

Biosafety Clearing-House (BCH)

LIVING MODIFIED ORGANISM (LMO)


BCH-LMO-SCBD-115141-1

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

LAST UPDATED: 23 AUG 2019


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.



Cassava modified for increased levels of iron and zinc

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=115141>


Name

Cassava modified for increased levels of iron and zinc

EN

Transformation event

D8023-985004

Developer(s)

- [ORGANIZATION](#): NATIONAL ROOT CROPS RESEARCH INSTITUTE | [BCH-CON-SCBD-115138-1](#)

ORGANIZATION

National Root Crops Research Institute

Academic or research institute

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Description

Cassava (*Manihot esculenta* Crantz) was modified to express *Arabidopsis thaliana* FERRITIN 1 and IRON-REGULATED TRANSPORTER 1 to increase the levels of iron and zinc in the tuber tissues. Previous overexpression experiments demonstrated increases of iron by 7-18 times and zinc by 3-10 times.

A selectable marker, *Escherichia coli* neomycin phosphotransferase II, was also included for

EN

selection of transformants using kanamycin.

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-112539-1](#) ORGANISM | MANIHOT ESCULENTA (CASSAVA, BRAZILIAN ARROWROOT, YUCA, MANIOC, MANDIOCA, MANES) |

Crops

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

Cassava cultivar: TMS 98/0505

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Related LMO(s)

[BCH-LMO-SCBD-115142-1](#) | Cassava modified for increased levels of iron and zinc | National Root Crops Research Institute(NRCRI) | Changes in quality and/or metabolite content, Increased levels of iron, Increased levels of zinc, Resistance to antibiotics (Kanamycin), Selectable marker genes and reporter genes

[BCH-LMO-SCBD-115140-1](#) | Viral resistant cassava with increased levels of zinc and iron | National Root Crops Research Institute(NRCRI) | Changes in quality and/or metabolite content, Increased iron levels, Increased zinc levels, Resistance to antibiotics (Kanamycin), Resistance to CBSV, Resistance to diseases and pests (Viruses), Resistance to UCBSV, Selectable marker genes and reporter genes

[BCH-LMO-SCBD-115144-1](#) | Viral resistant cassava with increased levels of zinc and iron | Dr Ihuoma Okwuonu | Changes in quality and/or metabolite content, Increased iron levels, Increased zinc levels, Resistance to antibiotics (Kanamycin), Resistance to CBSV, Resistance to diseases and pests (Viruses), Resistance to UCBSV, Selectable marker genes and reporter genes

Characteristics of the modification process

Vector

p8023

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Techniques used for the modification

Agrobacterium-mediated DNA transfer

Genetic elements construct

T-35S-CaM 0.208 kb	T-AtPP2 0.600	IP 1.02	P-AtPP2-A14 2.764 kb
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T-nos-RHIR 0.265 kb	Patatin 0.425	AtF 0.76	P-B33 1.037 kb
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T-nos-RHIR 0.249 kb	CS-nptII-EC 0.795 kb	P-e35S-CaMV 0.390 kb
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[P-e35S-CaMV](#)
0.390 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-115111-1 PHLOEM PROTEIN 2-A14 PROMOTER | (THALE CRESS) |

Promoter

BCH-GENE-SCBD-115112-1 IRON-REGULATED TRANSPORTER 1 | (THALE CRESS) |

Protein coding sequence | Changes in quality and/or metabolite content, Increased levels of iron

BCH-GENE-SCBD-115113-1 PHLOEM PROTEIN 2-A14 3' UNTRANSLATED REGION | (THALE CRESS) |

Terminator

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

Terminator

BCH-GENE-SCBD-100273-4 B33 GENE PROMOTOR | (POTATO) |

Promoter

BCH-GENE-SCBD-115136-1 FERRITIN 1 | (THALE CRESS) |

Protein coding sequence | Changes in quality and/or metabolite content, Increased levels of iron, Tolerance to abiotic stress, Tolerance to excess iron

BCH-GENE-SCBD-115137-1 PATATIN-1 3' UNTRANSLATED REGION | (POTATO) |

Terminator

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

Terminator

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

Protein coding sequence | Resistance to antibiotics (Kanamycin)

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

Promoter

Notes regarding the genetic elements present in this LMO

Iron-regulated transporter cassette:

Transcription of the *Arabidopsis thaliana* iron-regulated transporter 1 is under control of the *A. thaliana* phloem protein 2-A14 promoter and 3' untranslated region, as well as the Cauliflower Mosaic Virus 35S terminator.

Ferritin-1 cassette:

Arabidopsis thaliana ferritin-1 is under transcriptional control of the *Solanum tuberosum* patatin-1 promoter and terminator, as well as the *Agrobacterium tumefaciens* nopaline synthase (*nos*) terminator.

Selectable marker cassette:

Transcription of the *Escherichia coli* neomycin phosphotransferase II occurs from the duplicated enhanced Cauliflower Mosaic Virus 35S promoter and terminates at the *nos* terminator.

Please note all genetic elements were in the anti-sense orientation.

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LMO characteristics

Modified traits

Resistance to antibiotics

Kanamycin

Changes in quality and/or metabolite content

Selectable marker genes and reporter genes

Other

Increased levels of iron

Increased levels of zinc

Common use(s) of the LMO

Food

Research

Additional Information

Additional Information

Please note the following:

- This line was developed in parallel to another line with the same genetics. The only difference is that the other recipient cultivar was TMS 91/02324.
- The transformation event state is a placeholder. Several lines were developed and are expected to have similar genetics: D8023-985004, D8023-985005, D8023-985006, D8023-985009, D8023-985010, D8023-985011, and D8023-985012.
- The transformation event will be updated when more information is available and/or a line has been chosen for commercialization.

Other relevant website addresses and/or attached documents

? [Biofortification of field-grown cassava.pdf](#) (*English*)

BCH-LMO-SCBD-115141-1

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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