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(54) Title: GENES AND USES FOR PLANT IMPROVEMENT

(57) Abstract: Transgenic seed for crops with improved traits are provided by trait-improving recombinant DNA in the nucleus of cells of the seed where plants grown from such transgenic seed exhibit one or more improved traits as compared to a control plant. Of particular interest are transgenic plants that have increased yield. The present invention also provides recombinant DNA molecules for expression of a protein, and recombinant DNA molecules for suppression of a protein.



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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
 IPC: **A01H 1/00(2006.01);C12N 5/04(2006.01);C12N 15/82(2006.01);A01H 5/00(2006.01)**

 USPC: 435/468;800/278;435/412;800/280;800/320.1
 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)
 U.S. : 435/468; 800/278; 435/412; 800/280; 800/320.1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

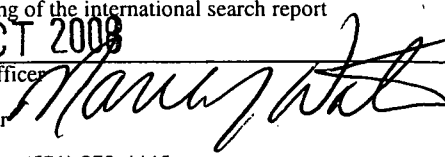
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Edgerton et al. (US Patent Publication No. 20050108791 A1, Published May 19, 2005)	1

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	"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
"E" earlier application or patent published on or after the international filing date	"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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 09 September 2008 (09.09.2008)	Date of mailing of the international search report 21 OCT 2008
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer Vinod Kumar  Telephone No. (571) 272-4445

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

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

a. type of material

a sequence listing

table(s) related to the sequence listing

b. format of material

on paper

in electronic form

c. time of filing/furnishing

contained in the international application as filed

filed together with the international application in electronic form

furnished subsequently to this Authority for the purposes of search

2. 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:

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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:
Please See Continuation 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 additional fees, this Authority did not invite payment of any 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

- 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.

BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim 1, drawn to a plant cell nucleus with stably-integrated, recombinant DNA comprising a promoter that is functional in plant cells and that is operably linked to DNA from a plant, bacteria or yeast that encodes a protein having at least one domain of amino acids in a sequence that exceeds the Pfam gathering cutoff of 16.9 for amino acid sequence alignment with a protein domain family identified by Pfam name Cyclin C.

Group II, claims 2-4 and 8-13, drawn to a plant cell nucleus with stably-integrated, recombinant DNA comprising a promoter that is functional in plant cells and that is operably linked to DNA from a plant, bacteria or yeast that encodes a protein having at least one domain of amino acids in a sequence that exceeds the Pfam gathering cutoff for amino acid sequence alignment with a protein domain family identified by a Pfam name, a transgenic plant cell or plant, transgenic seed, and a transgenic pollen grain.

Group III, claims 5-13, drawn to a plant cell nucleus with stably integrated, recombinant DNA to suppress the level of an endogenous protein having at least one domain of amino acids in a sequence that exceeds the Pfam gathering cutoff for amino acid sequence alignment with a protein domain family identified by a Pfam name, a transgenic plant cell or plant, transgenic seed, and a transgenic pollen grain.

Group IV, claims 14-18, drawn to a method for manufacturing transgenic seed.

Group V, claim 19, drawn to a method of producing hybrid seed.

Group VI, claim 20, drawn to a method of selecting a plant comprising cells with a plant cell nucleus of claim 2 or 5 using an immunoreactive antibody.

Group VII, claim 21, drawn to milled seed.

Group VIII, claims 22-23, drawn to a method comprising planting seed having plant cells with a plant cell nucleus of claim 2 or 5 which are selected for enhanced water use efficiency.

Group IX, claim 24, drawn to a method comprising planting seed having plant cells with a plant cell nucleus of claim 2 or 5 which are selected for enhanced nitrogen use efficiency.

The technical feature linking Groups I-IX is a nucleotide sequence encoding a protein which is involved in improving a trait (e.g. abiotic stress tolerance, growth and yield etc.).

However, Edgerton et al. (US Patent Publication No. 20050108791, Published May 19, 2005) teach a transgenic plant cell, plant and transgenic seed derived thereof, comprising a nucleotide sequence encoding a polypeptide having 100% identity to instant SEQ ID NO: 447 (a cyclin protein). See in particular, claims 1-21, paragraphs 0012-0102. The reference further

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teaches that the transgenic plant exhibited improved traits including increase in yield. Therefore, the technical feature linking Groups I-IX does not constitute a special technical feature as defined by PCT Rule 13.2, as it does not define a contribution over prior art.

Applicants are reminded that different nucleotide sequences and amino acid sequences are structurally distinct chemical compounds and are unrelated to one another. These sequences are thus deemed to normally constitute different inventive concepts.

This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In order for more than one species to be examined, the appropriate additional examination fees must be paid. The species are as follows:

For invention II: a single DNA sequence from a plant, bacteria or yeast that encodes the amino acid sequence of a single protein.

For invention III: a single suppressive recombinant DNA sequence.

For inventions IV-IX: a single DNA sequence from a plant, bacteria or yeast that encodes the amino acid sequence of a single protein, OR a single suppressive recombinant DNA sequence.

Continuation of B. FIELDS SEARCHED Item 3:

WEST (USPT, PGPB), Agricola, Caplus, Biosis; Key words: cyclin, cold, stress, transgenic, transform, nitrogen use efficiency, seed oil, plant cell.