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Previous Correction:

see PCT Gazette No. 08/2006 of 23 February 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.

(54) Title: NUCLEOTIDE SEQUENCES AND POLYPEPTIDES ENCODED THEREBY USEFUL FOR MODIFYING NITROGEN USE EFFICIENCY CHARACTERISTICS IN PLANTS

(57) Abstract: Isolated polynucleotides and polypeptides encoded thereby are described, together with the use of those products for making transgenic plants with increased nitrogen use efficiency. The present invention further relates to nucleotide sequences and the use of those nucleotide sequences in the genetic-engineering of plants to display enhanced nitrogen assimilatory and utilization capacities, grow larger, more efficiently or rapidly, and/or have enriched nitrogen contents in vegetative and/or reproductive plant parts and/or increased biomass. More particularly, this invention relates to producing transgenic plants engineered to have altered expression of key components in the nitrogen assimilation and utilization pathways. The engineered plants may be productively cultivated under conditions of low nitrogen fertilizer input or in nitrogen poor soils. Alternatively, the engineered plants may be used to achieve faster growing or maturing crops, higher crop yields and/or more nutritious products under ideal cultivation conditions.

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A. CLASSIFICATION OF SUBJECT MATTER

INV. C12N15/82 C12N15/29 C07K14/415 A01H5/00 C12Q1/68

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 C12Q C07K 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, BIOSIS, EMBASE, WPI Data, PAJ, 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	EP 1 033 405 A (CERES INCORPORATED) 6 September 2000 (2000-09-06) see SEQ ID NOs: 15406, 15408, 27079 and 27080 page 1 - page 26	1-17,19
X	----- US 2004/034888 A1 (LIU JINGDONG ET AL) 19 February 2004 (2004-02-19) see SEQ ID NO: 12755 paragraph [0021]; claims 1,3 paragraph [0038] paragraph [0115] ----- -/--	1,5-9, 11-17,19



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 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

5 October 2006

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22.11.2006

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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	FRAISIER VINCENT ET AL: "Constitutive expression of a putative high-affinity nitrate transporter in Nicotiana plumbaginifolia: Evidence for post-transcriptional regulation by a reduced nitrogen source" PLANT JOURNAL, vol. 23, no. 4, August 2000 (2000-08), pages 489-496, XP002375196 ISSN: 0960-7412 the whole document	1-19
A	----- HUANG NIEN-CHEN ET AL: "CHL1 encodes a component of the low-affinity nitrate uptake system in arabidopsis and shows cell type-specific expression in roots" PLANT CELL, vol. 8, no. 12, 1996, pages 2183-2191, XP002375197 ISSN: 1040-4651 the whole document	1-19
A	----- OLIVEIRA IGOR C ET AL: "Overexpression of cytosolic glutamine synthetase. Relation to nitrogen, light, and photorespiration" PLANT PHYSIOLOGY (ROCKVILLE), vol. 129, no. 3, July 2002 (2002-07), pages 1170-1180, XP002375198 ISSN: 0032-0889 the whole document	1-19
A	----- US 2003/233670 A1 (EDGERTON MICHAEL D ET AL) 18 December 2003 (2003-12-18) paragraph [0125] - paragraph [0131]; claim 17 -----	1-19

INTERNATIONAL SEARCH REPORT

International application No.

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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

☒

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 purpose 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:

INTERNATIONAL SEARCH REPORT

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Box 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 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 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.:
(1-19 partially, inventions 1 and 2)
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: 1-19 (partially)

A nucleic acid having a nucleotide sequence according to SEQ ID NO: 1 and encoding an amino acid having a sequence according to SEQ ID NO: 2. Vectors, hosts, methods of introducing said nucleic acid into a host cell, methods of transformation, detection, increasing nitrogen utilisation efficiency. Plants, plant cells, plant material, seeds comprising said nucleic acid.

Inventions 2-214: claims 1-19 (partially, as far as applicable)

same as invention 1, but comprising a nucleic acid sequence encoding an amino acid having a sequence in the order given in the sequence listing (i.e. invention 2 is limited to SEQ ID NO: 3; ... invention 214 is limited to SEQ ID NO: 219).

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1033405	A	06-09-2000	NONE
US 2004034888	A1	19-02-2004	US 2004031072 A1 12-02-2004
			US 2006236419 A1 19-10-2006
US 2003233670	A1	18-12-2003	NONE