

Biosafety Clearing-House (BCH)

LIVING MODIFIED ORGANISM (LMO)


BCH-LMO-SCBD-15409-10

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

LAST UPDATED: 27 AUG 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.



SY-GTSB77-7
InVigor™ Sugar Beet

CBD

<https://bch.cbd.int/database/record?documentID=15409>



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

Name

InVigor™ Sugar Beet

EN

Transformation event

GTSB77

Unique identifier

SY-GTSB77-7

Developer(s)

- [ORGANIZATION: MONSANTO](#) | [BCH-CON-SCBD-14925-3](#)

ORGANIZATION

Monsanto
800 North Lindbergh Blvd.
St. Louis, MO
63167, United States of America
Phone: + 1 314 694-1000
Fax: +1 314 694-3080
Website: <http://www.monsanto.com>

Description

Sugar beet line 77 was produced to exhibit tolerance to the herbicide glyphosate (Roundup) by incorporating the 5-enolpyruvylshikimate-3-phosphate synthase (cp4 epsps) gene from *Agrobacterium* sp. strain CP4 and a glyphosate oxidoreductase gene (gox) from *Ochrobactrum anthropi*.

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NOTE: This LMO was formerly referred to with the UID SY-GTSB77-8.

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-12097-4 ORGANISM | BETA VULGARIS (COMMON BEET, SUGARBEET, BETMA) |
Crops

Characteristics of the modification process

Vector

PV-BVGT03

EN

Techniques used for the modification

Agrobacterium-mediated DNA transfer

Genetic elements construct

P-34S-FMV 0.670 kb	TP-ctp2-ARATH 0.310 kb	CS-CP4epsps-RHIRD 1.360 kb	T-rbcS_E9-PEA 0.630 kb
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P-e35S-CaMV 0.620 kb	CS-uidA-ECOLX 1.810 kb	T-rbcS_E9-PEA 0.630 kb
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P-34S-FMV 0.670 kb	TP-rbcS 0.170 kb	CS-gox-OCHAN 1.300 kb	T-nos-RHIRD 0.260 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-14979-7 5-ENOLPYRUVYLSHIKIMATE-3-PHOSPHATE SYNTHASE GENE |

Protein coding sequence | Resistance to herbicides (Glyphosate)

BCH-GENE-SCBD-14998-4 GLYPHOSATE OXIDOREDUCTASE GENE |

Protein coding sequence | Resistance to herbicides (Glyphosate)

BCH-GENE-SCBD-46004-7 BETA-GLUCURONIDASE CODING SEQUENCE | (BACTERIA) |

Protein coding sequence | Selectable marker genes and reporter genes

BCH-GENE-SCBD-101416-6 TI PLASMID RIGHT BORDER REPEAT |

Plasmid vector

BCH-GENE-SCBD-101507-5 FMV 34S PROMOTER |

Promoter

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

Transit signal

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

Terminator

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

Transit signal

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

Terminator

BCH-GENE-SCBD-101415-9 TI PLASMID LEFT BORDER REPEAT |

Plasmid vector

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

Promoter

Notes regarding the genetic elements present in this LMO

Information on the inserted DNA sequences:

The codon optimised cp4epsps coding sequence cassette consists of the figwort mosaic virus (FMV) promoter, a chloroplast targeting sequence from Arabidosis thaliana, a CP4 EPSPS coding region from Agrobacterium sp. strain CP4. The CP4 EPSPS protein is highly resistant to inhibition by glyphosate, the active ingredient in Roundup herbicide. The uidA coding region for the B-D-glucuronidase (GUS) protein from E. coli and the 3' non-translated region from pea which directs polyadenylation. This gene serves as a selectable marker gene during the plant transformation process. The gox coding sequence cassette consists of the figworth mosaic virus (FMV) promoter, a chloroplast targeting sequence from Arabidosis thaliana promoter coding region from Ochrobactrum anthropi and the 3' non-translated region of the nopaline synthase gene, which directs polyadenylation. When expressed, the function of the glyphosate oxidase (GOX) enzyme is to metabolize glyphosate (N-phosphonomethylglycine), the active ingredient in Roundup herbicide to an inactive form.

Vector information

The plasmid vector PV-BVGT03 contains well characterized DNA segments required for selection and replication of the plasmid in the bacteria as well as a right border for initiating the region of T-DNA, into the plant genomic DNA. The plasmids are composed of several genetic elements: cp4 epsps coding sequence from Agrobacterium tumefaciens, uid sequence (GUS) from Escherichi coli, gox sequence from Ochrobactrum anthropi, and nptII coding sequence from Tn5. The nptII gene was not transferred into the sugar beet genome because of the truncation of the insertion event within the gox gene. In addition, the plasmid contains a bacterial selectable marker coding sequence, aad as well as origins of replication (ori-V and ori-322) necessary for replication and maintenance of the plasmid PV-BVGT03 in bacteria.

The truncated nptII construct was as follows: CaMV 35S promoter >> nptII gene >> nos terminator

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LMO characteristics

Modified traits

Resistance to herbicides

Glyphosate

Selectable marker genes and reporter genes

Common use(s) of the LMO

Food
Feed

Detection method(s)

Additional Information

Southern blot analysis indicates that a single copy of the epsps gene integrated into the host genome in addition to single copies of the gus and gox expression cassettes. However nucleotide sequencing analyses indicated that the gox coding sequence did not fully integrate into the host genome and is thus present in a truncated form. Protein expression analysis further indicated that the gox is expressed in a truncated, chimeric and inactive form.

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Additional Information

Other relevant website addresses and/or attached documents

[GTSB77 - CERA](#) (English)

? [GTSB77 APHIS.pdf](#) (English)

? [InVigor™ sugarbeet - ISAAA](#) (English)

[BCH-LMO-SCBD-15409-10](#)

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