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(54) Title: TOXIN GENES AND METHODS FOR THEIR USE

(57) Abstract: Compositions and methods for conferring pesticidal activity to bacteria, plants, plant cells, tissues and seeds are provided. Compositions comprising a coding sequence for a toxin polypeptide are provided. The coding sequences can be used in DNA constructs or expression cassettes for transformation and expression in plants and bacteria. Compositions also comprise transformed bacteria, plants, plant cells, tissues, and seeds. In particular, isolated toxin nucleic acid molecules are provided. Additionally, amino acid sequences corresponding to the polynucleotides are encompassed, and antibodies specifically binding to those amino acid sequences. In particular, the present invention provides for isolated nucleic acid molecules comprising nucleotide sequences encoding the amino acid sequence shown in SEQ ID NO:21-74, or the nucleotide sequence set forth in SEQ ID NO: 1-20, as well as variants and fragments thereof.



# INTERNATIONAL SEARCH REPORT

International application No PCT/US2014/021021
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<b>A. CLASSIFICATION OF SUBJECT MATTER</b> INV. C12N15/82      A01N63/02      C07K14/325 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) C12N A01N C07K		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, BIOSIS, Sequence Search, EMBASE, MEDLINE, WPI Data		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 92/19739 A1 (MYCOGEN CORP [US]) 12 November 1992 (1992-11-12) Seq. ID Nos 11 and 12; Examples 2, 3 and 8; pages 2 and 13 -----	1-24
A	WO 2011/103248 A2 (ATHENIX CORP [US]; SAMPSON KIMBERLY S [US]; TOMSO DANIEL JOHN [US]) 25 August 2011 (2011-08-25) pages 2, 3 and 5; Examples 1, 3 and 4; claims 1-25 ----- -/--	1-24
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents :		
"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family	
Date of the actual completion of the international search	Date of mailing of the international search report	
2 October 2014	15/10/2014	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  Kurz, Birgit	

## INTERNATIONAL SEARCH REPORT

International application No

PCT/US2014/021021

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>NANASAHEB P. CHOUGULE ET AL: "Toxins for Transgenic Resistance to Hemipteran Pests", TOXINS, vol. 4, no. 12, 4 June 2012 (2012-06-04), pages 405-429, XP055123250, DOI: 10.3390/toxins4060405 pages 405-411</p>	1-24
A	<p>----- WO 94/04684 A1 (MYCOGEN CORP [US]) 3 March 1994 (1994-03-03) claims 1-6; page 1; Table 1; Examples 3-6</p>	1-24
A	<p>----- WO 2010/099365 A2 (ATHENIX CORP [US]; SAMPSON KIMBERLY S [US]; TOMSO DANIEL J [US]; DUMIT) 2 September 2010 (2010-09-02) pages 1-5; Examples 1-13 and 17-19</p>	1-24
A	<p>----- DATABASE EMBL [Online]  30 December 2010 (2010-12-30), "Bacillus thuringiensis strain C006 nonfunctional Cry1-like gene, partial sequence.", XP002730579, retrieved from EBI accession no. EM STD:EF550989 Database accession no. EF550989 the whole document</p>	1-24
A	<p>----- WO 2013/016622 A1 (ATHENIX CORP [US]; SAMPSON KIMBERLY S [US]; LEHTINEN DUANE A [US]) 31 January 2013 (2013-01-31) Seq. ID Nos 2-5; abstract; pages 1-3 and 35-37</p>	1-24
A	<p>----- DE MAAGD R A ET AL: "How Bacillus thuringiensis has evolved specific toxins to colonize the insect world", TRENDS IN GENETICS, ELSEVIER SCIENCE PUBLISHERS B.V. AMSTERDAM, NL, vol. 17, no. 4, 1 April 2001 (2001-04-01), pages 193-199, XP004231927, ISSN: 0168-9525, DOI: 10.1016/S0168-9525(01)02237-5 the whole document, in particular abstract, pages 193 and 198, Figures 2 and 5</p> <p>-----</p>	1-24

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2014/021021

## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:  
  
1-24(partially)
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-24(partially)

Nucleotide sequence comprising Seq. ID No. 1 and encoding amino acids with Seq. ID Nos 21 and 22. Constructs, cells and plants comprising the nucleic acid sequence; polypeptide sequence and use thereof in compositions and methods for controlling insect pests.

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2-20. claims: 1-24(partially)

Nucleotide sequence comprising Seq. ID Nos 2-20 and encoding amino acids as indicated in Table 1. Constructs, cells and plants comprising the nucleic acid sequence; polypeptide sequence and use thereof in compositions and methods for controlling insect pests. Numbering of the groups is according to their order in claim 1, i.e. invention 2=Seq. ID No. 2 and encoded amino acids, invention 3=Seq. ID No. 3 and encoded amino acids,..., invention 20=Seq. ID No. 20 and encoded amino acids.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2014/021021
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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