LIVING MODIFIED ORGANISM (LMO)

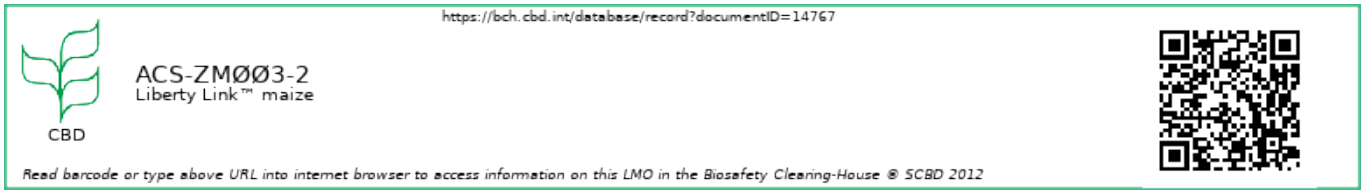
BCH-LMO-SCBD-14767-14

? Decisions on the LMO ? Risk Assessments

LAST UPDATED: 27 NOV 2012

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

Liberty Link™ maize	EN

Transformation event

T25

Unique identifier

ACS-ZMØØ3-2

Developer(s)

- ORGANIZATION: BAYER CROPSCIENCE | BCH-CON-SCBD-7088-7

ORGANIZATION

Bayer CropScience
Website: http://www.bayercropscience.com

Description

Glufosinate tolerance in T25 maize is the result of introducing a gene encoding the enzyme phosphinothricin-N-acetyltransferase (PAT) isolated from the common aerobic soil actinomycete, Streptomyces viridochromogenes, the same organism from which glufosinate was originally isolated. The PAT enzyme catalyzes the acetylation of phosphinothricin, detoxifying it into an inactive compound. The PAT enzyme is not known to have any toxic properties.	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

Characteristics of the modification process

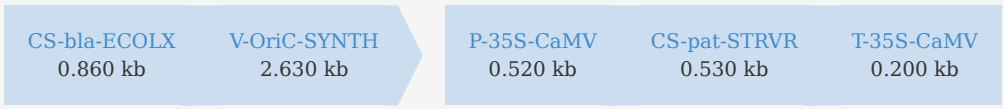
Vector

pDH51 (derived from pUC) EN

Techniques used for the modification

Osmotic shock

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-15002-4 PHOSPHINOTHRICIN N-ACETYLTRANSFERASE GENE

Protein coding sequence | Resistance to herbicides (Glufosinate)

BCH-GENE-SCBD-14975-5 BETA-LACTAMASE GENE | (BACTERIA)

Protein coding sequence | Resistance to antibiotics (Ampicillin)

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

Promoter

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

Terminator

BCH-GENE-SCBD-101411-3 PUC ORIGIN OF REPLICATION

Plasmid Vector

Notes regarding the genetic elements present in this LMO

The *pat* gene introduced is a was synthetic version which was modified to optimize its expression in plants without altering the amino acid sequence of the PAT enzyme.

Inserted DNA sequences

The pat gene is derived from the microorganism Streptomyces viridochromogenes strain Tu494, and encodes for the enzyme phosphinothricin acetyl transferase (PAT). This modifies and inactivates the herbicide glufosinate ammonium, and its presence thus confers to the plant tolerance to this herbicide. The pat gene was modified at the DNA sequence level to increase its level of expression in the plant. The modification to the DNA sequence of the gene did not result in any changes to the amino acid sequence of the PAT protein. Corn T25 contains the 35S promoter and terminator sequences derived from cauliflower mosaic virus (CaMV). The relevant promoter sequences are form pos. 6808 -7437 and the relevant terminator sequences are from pos. 7429 -7632 of the CaMV genome sequence (Franck et

EN

al., Cell21. (1980). pp. 285-294). The 35S promoter directs high level constitutive expression and is widely used as a promoter for high expression of genes.

DNA cassette:

bla (0.86) | Ori-pUC (2.63) | P-35S (0.52) >> space (0.029) >> *pat* (0.53) >> space (0.019) >> T-35S(0.2)

Note: the symbols >> and << indicate the sense and anti-sense direction of transcription, respectively, between different elements (typically, promoter - coding sequence - terminator). If present, the symbol | indicates elements that may be cloned adjacently in a cassette but that presumably are not transcribed together. The numbers in parenthesis indicate the approximate length in Kb of each genetic element.

Information on the vector
The vector used for the production of the recombinant maize T25 is plasmid pUC/AC. To construct the plasmid, the synthetic pat gene was cloned into the Sal1, between the CaMV derived 35S gene promoter and terminator sequences of the pUC derived plasmid. The chimeric pat gene cassette (35S promoter: pat:.35S terminator) can be isolated as a 1.3 kb EcoR1 fragment. The construct contains no other plant expressible genes. The pUC sequences include an ampicillin resistance (ampR) gene and a bacterial origin of replication. The ampR gene has regulatory signals recognized in bacteria but not functional in transgenic corn cells.

LMO characteristics

Modified traits

Resistance to herbicides
Glufosinate
Resistance to antibiotics
Ampicillin

Common use(s) of the LMO

Food
Feed
Biofuel

Detection method(s)

External link(s)

? ACS-ZMØØ3-2 - EU Reference Laboratory for GM Food and Feed (EURL-GMFF) *(English)*

? ACS-ZMØØ3-2 - CropLife International Detection Methods Database *(English)*

Additional Information

Molecular analyses shows that event T25 contains only one copy of the DNA cassette. It has EN

a truncated copy of the *bla* gene (25% of the 5' end of the *bla* gene is missing in T25). An intact Ori-pUC and the P-35S - *pat* - T-35S cassette are present.

Additional Information

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The maize line T25 was genetically engineered to express tolerance to glufosinate ammonium, the active ingredient in phosphinothricin herbicides (Basta®, Rely®, Finale®, and Liberty®). Glufosinate chemically resembles the amino acid glutamate and acts to inhibit an enzyme, called glutamine synthetase, which is involved in the synthesis of glutamine. Essentially, glufosinate acts enough like glutamate, the molecule used by glutamine synthetase to make glutamine, that it blocks the enzyme's usual activity. Glutamine synthetase is also involved in ammonia detoxification. The action of glufosinate results in reduced glutamine levels and a corresponding increase in concentrations of ammonia in plant tissues, leading to cell membrane disruption and cessation of photosynthesis resulting in plant withering and death.

Cultured protoplasts obtained from a yellow dent corn line were transformed using a chemically mediated direct DNA introduction method. Transformed cell colonies were selected for the presence of the pat gene by regeneration on medium containing glufosinate ammonium. The primary transformant T25 was then backcrossed with parental lines of the yellow dent corn type. The resulting line displayed field tolerance to phosphinothricin-containing herbicides, thereby permitting farmers to use this herbicide for weed control in maize cultivation.

Other relevant website addresses and/or attached documents

? OECD Biotrack Product Database: ACS-ZMØØ3-2 *(English)*

? CERA GM Database *(English)*

? BATS (2003) Genetically Modified (GM) Crops: molecular and regulatory details, v.2.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
413 rue Saint-Jacques, suite 800
Montreal, Québec, H2Y 1N9
Canada
Fax: +1 514 288-6588
Email: secretariat@cbd.int