

Biosafety Clearing-House (BCH)

LIVING MODIFIED ORGANISM (LMO)

BCH-LMO-SCBD-115143-2

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

LAST UPDATED: 21 JAN 2022

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 brown streak disease-resistant cassava

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=115143>



Name

Cassava brown streak disease-resistant cassava

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Transformation event

D5001-985013

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 for RNA interference-mediated resistance to Cassava Brown Streak Disease. The modified cassava expresses a hairpin RNA (hpRNA) cassette that contains portions of the coat proteins of *Cassava brown streak virus* and *Ugandan cassava brown streak virus*, the causal agents of Cassava Brown Streak Disease. Transcription of the hpRNA from this cassette guides host cell machinery for targeted degradation of infecting viral transcripts.

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

Characteristics of the modification process

Vector

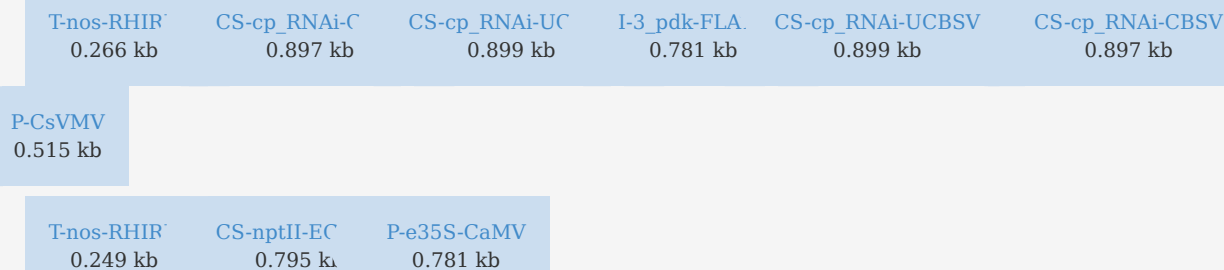
p5001

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Techniques used for the modification

Agrobacterium-mediated DNA transfer

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-101900-6

C5MVV PROMOTER | CASSAVA VEIN MOSAIC VIRUS (CASSAVA VEIN MOSAIC VIRUS, CVMV, C5MVV)

Promoter
- BCH-GENE-SCBD-115110-2

COAT PROTEIN | UGANDAN CASSAVA BROWN STREAK VIRUS (UCBSV)

Double-stranded RNA
- BCH-GENE-SCBD-115108-2

COAT PROTEIN | CASSAVA BROWN STREAK VIRUS (CASSAVA BROWN STREAK VIRUS, CBSV)

Double-stranded RNA
- BCH-GENE-SCBD-103123-6

PYRUVATE ORTHOPHOSPHATE DIKINASE, INTRON 3 | FLAVERIA TRINERVIA (CLUSTERED YELLOWTOPS, SPEEDYWEED, FLAVERIA, YELLOW TWINSTEM)

Intron
- BCH-GENE-SCBD-100269-8

NOPALINE SYNTHASE GENE TERMINATOR

Terminator
- BCH-GENE-SCBD-100366-6

CAMV ENHANCED 35S PROMOTER

Promoter
- BCH-GENE-SCBD-15001-5

NEOMYCIN PHOSPHOTRANSFERASE II | (BACTERIA)

Protein coding sequence | Resistance to antibiotics (Kanamycin)

Notes regarding the genetic elements present in this LMO

RNA interference cassette:

Transcription of the cassette produces a hairpin RNA (hpRNA). RNA polymerase is recruited to the Cassava vein mosaic virus promoter and then transcribes: two segments of *Cassava brown streak virus* (CBSV) and the *Ugandan cassava brown streak virus* (UCBSV) coat protein (sense orientation), the *Flaveria trinervia* pyruvate orthophosphate dikinase intron 3 (*pdk*), and CBSV and UCBSV coat protein (anti-sense orientation). Transcription stops at the *Agrobacterium tumefaciens* nopaline synthase (*nos*) terminator. The produced RNA then can form a double stranded segment due to the inter-strand homology between the CBSV and UCBSV coat protein segments in inverted orientations and the flexible linker/loop, *pdk*. The double stranded segment of the hpRNA is sufficient to elicit an RNA interference (RNAi) response. The host cell machinery then processes the hpRNA into small interfering RNA, which is used to guide the targeted degradation of RNA molecules with sequence homology. In this case, infecting viral transcripts are degraded by the host cell.

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

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LMO characteristics

Modified traits

- Resistance to diseases and pests
- Viruses
- Resistance to antibiotics
- Kanamycin
- Other
- Resistance to CBSV
- Resistance to UCBSV

Common use(s) of the LMO

Food
Research

Detection method(s)

Additional Information

Due to the processing of the hpRNA by the host cell DICER protein, it is expected that small interfering RNA 21 to 24 base pairs in length will be present instead. Additionally, the cellular processing means that no proteins are expected to be produced from the hpRNA.

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Additional Information

Additional Information

Please note that several lines have been created using the transformation vector p5001. The following transformation events are expected to contain similar genetics:

D5001-985013, D5001-985019, D5001-985022, D5001-985024, D5001-985025, D5001-985026, D5001-985028, D5001-985029, D5001-985030, D5001-985031, D5001-985033 and D5001-985034.

The transformation event is thus a placeholder until further information is uncovered and/or a line has been selected for commercialization.

Other relevant website addresses and/or attached documents

? [Virus-Derived Stacked RNAi Construct Confers Robust Resistance to Cassava Brown Streak Disease.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.

Secretariat of the Convention on Biological Diversity

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