(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
10 November 2005 (10.11.2005)

PCT

(10) International Publication Number
WO 2005/105836 A3

(51) International Patent Classification:
C12N 15/82 (2006.01) *C12N 9/02* (2006.01)
A01H 5/00 (2006.01)

(21) International Application Number:
PCT/US2005/013750

(22) International Filing Date: 22 April 2005 (22.04.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/565,028 23 April 2004 (23.04.2004) US

(71) Applicant *(for all designated States except US)*: **CERES INC.** [US/US]; 1535 Rancho Conejo Boulevard, Thousand Oaks, CA 91320-1440 (US).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **FANG, Yiwen** [US/US]; 3487 Moore Street, Los Angeles, CA 90066 (US). **PENNELL, Roger I.** [US/US]; 29664 Zuma Bay Way, Malibu, CA 90265 (US).

(74) Agent: **KAYTOR, PH.D., Elizabeth**; Fish & Richardson, P.C., P.A., 3300 Dain Rauscher Plaza, 60 South Sixth Street, Minneapolis, MN 55402 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

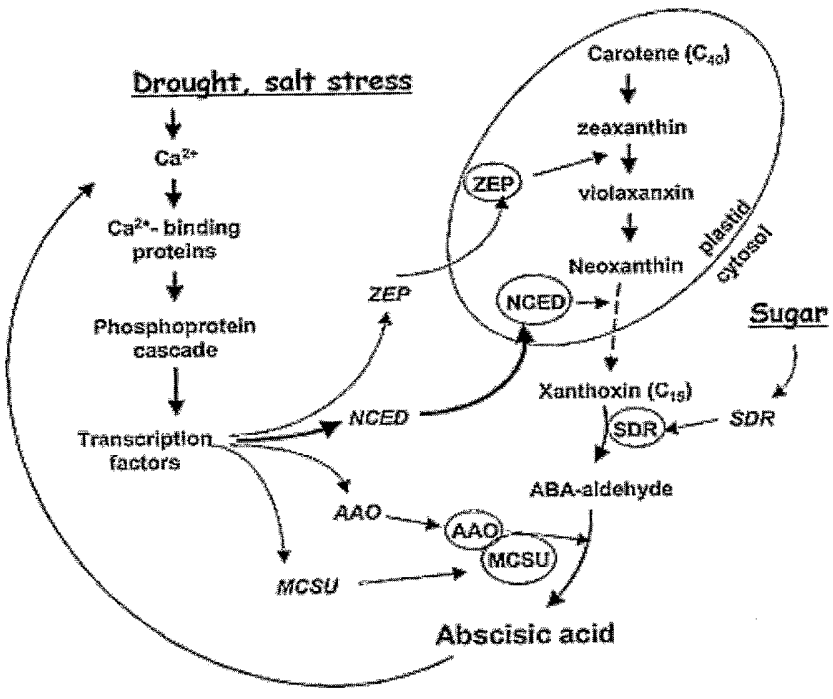
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:
— *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*

[Continued on next page]

(54) Title: METHODS AND MATERIALS FOR IMPROVING PLANT DROUGHT TOLERANCE



(57) Abstract: Isolated NCED3 nucleic acids and polypeptides are described herein, together with methods for using such nucleic acids and polypeptides for making transgenic plants with improved drought tolerance.

WO 2005/105836 A3

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:
11 May 2006

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.

INTERNATIONAL SEARCH REPORT

Intern al application No
PCT/US2005/013750

A. CLASSIFICATION OF SUBJECT MATTER
INV. C12N15/82 A01H5/00 C12N9/02

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)
C12N A01H

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, WPI Data, PAJ, EMBASE, BIOSIS, Sequence Search

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 03/020015 A (PURDUE RESEARCH FOUNDATION; RUGGIERO, BRUNO; BRESSAN, RAY, A; HASEGAWA) 13 March 2003 (2003-03-13) SEQ ID No: 2 has 98.33 % identity (98.33 % ungapped) over 599 (q:s=1-599:1-599) with subject GSP:ABP72778 disclosed in patent WO03020015 published on 20030313. claims 1-78; example 2	1-30

-/--

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

[X] 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	Date of mailing of the international search report
15 March 2006	29/03/2006

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	Vollbach, S

INTERNATIONAL SEARCH REPORT

Inte I application No
PCI/US2005/013750

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	IUCHI S ET AL: "Regulation of drought telerance by gene manipulation of 9-cis-epoxycarotenoid dioxygenase, a key enzyme in abscisic acid biosynthesis in arabidopsis" PLANT JOURNAL, BLACKWELL SCIENTIFIC PUBLICATIONS, OXFORD, GB, vol. 27, no. 4, 2001, pages 325-333, XP002973637 ISSN: 0960-7412 abstract page 329 - page 331; figure 1 -----	1-30
X	QIN X ET AL: "Overexpression of a 9-cis-epoxycarotenoid dioxygenase gene in nicotiana plumbaginifolia increases abscisic acid and phaseic acid levels and enhances drought tolerance" PLANT PHYSIOLOGY, AMERICAN SOCIETY OF PLANT PHYSIOLOGISTS, ROCKVILLE, MD, US, vol. 128, February 2002 (2002-02), pages 544-551, XP002973636 ISSN: 0032-0889 abstract page 548, left-hand column, paragraph 1 -----	1-30
A	IUCHI S ET AL: "A stress-inducible gene for 9-cis-epoxycarotenoid dioxygenase involved in abscisic acid biosynthesis under water stress in drought-tolerant cowpea" PLANT PHYSIOLOGY, AMERICAN SOCIETY OF PLANT PHYSIOLOGISTS, ROCKVILLE, MD, US, vol. 123, June 2000 (2000-06), pages 553-562, XP002180185 ISSN: 0032-0889 page 553; figure 2 -----	1-30
A	THOMPSON ANDREW J ET AL: "Abscisic acid biosynthesis in tomato: Regulation of zeaxanthin epoxidase and 9-cis-epoxycarotenoid dioxygenase mRNAs by light/dark cycles, water stress and abscisic acid" PLANT MOLECULAR BIOLOGY, SPRINGER, DORDRECHT, NL, vol. 42, no. 6, April 2000 (2000-04), pages 833-845, XP002199158 ISSN: 0167-4412 figure 3 ----- -/--	1-30

INTERNATIONAL SEARCH REPORT

Inter al application No
PCT/US2005/013750

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	QIN X ET AL: "The 9-cis-epoxycarotenoid cleavage reaction is the key regulatory step of abscisic acid biosynthesis in water-stressed bean" PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF USA, NATIONAL ACADEMY OF SCIENCE, WASHINGTON, DC, US, vol. 96, no. 26, 21 December 1999 (1999-12-21), pages 15354-15361, XP002180184 ISSN: 0027-8424 figure 2 -----	1-30

INTERNATIONAL SEARCH REPORT

Ir ional application No.
PCT/US2005/013750

Box No. I Nucleotide and/or amino acid sequence(s) (Continuation of item 1.b of the first sheet)

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, the international search was carried out on the basis of:

   a. type of material

   [X] a sequence listing

   [ ] table(s) related to the sequence listing

   b. format of material

   [X] on paper

   [X] in electronic form

   c. time of filing/furnishing

   [ ] contained in the international application as filed

   [ ] filed together with the international application in electronic form

   [X] furnished subsequently to this Authority for the purpose of search

2. [X] In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

3. Additional comments:

INTERNATIONAL SEARCH REPORT

mation on patent family members

Intern al application No
PCT/US2005/013750

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 03020015 A	13-03-2003	NONE	