



(51) International Patent Classification:
C07K 14/415 (2006.01) *C12N 15/82* (2006.01)

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(21) International Application Number:
PCT/IB2009/005842

(72) Inventors; and

(22) International Filing Date:
8 May 2009 (08.05.2009)

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(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/051,459 8 May 2008 (08.05.2008) US

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,

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[Continued on next page]

(54) Title: GENES AND METHODS FOR INCREASING DISEASE RESISTANCE IN PLANTS

Figure 1.



(57) Abstract: The present invention relates to the regulation of the natural defense system of plants through the introduction of foreign/native genes into plant cells, preferably into their genomes. More specifically, the methods relate to increasing citrus plant disease resistance by over-expressing genes involved in the innate plant defense system.



HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))
- with sequence listing part of description (Rule 5.2(a))

(88) Date of publication of the international search report:

26 August 2010

Declarations under Rule 4.17:

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2009/005842

A. CLASSIFICATION OF SUBJECT MATTER
 INV. C07K14/415 C12N15/82

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C07K C12N

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 practical, search terms used)

EPO-Internal, BIOSIS, Sequence Search, EMBASE, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE EMBL [Online] 6 April 2004 (2004-04-06), "UCRCS04_0003N16_r Ruby Orange Developing Flower cDNA Library Citrus sinensis cDNA clone CS_REb0003N16, mRNA sequence." XP002568337 retrieved from EBI accession no. EMBL:CN183331 Database accession no. CN183331 EST sequence with 100% identity to SEQ ID NO:1compound ----- -/--	1-2



Further documents are listed in the continuation of Box C.



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 document 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

19 February 2010

Date of mailing of the international search report

01/07/2010

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2009/005842

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DENG Z ET AL: "Cloning and characterization of receptor kinase class disease resistance gene candidates in citrus." THEORETICAL AND APPLIED GENETICS, vol. 108, no. 1, December 2003 (2003-12), pages 53-61, XP002568338 ISSN: 0040-5752	1-16
A	----- DENG Z ET AL: "Cloning and characterization of NBS-LRR class resistance-gene candidate sequences in citrus" THEORETICAL AND APPLIED GENETICS, SPRINGER, BERLIN, DE, vol. 101, 1 January 2000 (2000-01-01), pages 814-822, XP002973464 ISSN: 0040-5752	1-16
A	----- DATABASE BIOSIS [Online] BIOSCIENCES INFORMATION SERVICE, PHILADELPHIA, PA, US; 2007, GUIDETTI-GONZALEZ SIMONE ET AL: "Putative resistance genes in the CitEST database" XP002568339 Database accession no. PREV200800688887 abstract & GENETICS AND MOLECULAR BIOLOGY, vol. 30, no. 3, Suppl. S, 2007, page 931, ISSN: 1415-4757	1-16
A	----- DENG Z ET AL: "Construction of a bacterial artificial chromosome (BAC) library for citrus and identification of BAC contigs containing resistance gene candidates" THEORETICAL AND APPLIED GENETICS, vol. 102, no. 8, June 2001 (2001-06), pages 1177-1184, XP002568340 ISSN: 0040-5752	1-16
A	----- WO 03/068911 A2 (UNIV FLORIDA [US]) 21 August 2003 (2003-08-21)	1-16
A	----- CAMPOS MAGNOLIA A ET AL: "PR gene families of citrus: Their organ specific-biotic and abiotic inducible expression profiles based on ESTs approach" GENETICS AND MOLECULAR BIOLOGY, vol. 30, no. 3, Suppl. S, 2007, page 917, XP002568341 ISSN: 1415-4757 ----- -/--	1-16

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2009/005842

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
T	CERNADAS RAUL ANDRES ET AL: "Transcriptional analysis of the sweet orange interaction with the citrus canker pathogens <i>Xanthomonas axonopodis</i> pv. <i>citri</i> and <i>Xanthomonas axonopodis</i> pv. <i>aurantifolii</i>" MOLECULAR PLANT PATHOLOGY, vol. 9, no. 5, September 2008 (2008-09), pages 609-631, XP002568342 ISSN: 1464-6722 -----	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2009/005842

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.:
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.:

1-16(partially)

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:

Invention: 1; Claims: 1-16(partially)

An isolated nucleic acid sequence encoding a polypeptide comprising an amino acid sequence set forth in SEQ ID NO:14, a construct comprising a nucleotide sequence set forth in SEQ ID NO:1, and related subject-matter as claimed.

Inventions: 2-13; Claims: 1-16(partially)

idem for SEQ ID NO:2-13 and 15-26

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2009/005842

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 03068911	A2	21-08-2003	
		AU 2002365937 A1	04-09-2003
		US 2003221214 A1	27-11-2003
		US 2007074307 A1	29-03-2007