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7 November 2002

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 01/045493 A3

(54) Title: TRANSCRIPTION FACTOR STRESS-RELATED PROTEINS AND METHODS OF USE IN PLANTS

(57) Abstract: A transgenic plant transformed by a transcription factor stress-related protein (TFSRP) coding nucleic acid, wherein expression of the nucleic acid sequence in the plant results in increased tolerance to environmental stress as compared to a wild type variety of the plant. Also provided are agricultural products, including seeds, produced by the transgenic plants. Also provided are isolated TFSRP, and isolated nucleic acid coding TFSRP, and vectors and host cells containing the latter. Further provided are methods of producing transgenic plants expressing TFSRP, methods of increasing expression of other genes of interest using the TFSRP, methods of identifying novel TFSRP, and methods of modifying the expression of TFSRP in plants.

INTERNATIONAL SEARCH REPORT

Internatic ...lication No
PCT/US 00/34972

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A01H5/00 A01H5/10 C12N15/29 C07K14/415 C12N5/10
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)
IPC 7 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)
BIOSIS, EPO-Internal, EMBL, 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	WO 99 38977 A (JAGLO OTTOSEN KIRSTEN ;STOCKINGER ERIC J (US); THOMASHOW MICHAEL F) 5 August 1999 (1999-08-05) page 4, line 1 -page 13, line 7; examples 1-9	1-4,8, 13-17, 19-30, 32,33, 36,37
X	US 5 981 729 A (CHUN JONG-YOON ET AL) 9 November 1999 (1999-11-09) the whole document	1-4,8, 13-17, 19-30, 32,33, 36,37

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in 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	Date of mailing of the international search report
10 October 2001	30. 10. 01

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Bilang, J

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	KASUGA MIE ET AL: "Improving plant drought, salt, and freezing tolerance by gene transfer of a single stress-inducible transcription factor." NATURE BIOTECHNOLOGY, vol. 17, no. 3, March 1999 (1999-03), pages 287-291, XP002173128 ISSN: 1087-0156 cited in the application the whole document	1-4,8, 13-17, 19-30, 32,33, 36,37
X	JAGLO-OTTOSEN ET AL: "Arabidopsis thaliana CBF1 overexpression induces COR genes and enhances freezing tolerance" SCIENCE,AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE,,US, vol. 280, 3 April 1998 (1998-04-03), pages 104-106, XP002096424 ISSN: 0036-8075 cited in the application the whole document	1-4,8, 13-17, 19-30, 32,33, 36,37
X	WINICOV ILGA ET AL: "Transgenic overexpression of the transcription factor Alfin1 enhances expression of the endogenous MsPRP2 gene in alfalfa and improves salinity tolerance of the plants." PLANT PHYSIOLOGY (ROCKVILLE), vol. 120, no. 2, June 1999 (1999-06), pages 473-480, XP002179695 ISSN: 0032-0889 the whole document	1-4,8, 13-17, 19-30, 32,33, 36,37
X	XIANG CHENGBIN ET AL: "DNA-binding properties, genomic organization and expression pattern of TGA6, a new member of the TGA family of bZIP transcription factors in Arabidopsis thaliana" PLANT MOLECULAR BIOLOGY, NIJHOFF PUBLISHERS, DORDRECHT, NL, vol. 34, no. 3, 1997, pages 403-415, XP002133168 ISSN: 0167-4412 abstract page 413, right-hand column, paragraph 2 -page 414, right-hand column, paragraph 1	1-4,8, 13-17, 19-30, 32,33, 36,37

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	BABIYCHUK ET AL: "Arabidopsis thaliana NADPH oxidoreductase homologs confer tolerance of yeasts towards the thiol-oxidizing drug Diamide" JOURNAL OF BIOLOGICAL CHEMISTRY, AMERICAN SOCIETY OF BIOLOGICAL CHEMISTS, BALTIMORE, MD, US, vol. 270, no. 44, 3 November 1995 (1995-11-03), pages 26224-26231, XP002127805 ISSN: 0021-9258 abstract --- DATABASE EMBL 'Online! Accession Number AL133315, 2 December 1999 (1999-12-02) CHOISNE N, ET AL.: "Arabidopsis thaliana chromosome 3, BAC clone T8P19" XP002173129 gene 44789..45493; SPTREMBL Q9SMP0 transcription factor Hap5a abstract --- DATABASE EMBL 'Online! Accession Number AW098572, 20 October 1999 (1999-10-20) QUATRANO R, ET AL.: "ga02b09.y1 Moss EST library" XP002179697 abstract --- DATABASE EMBL 'Online! Accession Number AW145337, 2 November 1999 (1999-11-02) QUATRANO R, ET AL.: "ga31e07.y1 Moss EST library" XP002179698 abstract --- NOVER LUTZ ET AL: "The Hsf world: Classification and properties of plant heat stress transcription factors." CELL STRESS & CHAPERONES, vol. 1, no. 4, 1996, pages 215-223, XP001008004 ISSN: 1355-8145 the whole document --- -/--	19-24, 28-30 19-24 19-24 19-24
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KUSNETSOV VICTOR ET AL: "The assembly of the CAAT-box binding complex at a photosynthesis gene promoter is regulated by light, cytokinin, and the stage of the plastids." JOURNAL OF BIOLOGICAL CHEMISTRY, vol. 274, no. 50, 10 December 1999 (1999-12-10), pages 36009-36014, XP001008026 ISSN: 0021-9258 the whole document	
A	WINICOV I: "New molecular approaches to improving salt tolerance in crop plants." ANNALS OF BOTANY (LONDON), vol. 82, no. 6, December 1998 (1998-12), pages 703-710, XP001007288 ISSN: 0305-7364 page 707, left-hand column, paragraph 2 -page 708, left-hand column, paragraph 1	
A	CAO H ET AL: "GENERATION OF BROAD-SPECTRUM DISEASE RESISTANCE BY OVEREXPRESSION OF AN ESSENTIAL REGULATORY GENE IN SYSTEMIC ACQUIRED RESISTANCE" PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF USA, NATIONAL ACADEMY OF SCIENCE. WASHINGTON, US, vol. 95, May 1998 (1998-05), pages 6531-6536, XP002930408 ISSN: 0027-8424 the whole document	
P,X	WO 00 53741 A (UNIV DUKE ;UNIV CALIFORNIA (US)) 14 September 2000 (2000-09-14) abstract	1-4,8, 13-17, 19-30, 32,33, 36,37
P,X	BHARTI KAPIL ET AL: "Isolation and characterization of HsfA3, a new heat stress transcription factor of Lycopersicon peruvianum." PLANT JOURNAL, vol. 22, no. 4, May 2000 (2000-05), pages 355-365, XP001007995 ISSN: 0960-7412 the whole document	1-4,8, 13-17, 19-30, 32,33, 36,37

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
P,X	DATABASE EMBL 'Online! Accession Number Q9LS31, 1 October 2000 (2000-10-01) SAKAKIBRARA K, ET AL.: "Homeobox Protein PPHB7" XP002179699 abstract	19-24
P,X	DATABASE EMBL 'Online! Accession Number AW699069, 19 April 2000 (2000-04-19) QUATRANO R, ET AL.: "gb19f04.y1 Moss EST library" XP002179700 abstract	19-24
P,X	DATABASE EMBL 'Online! Accession Number AB028078, 4 April 2000 (2000-04-04) SAKAKIBARA K, HASEBE M: "Physcomitrella patens mRNA for homeobox protein PpHB7" XP002179701 abstract	19-24
P,A	KRANZ HARALD ET AL: "c-MYB oncogene-like genes encoding three MYB repeats occur in all major plant lineages." PLANT JOURNAL., vol. 21, no. 2, January 2000 (2000-01), pages 231-235, XP002179696 ISSN: 0960-7412 the whole document	

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INTERNATIONAL SEARCH REPORT

Inte...nal application No.
PCT/US 00/34972

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

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

see additional sheet

1. [X] 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 fee, this Authority did not invite payment of any additional fee.

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.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

[X] No protest accompanied the payment of additional search fees.

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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. Claims: 1-41 (all partially)

   Transcription factor stress-related protein, nucleic acid encoding said protein, plants transformed with said nucleic acid, methods of making use of said transcription factor stress-related protein or the nucleic acid encoding it; wherein the transcription factor stress-related protein is a CAAT-box like binding factor (CABF)

2. Claims: 1-8, 11-41 (all partially)

   As 1, but wherein the transcription factor stress-related protein is a DNA binding factor (DBF)

3. Claims: 1-8, 11-41 (all partially)

   As 1, but wherein the transcription factor stress-related protein is a homeo domain / leucine zipper (HDZ)

4. Claims: 1-41 (all partially)

   As 1, but wherein the transcription factor stress-related protein is a zinc finger factor (ZF)

5. Claims: 1-41 (all partially)

   As 1, but wherein the transcription factor stress-related protein is a leucine zipper (LZ)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 00/34972

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9938977 A	05-08-1999	AU 2566999 A	16-08-1999
		EP 1053328 A2	22-11-2000
		WO 9938977 A2	05-08-1999
US 5981729 A	09-11-1999	NONE	
WO 0053741 A	14-09-2000	US 6137031 A	24-10-2000
		WO 0053741 A1	14-09-2000

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