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16/40

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(AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU,
MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM,
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16 August 2001

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.

(54) Title: BARLEY GENE FOR THIOREDOXIN AND NADP-THIOREDOXIN REDUCTASE

(57) Abstract: The present invention provides barley thioredoxin *h* nucleic acids and NADP-thioredoxin reductase nucleic acids, the respective encoded proteins and methods of use.



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INTERNATIONAL SEARCH REPORT

International Application No
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A. CLASSIFICATION OF SUBJECT MATTER IPC 7 C07K14/415 C12N15/53 C12N9/02 C12N15/82 A01H1/00 A01H5/00 C07K16/16 C07K16/40											
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 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) STRAND, EPO-Internal, WPI Data, PAJ, BIOSIS											
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1"> <thead> <tr> <th>Category *</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X Y A</td> <td> WO 96 03505 A (AGRONOMIQUE INST NAT RECH ;GAUTHIER MARIE FRANCOISE (FR); LULLIEN) 8 February 1996 (1996-02-08) abstract; claims page 3, line 18 -page 4, line 5 page 4, line 24 -page 6, line 25 page 8, line 7 -page 9, line 30 seq id nos 2,3,4,5,7,8 --- </td> <td> 1,3-20, 57,59, 61-64 22-24 2,21,60, 71 </td> </tr> <tr> <td>Y</td> <td> PATENT ABSTRACTS OF JAPAN vol. 018, no. 662 (C-1287), 14 December 1994 (1994-12-14) & JP 06 261783 A (TOYOTA CENTRAL RES & DEV LAB INC), 20 September 1994 (1994-09-20) abstract --- -/-- </td> <td>22-24</td> </tr> </tbody> </table>			Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X Y A	WO 96 03505 A (AGRONOMIQUE INST NAT RECH ;GAUTHIER MARIE FRANCOISE (FR); LULLIEN) 8 February 1996 (1996-02-08) abstract; claims page 3, line 18 -page 4, line 5 page 4, line 24 -page 6, line 25 page 8, line 7 -page 9, line 30 seq id nos 2,3,4,5,7,8 ---	1,3-20, 57,59, 61-64 22-24 2,21,60, 71	Y	PATENT ABSTRACTS OF JAPAN vol. 018, no. 662 (C-1287), 14 December 1994 (1994-12-14) & JP 06 261783 A (TOYOTA CENTRAL RES & DEV LAB INC), 20 September 1994 (1994-09-20) abstract --- -/--	22-24
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☒ Further documents are listed in the continuation of box C. ☒ 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 27 February 2001		Date of mailing of the international search report 07. 3. 01									
Name and mailing address of the ISA 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		Authorized officer Ceder, O									

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/08566

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CHO ET AL: "Subcellular targeting of barley hordein promoter-uidA fusions in transgenic barley seed" IN VITRO CELLULAR & DEVELOPMENTAL BIOLOGY. ANIMAL,US,TISSUE CULTURE ASSOCIATION, COLUMBIA, MD, vol. 34, no. 3, PART 02, 1998, page 48A XP002096845 ISSN: 1071-2690 the whole document	11,17,64
X	GAUTIER M F ET AL: "CHARACTERIZATION OF WHEAT THIOREDOXIN H cDNA AND PRODUCTION OF AN ACTIVE TRITICUM AESTIVUM PROTEIN IN ESCHERICHIA COLI" EUROPEAN JOURNAL OF BIOCHEMISTRY,BERLIN,DE, vol. 252, no. 2, 1 March 1998 (1998-03-01), pages 314-324, XP000910689 ISSN: 0014-2956 abstract; figures 1,2	1,3,4, 19,20
A	HOLMGREN A AND BJÖRNSTED M: "Thioredoxin and Thioredoxin Reductase" METHODS IN ENZYMOLOGY,US,ACADEMIC PRESS INC, SAN DIEGO, CA, vol. 252, no. PART B, 1995, pages 199-208, XP002112640 ISSN: 0076-6879	
X	ZHONG ET AL.: "NADPH Thioredoxin Reductase" EMBL SEQUENCE DATABASE, 1 January 1998 (1998-01-01), XP002154090 HEIDELBERG DE	29,47,65
A	Ac 022751 the whole document	30-32, 48,49, 66-68
A	JACQUOT ET AL.: "Arabidopsis thaliana NADPH thioredoxin reductase cDNA characterization and expression of recombinant protein in Escherichia coli" JOURNAL OF MOLECULAR BIOLOGY, vol. 235, no. 4, January 1994 (1994-01), pages 1357-1363, XP000987204 cited in the application the whole document	29-35, 41,42, 47-49, 65-68

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 00/08566

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. ☒ 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.
- ☒ 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: 1-28 57 59-64 71

Nucleic acid encoding thioredoxin h protein, expression vector, host cells and transgenic plants and seeds comprising it, thioredoxin h polypeptide encoded by it, and an antibody binding to the polypeptide as well as methods using them.

2. Claims: 29-56 58 65-70 72

Nucleic acid encoding NADP-thioredoxin reductase (NTR) protein, expression vector, host cells and transgenic plants and seeds comprising it, NTR polypeptide encoded by it, and an antibody binding to the polypeptide as well as methods using them.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. onal Application No

PCT/US 00/08566

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9603505 A	08-02-1996	FR 2723097 A AU 3082795 A EP 0802977 A	02-02-1996 22-02-1996 29-10-1997
JP 06261783 A	20-09-1994	NONE	