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Declarations under Rule 4.17:

- as to the identity of the inventor (Rule 4.17(i))
- 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))
- with information concerning authorization of rectification of an obvious mistake under Rule 91.3 (b) (Rule 48.2(i))

(88) Date of publication of the international search report:
26 November 2009

(15) Information about Correction:

Previous Correction:
see Notice of 8 October 2009

(54) Title: NUCLEOTIDE SEQUENCES AND POLYPEPTIDES ENCODED THEREBY USEFUL FOR MODIFYING PLANT CHARACTERISTICS IN RESPONSE TO COLD

(57) Abstract: Methods and materials for modulating cold tolerance levels in plants are disclosed. For example, nucleic acids encoding cold tolerance-modulating polypeptides are disclosed as well as methods for using such nucleic acids to transform plant cells. Also disclosed are plants having increased cold tolerance levels and plant products produced from plants having increased cold tolerance levels.



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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/031609

A. CLASSIFICATION OF SUBJECT MATTER <i>C12N 1/15(2006.01)i, A01H 1/00(2006.01)i</i> 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: C12N 1/15, A01H 1/00 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) Pubmed, Delphion, Esp@snet		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GONG, Z. et al: 'RNA helicase-like protein as an early regulator of transcription factor for plant chilling and freezing tolerance' PNAS, Vol. 99(17), pp. 11507-11512 (20 August 2002) See the abstract.	1, 5, 9-20, 25-27
A	SALAITA, L. et al: 'Identification and characterization of mutants capable of rapid seed germination at 10°C from activation-tagged lines of Arabidopsis thaliana' Journal of experimental Botany, vol. 56(418), pp. 2059-2069 (August 2005) See the whole document.	1, 5, 9-20, 25-27
A	'unknown[Arabidopsis thaliana]' NCBI GenBank Accession AAM6430 5(27 January 2006) See the whole document.	1, 5, 9-20, 25-27
A	WO 2007/044988 (CERES Inc.) (19 April 2007) See the whole document.	1, 5, 9-20, 25-27
A	YI, S. Y. et al: 'The pepper transcription factor CaPF1 confers pathogen and freezing tolerance in Arabidopsis' Plant Physiology, Vol. 136(1), pp. 2862-2874 (3 September 2004) See the abstract.	1, 5, 9-20, 25-27
☐ 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 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 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 29 SEPTEMBER 2009 (29.09.2009)	Date of mailing of the international search report 30 SEPTEMBER 2009 (30.09.2009)	
Name and mailing address of the ISA/KR  Korean Intellectual Property Office Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer KIM, JI YUN Telephone No. 82-42-481-8288 	

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2009/031609**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.: 21,22,28
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 Extra 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 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.:
1, 5, 9-20, and 25-27

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.

D1: GONG, Z. et al: 'RNA helicase-like protein as an early regulator of transcription factor for plant chilling and freezing tolerance'
PNAS, Vol. 99(17), pp. 11507-11512 (20 August 2002)

D2: SALAITA, L. et al: 'Identification and characterization of mutants capable of rapid seed germination at 10°C from activation-tagged lines of *Arabidopsis thaliana*'
Journal of experimental Botany, vol. 56(418), pp. 2059-2069 (August 2005)

Inventions 1-157: A method of modulating the level of cold tolerance in a plant, a method of producing a plant tissue, a plant cell, a transgenic plant, an isolated nucleic acid, and a product therefrom related to an amino acid sequence selected from the group consisting of SEQ ID Nos: 2, 4, 6, 8, 10, 12, 13, 15, 17, 20, 22, 24, 26, 28-30, 32, 34, 36, 38, 40, 42-54, 56, 58-65, 68, 69, 71, 74, 76, 77, 79, 81-83, 85, 86, 88, 90, 93, 95, 96, 98, 100-102, 104, 106, 107, 108, 110, 112, 114, 116-128, 130-132, 134, 136-139, 141, 143, 157-161, 163-165, 167, 169, 170, 172, 173, 175, 176, 178, 180-183, 185-187, 189, 190, 192-196, 198, 199, 201, 203-208, 210-214, 216, 218-221, 223, 225-227, 229, 231, 233, 235, 237, 239, 241, 242, 244, 246, 247, 249, 250, 252, 254-256, 258-260 (claims 1-37 all partially)

They are not so linked as to form a single general inventive concept in the sense of Rule 13.1 PCT for the following reasons:

The present application discloses isolated nucleic acids encoding polypeptides which render a plant improved tolerance to low or chilling temperatures, methods for increasing cold tolerance in a plant, and transgenic plants. The common technical feature among inventions 1-39 is a isolated nucleic acid which exhibits improved low temperature, chilling, or cold stress tolerance as compared to wild-type plants when overexpressed. Those genes which lead to cold or chilling stress tolerance in transgenic plants are already known from the prior art D1 or D2, the common technical feature is not considered to contribute over the prior art as a whole. Therefore, the present application do not meet the requirement of unity of invention (Rule 13.1 PCT).

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2009/031609

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2007-044988 A2	19.04.2007	US 07244879 B2	17.07.2007
		US 2007-0083953 A1	12.04.2007
		WO 2007-044988 A3	07.06.2007
		WO 2007-044988 A3	19.04.2007