Fertility restoration

Common use(s) of the LMO

Other (Hybrid seed production)

Additional Information

Other relevant website addresses and/or attached documents

? [Safety-assessment-report-on-GE-Mustard_0.pdf](#) (English)

? [GenBank - Binary cloning vector pPZP200 for plant transformation, complete sequence](#) (English)

? [SnapGene - pPZP200](#) (English)

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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