# LIVING MODIFIED ORGANISM (LMO)

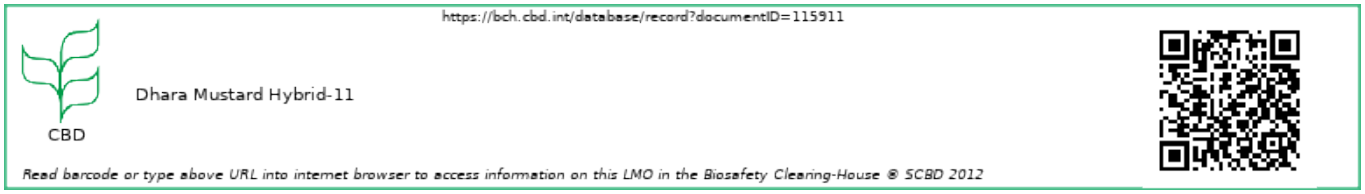
BCH-LMO-SCBD-115911-1

? 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.




Name

| | |
|---|---|
| Dhara Mustard Hybrid-11 | EN |

Transformation event

DMH-11 (Varuna bn 3.6 × EH-2 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 hybrid DMH-11 Indian mustard (*Brassica juncea*) was produced through crossing two modified parental lines for restored male-fertility and herbicide tolerance. The mustard expresses expresses both *Bacillus amyloliquefaciens* barnase, an RNase, and barstar, an inhibitor of barnase, in the tapetum cell layer of the pollen sac during anther development. Without barstar, the non-specific nature of barnase would degrade the RNA and prevent the pollen from developing. The expression of barnase allowed the developers to control crosses of the parental plants. In this specific cross, fertility (pollen production) was restored through the introduction of barstar. Overall, the resulting heterosis is expected to improve | EN |

productivity of the hybrid mustard.

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

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 |

BCH-LMO-SCBD-115909-2 LIVING MODIFIED ORGANISM | MALE STERILE INDIAN MUSTARD |

Changes in physiology and/or production - Reproduction - Male sterility Resistance to herbicides - Glufosinate, Imidazolinone, Sulfonylurea

BCH-LMO-SCBD-115910-1 LIVING MODIFIED ORGANISM | FERTILITY RESTORER INDIAN MUSTARD |

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

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

Kindly refer to parental records for more information. EN

## Characteristics of the modification process

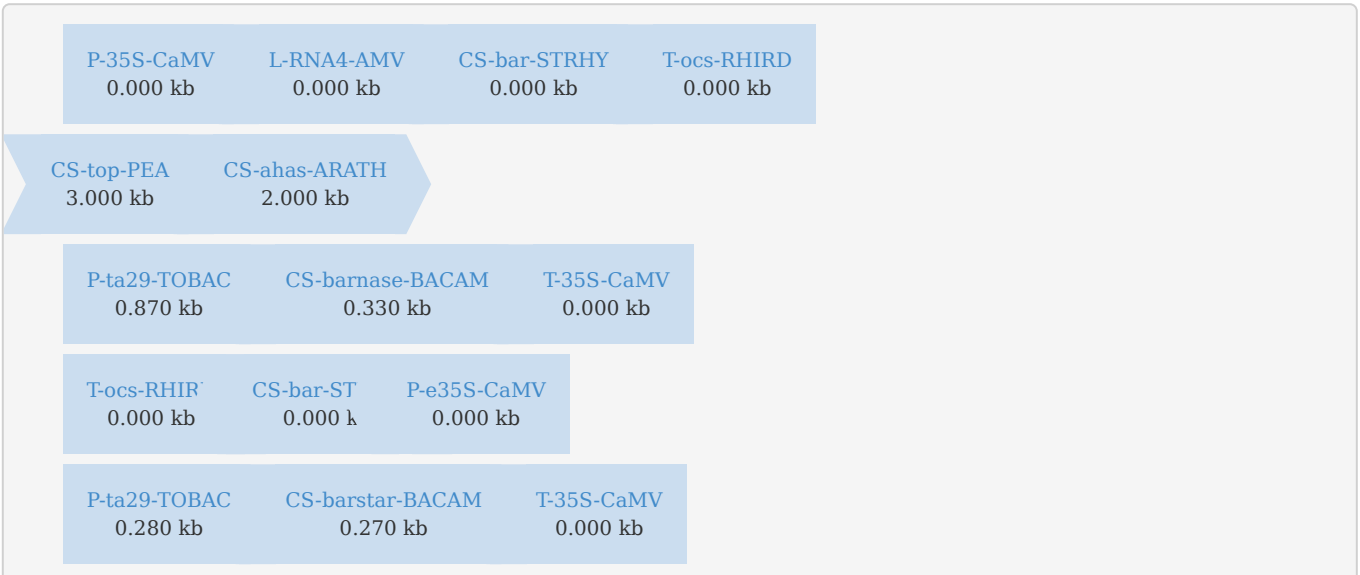
Vector

pPZP200 EN

Techniques used for the modification

Cross breeding

Genetic elements construct




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-14973-6 BARNASE

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

BCH-GENE-SCBD-14974-7 BARSTAR

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

BCH-GENE-SCBD-14972-12 PHOSPHINOTHRICIN N-ACETYLTRANSFERASE GENE

Protein coding sequence | Resistance to herbicides (Glufosinate)

BCH-GENE-SCBD-115906-1 TOPOISOMERASE - PISUM SATIVUM - GARDEN PEA, PEA

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

Promoter

BCH-GENE-SCBD-100287-7 CAMV 35S PROMOTER

Promoter

BCH-GENE-SCBD-103886-2 5' UNTRANSLATED LEADER OF AMV RNA4 | (ALFALFA MOSAIC VIRUS, AMV)

Leader

BCH-GENE-SCBD-100366-6 CAMV ENHANCED 35S PROMOTER

Promoter

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

Terminator

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

Terminator

BCH-GENE-SCBD-48073-8 ACETOHYDROXY ACID SYNTHASE GENE | (THALE CRESS)

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

Notes regarding the genetic elements present in this LMO

**Insertion related to Varuna bn 3.6**

The parental genome contains two gene cassettes: *Streptomyces hygroscopicus* phosphinothricin N-acetyltransferase (*bar*) and *Bacillus amyloliquefaciens* barnase.

The *bar* coding sequence is under control of a *Cauliflower mosaic virus* (CaMV) 35S promoter with an *Alflafa mosaic virus* (AMV) leader and an *Rhizobium radiobacter* octopine synthase gene terminator. The AMV leader sequence enhances expression of *bar*.

Barnase is under control of a *Nicotiana tabacum* TA29 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).

A spacer fragment can be found between the two gene cassettes to prevent 'leaky' expression of barnase from the CaMV promoter. It is comprised of *Pisum sativum* topoisomerase (3kb) and *Arabidopsis thaliana* acetohydroxy acid synthase (2 kb) fragments. Each fragment contains truncations on the 3' and 5' ends. No open reading frames were created during the fusion of the two fragments and thus are not expected to encode a functional product. Note: The arrangement of the insert is unclear.

Note:

- Southern blot and segregation analyses indicated that the genome contains a single

EN

insertion.
- Sequencing analysis indicated that the T-DNA integrated was identical to the sequences in the vector.
- The T-DNA was found to be integrated in A9 Linkage Group on the 'A' genome between *Bra32488* and *Bra32489* genes.

**Insertion related to EH-2 modbs 2.99**
The parental genome contains two gene cassettes: (*bar*) and *B. amyloliquefaciens* barstar.

The *bar* coding sequence is under control of a CaMV enhanced 35S promoter and *R. radiobacter* octopine synthase terminator.

Barstar is under control of a *N. 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.

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.

*For more information, kindly refer to the parental records.*

### LMO characteristics

Modified traits

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

Common use(s) of the LMO

Food

### Additional Information

Other relevant website addresses and/or attached documents

? Safety-assessment-report-on-GE-Mustard_0.pdf *( 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.

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