LIVING MODIFIED ORGANISM (LMO)

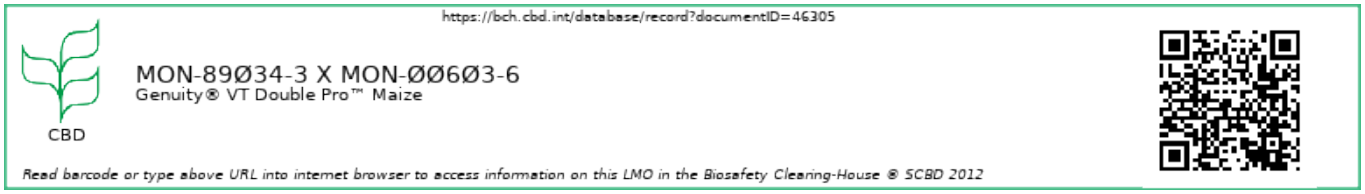
BCH-LMO-SCBD-46305-16

? Decisions on the LMO ? Risk Assessments

LAST UPDATED: 06 APR 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.



Name

Genuity® VT Double Pro™ Maize	EN

Transformation event

MON89034 x NK603

Unique identifier

MON-89Ø34-3 x MON-ØØ6Ø3-6

Developer(s)

- ORGANIZATION: MONSANTO EUROPE S.A. | BCH-CON-EUR-43679-1

ORGANIZATION

Monsanto Europe S.A.
Avenue de Tervuren 270-272
Brussels
B-1150, Belgium

Description

The stacked maize line was obtained through the traditional cross-breeding of the parental lines MON-89Ø34-3 and MON-ØØ6Ø3-6. The modified maize expresses *Bacillus thuringiensis* cry1A.105 and cry2Ab2, which confer resistance to Lepidoptera pests. The line also contains two *Agrobacterium tumefaciens* epsps gene cassettes for tolerance to glyphosate.The bacterial epsps gene contains a sequence variation, which allows for tolerance to the glyphosate herbicide.	EN

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-43773-18 LIVING MODIFIED ORGANISM | MON-89Ø34-3 - YIELDGARD™ VT PRO™ |
Resistance to diseases and pests - Insects - Lepidoptera (butterflies and moths)

BCH-LMO-SCBD-14776-17 LIVING MODIFIED ORGANISM | MON-ØØ6Ø3-6 - ROUNDUP READY™ MAIZE |
Resistance to herbicides - Glyphosate

Characteristics of the modification process

Vector

PV-ZMGT32 and PV-ZMIR245 EN

Techniques used for the modification

Cross breeding

Genetic elements construct

P-e35S-CaMV 0.300 kb	L-cab-WHEAT 0.060 kb	I-1_act1-ORYSA 0.480 kb	CS-cry1A_105-SYNTH 3.530 kb	T-hsp17_3-WHEAT 0.210 kb
P-34S-FMV 0.560 kb	I-hsp70-MAIZE 0.800 kb	TP-rbcS-MAIZE 0.400 kb	CS-Cry2Ab2-BACTU 1.910 kb	T-nos-RHIRD 0.250 kb
P-act1-ORYSA 0.800 kb	I-1_act1-ORYSA 0.600 kb	TP-ctp2-ARATH 0.200 kb	CS-CP4epsps-RHIRD 1.400 kb	T-nos-RHIRD 0.300 kb
P-e35S-CaMV 0.600 kb	I-hsp70-MAIZE 0.800 kb	TP-ctp2-ARATH 0.200 kb	CS-CP4epsps-RHIRD 1.400 kb	T-nos-RHIRD 0.300 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-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-43771-9 CRY1A.105 | BACILLUS THURINGIENSIS - BT, BACILLUS, BACTU |
Protein coding sequence | Resistance to diseases and pests (Insects, Lepidoptera (butterflies and moths))

BCH-GENE-SCBD-100356-6 HEAT SHOCK PROTEIN 17.3 TERMINATOR | (WHEAT) |
Terminator

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

BCH-GENE-SCBD-100359-7 HSP70 INTRON | (MAIZE, CORN)
Intron

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-100364-5 RICE ACTIN 1 GENE PROMOTER | (RICE)
Promoter

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-100360-4 TRANSIT PEPTIDE AND FIRST INTRON OF RUBISCO SSU | (MAIZE, CORN)
Transit signal

BCH-GENE-SCBD-14988-7 CRY2AB2 | BACILLUS THURINGIENSIS - BT, BACILLUS, BACTU
Protein coding sequence | Resistance to diseases and pests (Insects, Lepidoptera (butterflies and moths))

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

Notes regarding the genetic elements present in this LMO

DNA insert from MON89034 vector PV-ZMIR245: Maize line MON89034 expresses two Bt-toxins encoded by the *Bacillus thuringiensis* genes cry1A.105 and cry2Ab2. Transcription of cry1A.105 begins are the Cauliflower Mosaic Virus (CaMV) 35S promoter and finishes at the wheat (*Triticum aestivum*) wheat heat shock protein 17.3 terminator. The transcript initially includes (5' to 3'): wheat 5' untranslated leader from the chlorophyll a/b-binding protein, *Oryza sativa* (rice) actin 1 intron and cry1A.105. The wheat 5' untranslated leader sequence and the rice intron enhance expression of cry1A.105. Transcription of cry2Ab2 commences from the Figwort Mosaic Virus (FMV) 35S promoter and terminates at the *Agrobacterium tumefaciens nopaline synthase* (*nos*) terminator. The transcript initially includes (5' to 3'): maize heat shock protein 70 (Hsp70) intron, maize transit peptide and first intron from the small subunit of Rubsico and cry2Ab32. The Hsp70 regulates and enhances gene expression, while the transit peptide targets cr2Ab2 to the chloroplast. Note: - The viral promoters are expected to be constitutively active and promote high levels of transcription. - The coding sequence of cry2Ab2 was codon-optimized for expression within plant systems. - A second T-DNA insertion (containing CaMV 35S promoter, *Escherichia coli* neomycin phosphotransferase and *A. tumefaciens* nos terminator) was initially inserted into the	EN

genome for kanamycin selection during transformation. However, once transformants were regenerated, the selectable marker was bred out of the parental line using convention breeding techniques.
- Southern blot analyses indicated a single copy of the cry1A.105 and the cry2Ab2 cassettes. No backbone plasmid DNA or nptII sequences were detected. PCR and DNA sequence analyses provided the complete DNA sequence of the insert and confirmed the organization of the elements within the insert. Furthermore, sequence analysis indicated that MON 89034 no longer has the duplicated enhancer elements compared to the original e35S promoter in PV-ZMIR245, possibly due to a recombination event that resulted in its deletion.

DNA insert from NK603, vector PV-ZMGT32:
The plant expression plasmid vector, PV-ZMGT32 contains two adjacent plant gene expression cassettes each containing a single copy of the *Agrobacterium tumefaciens* strain CP4 5-enolpyruvylshikimate-3-phosphate synthase (epsps). In the first expression cassette (5' end), the epsps gene is under transcriptional control of an *Oryza sativa* (rice) Actin 1 promoter and the *A. tumefaciens nopaline synthase* (*nos*) terminator. During transcription, a rice Actin 1 intron and an *Arabidopsis thaliana* chloroplast transit peptide 2 are included upstream (5') of the epsps coding sequence. The rice intron enhances EPSPS expression and the transit peptide targets EPSPS to the chloroplasts of the plant cells. The second epsps cassette is under control of the Cauliflower Mosaic Virus 35S enhanced promoter and the *nos* terminator. Similarly, transcription additionally includes a maize heat shock protein 70 intron and an *A. thaliana* chloroplast transit peptide 2. The heat shock protein intron also enhances expression of epsps.

Note:
The parental line (NK603) has one insertion site containing both epsps gene cassettes. No vector backbone (neomycin phosphotransferase and origin of replication) sequences were detected.

For additional information on this LMO, please refer to the records of the parental LMOs.

LMO characteristics

Modified traits

Resistance to diseases and pests
- Insects
  - Lepidoptera (butterflies and moths)

Resistance to herbicides
- Glyphosate

Resistance to antibiotics
- Kanamycin

Common use(s) of the LMO

Food
Feed

Biofuel

Detection method(s)

External link(s)

? MON-89Ø34-3 - EU Reference Laboratory for GM Food and Feed (EURL-GMFF) *(English)*

? MON-ØØ6Ø3-6 - EU Reference Laboratory for GM Food and Feed (EURL-GMFF) *(English)*

? Report on the Verification of the Performance of MON 89034 and NK 603 Event-specific Methods on the Maize Event MON 89034 x NK 603 Using Real-time PCR.pdf *(English)*

Additional Information

Other relevant website addresses and/or attached documents

? EUginius: MON 89034 × NK603 *(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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