

## Biosafety Clearing-House (BCH)

LIVING MODIFIED ORGANISM (LMO)


BCH-LMO-SCBD-115719-1

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

LAST UPDATED: 10 SEP 2020


### 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.



MON-87427-7 × MON87411-9  
Herbicide tolerant, insect resistant maize

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=115719>


Name

Herbicide tolerant, insect resistant maize

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Transformation event

MON87427 × MON87411

Unique identifier

MON-87427-7 × MON87411-9

Developer(s)

- [ORGANIZATION: BAYER CROPSCIENCE](#) | [BCH-CON-SCBD-7088-7](#)

#### ORGANIZATION

Bayer CropScience

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

Description

The maize has been produced through cross breeding of modified parental lines to confer tolerance to herbicides and resistance to insects. For Coleoptera resistance, the maize expresses *Bacillus thuringiensis* Cry3Bb1, which forms pores in the insect's midgut lining, leading to cell lysis and septicemia. Additionally, the maize contains an RNA interference cassette targeting *Diabrotica virgifera virgifera* (Western corn rootworm) DvSnf7, an essential cellular component of endosomal sorting complex required for transport. Instead of producing a protein, the cassette produces RNA molecules that cause gene silencing of this gene in western corn rootworm upon consumption of plant tissue and leads to mortality. For tolerance to glyphosate, the maize expresses *Agrobacterium tumefaciens*

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5-enolpyruvylshikimate-3-phosphate synthase, a bacterial variant of an endogenous gene, which prevents the herbicide interference of the shikimate pathway (responsible for essential aromatic amino acid biosynthesis). Both parental lines contain a 5-enolpyruvylshikimate-3-phosphate synthase gene cassette. However, due to the general (non-specific) expression of one parental line, the tissue-specific expression is lost in the resulting cross.

#### 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-246-6** ORGANISM | ZEA MAYS (MAIZE, CORN, MAIZE) |

Crops

**BCH-LMO-SCBD-104758-3** LIVING MODIFIED ORGANISM | MON-87427-7 - MAIZE MODIFIED FOR TISSUE SELECTIVE GLYPHOSATE TOLERANCE |

Resistance to herbicides - Glyphosate

**BCH-LMO-SCBD-108881-1** LIVING MODIFIED ORGANISM | MON-87411-9 - MAIZE MODIFIED FOR HERBICIDE TOLERANCE AND INSECT RESISTANCE |

Monsanto | Resistance to diseases and pests (Insects, Coleoptera (beetles), Western corn rootworm (*Diabrotica virgifera*), Northern corn rootworm (*Diabrotica barberi*)), Resistance to herbicides (Glyphosate)

### Characteristics of the modification process

#### Vector

PV-ZMAP1043; PV-ZMIR10871

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#### Techniques used for the modification

Cross breeding

#### Genetic elements construct

P-e35S-CaMV 0.620 kb	I-hsp70-MAIZE 0.800 kb	TP-ctp2-ARATH 0.230 kb	CS-CP4epsps-RHIRD 1.370 kb	T-nos-RHIRD 0.250 kb
P-e35S-CaMV 0.620 kb	I-hsp70-MAIZE 0.800 kb	CS-Snf7_RNAi_u-DIAVI 0.240 kb	CS-Snf7_RNAi_u-DIA 0.240 kb	T-rbcS_E9-PEA 0.630 kb
P-piIG-MAIZE 0.950 kb	L-cab-WHEAT 0.060 kb	I-1_act1-ORYSA 0.480 kb	CS-Cry3Bb1-BACTU 1.960 kb	T-hsp17_3-WHEAT 0.210 kb
P-TubA-ORYSA 2.180 kb	TP-ctp2-ARATH 0.230 kb	CS-CP4epsps-RHIRD 1.370 kb	T-TubA-ORYSA 0.580 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-100366-6** CAMV ENHANCED 35S PROMOTER |

Promoter

[BCH-GENE-SCBD-100359-7](#) HSP70 INTRON | (MAIZE, CORN) |

Intron

[BCH-GENE-SCBD-100365-6](#) CHLOROPLAST TRANSIT PEPTIDE 2 | (THALE CRESS) |

Transit signal

[BCH-GENE-SCBD-14979-7](#) 5-ENOLPYRUVYLSHIKIMATE-3-PHOSPHATE SYNTHASE GENE |

Protein coding sequence | Resistance to herbicides (Glyphosate)

[BCH-GENE-SCBD-100269-8](#) NOPALINE SYNTHASE GENE TERMINATOR |

Terminator

[BCH-GENE-SCBD-108875-2](#) SNF7 CODING SEQUENCE | (WESTERN CORN ROOTWORM) |

Protein coding sequence | Resistance to diseases and pests (Insects, Coleoptera (beetles), Western corn rootworm (*Diabrotica virgifera*))

[BCH-GENE-SCBD-101877-5](#) RBCS-E9 GENE TERMINATOR | (GARDEN PEA) |

Terminator

[BCH-GENE-SCBD-108876-1](#) PIIG GENE PROMOTER | (MAIZE, CORN) |

Promoter

[BCH-GENE-SCBD-100354-6](#) 5' UNTRANSLATED LEADER FROM CHLOROPHYLL A/B-BINDING PROTEIN | (WHEAT) |

Leader sequence

[BCH-GENE-SCBD-100355-6](#) RICE ACTIN 1, INTRON | (RICE) |

Intron

[BCH-GENE-SCBD-14993-5](#) CRY3BB1 | BACILLUS THURINGIENSIS - BT, BACILLUS, BACTU |

Protein coding sequence | Resistance to diseases and pests (Insects, Coleoptera (beetles))

[BCH-GENE-SCBD-100356-6](#) HEAT SHOCK PROTEIN 17.3 TERMINATOR | (WHEAT) |

Terminator

[BCH-GENE-SCBD-108877-1](#) ALPHA TUBULIN GENE PROMOTER | (RICE) |

Promoter

[BCH-GENE-SCBD-108880-1](#) ALPHA TUBULIN GENE TERMINATOR | (RICE) |

Terminator

Notes regarding the genetic elements present in this LMO

#### **DNA insert from MON87427 (MON-87427-7) vector PV-ZMAP1043**

Transcription of *Agrobacterium tumefaciens* 5-enolpyruvylshikimate-3-phosphate synthase (*epsps*) commences from the *Cauliflower mosaic virus* (CaMV) enhanced 35S promoter and terminates at the *A. tumefaciens* nopaline synthase (*nos*) terminator. The transcript contains a *Zea mays* heat shock protein 70 (*hsp70*) intron, an *Arabidopsis thaliana* N-terminal chloroplast transit peptide sequence for chloroplast targeting of the protein and *epsps*. The CaMV enhanced 35S promoter-*hsp70* combination promotes gene expression in female and vegetative tissues, but not in male reproductive tissues (pollen microspores and tapetum).

#### **Note:**

- Southern blot analyses indicate that a single copy of the T-DNA was inserted at a single site in the parental maize genome and no plasmid vector backbone sequences were detected to have been integrated. DNA sequencing analyses further indicated that the expected T-DNA

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sequences were integrated.

-The *epsps* coding sequence is the codon optimized coding sequence of the *aroA* gene from *Agrobacterium sp.* strain CP4 encoding EPSPS.

#### **DNA insert from MON87411 (MON-87411-9) vector PV-ZMIR10871**

The MON87411 genome contains an RNA interference (RNAi) cassette targeting *Diabrotica virgifera virgifera*, a *Bacillus thuringiensis* Cry3Bb1 cassette and an *Agrobacterium tumefaciens* 5-enolpyruvylshikimate-3-phosphate synthase (*epsps*) cassette.

Transcription of the RNAi cassette commences from the *Cauliflower mosaic virus* 35S enhanced promoter and terminates at the *Pisum sativum* ribulose biphosphate carboxylase small chain 2 terminator. The transcript initially contains a *Zea mays* heat shock protein 70 intron, which contributes to enhanced expression in vegetative tissues of the plant, and two partial coding sequences of the *D. virgifera virgifera* Snf7p gene, which encodes the SNF7 subunit of the ESCRT-III complex. The two Snf7p sequences are in an inverted orientation, separated by a 150 nucleotide intervening sequence, which allows base pairing between the inverted sequences and hairpin RNA formation post-transcription, which then triggers an RNAi response. Due to RNAi processing, small interfering RNA molecules (roughly 21-23 nucleotides in length) will be produced and thus no translation into protein will occur from this cassette.

Transcription of the *cry3Bb1* is under control of the *Z. mays* physical impedance induced protein promoter and *Triticum aestivum* (wheat) heat shock protein 17.3 terminator. The transcript also contains a wheat 5' untranslated leader from chlorophyll a/b-binding protein and *Oryza sativa* actin 1 intron for enhanced expression of the transgene. Expression of *epsps* is under control of an *O. sativa* alpha tubulin promoter and terminator. The transcript additionally contains *Arabidopsis thaliana* chloroplast targeting peptide 2 to sequester the protein to the chloroplast.

#### Note:

- Sequencing, PCR and bioinformatic analyses indicate that a single, intact insertions of the three gene cassettes occurred in the parental line.
- No plasmid backbone was detected.

*Kindly refer to the parental LMO records for more information.*

## **LMO characteristics**

### Modified traits

Resistance to diseases and pests

Insects

Coleoptera (beetles)

Western corn rootworm (*Diabrotica virgifera*)

Resistance to herbicides

Glyphosate

### Common use(s) of the LMO

Food  
Feed

### Detection method(s)

External link(s)

? [MON-87427-7 - EU Reference Laboratory for GM Food and Feed \(EURL-GMFF\)](#) ( *English* )

? [MON-87411-9 - EU Reference Laboratory for GM Food and Feed \(EURL-GMFF\)](#) ( *English* )

### Additional Information

Other relevant website addresses and/or attached documents

? [Euginius: MON87427 x MON87411](#) ( *English* )

[BCH-LMO-SCBD-115719-1](#)

## 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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