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17 August 2000 (17.08.00)

(54) Title: PLANT GLUTAMINE AMIDOTRANSFERASE HOMOLOGS

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SEQ ID NO:15  GIPVIASSGAGTPDHFSEVFEEDKRICRACCRHFPPERGYQSQSVKEHLQEERIEVRI
SEQ ID NO:02  NIPVIASSGAGVADHFSEVFNETNASAALAAGIFHR-KEVPIKAVKEHLLKEGIEVRL
SEQ ID NO:04  ------------------------------------------------------------
SEQ ID NO:08  ------------------------------------------------------------
SEQ ID NO:06  TIPVIASSGAGAVQHFSEIFEKTNASAALAAGIFHR-KEVPILAVKEHLVNAGVEVRV
SEQ ID NO:10  ------------------------------------------------------------
SEQ ID NO:12  ------------------------------------------------------------
SEQ ID NO:14  SIPVIASXGAGAPEHFSEVFYKTNASAALAAGIFHR-KEVPIQSVKEHLLKEGIEVRI
              541                                                      598
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(57) Abstract

This invention relates to an isolated nucleic acid fragment encoding a histidine biosynthetic enzyme. The invention also relates to the construction of a chimeric gene encoding all or a portion of the histidine biosynthetic enzyme, in sense or antisense orientation, wherein expression of the chimeric gene results in production of altered levels of the histidine biosynthetic enzyme in a transformed host cell.

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INTERNATIONAL SEARCH REPORT

Int onal Application No
PCT/US 99/25950

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C12N15/82 C12N15/52 C12N9/00 C12N5/10 G01N33/50
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)
IPC 7 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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FUJIMORI K AND OHTA D: "An Arabidopsis cDNA encoding a bifunctional glutamine amidotransferase/cyclase suppresses the histidine auxotrophy of a Saccharomyces cerevisiae his7 mutant" FEBS LETTERS, vol. 428, no. 3, 29 May 1998 (1998-05-29), pages 229-234, XP002136027 the whole document	1-8, 10-15, 17-23
X	KLEM T J AND DAVISSON V J: "Imidazole glycerole phosphate synthase: the glutamine amidotransferase in histidine biosynthesis" BIOCHEMISTRY, vol. 32, 1993, pages 5177-5186, XP002136052 the whole document	16

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[X] 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
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"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
19 April 2000	12/05/2000

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	Oderwald, H

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Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
P,X	DATABASE EMEST21 'Online! EMBL Heidelberg, Germany AC/ID AW066760, 18 October 1999 (1999-10-18) WALBOT V: "Maize ESTs from various cDNA libraries sequenced at Stanford University" XP002136029 abstract	1,3-8, 11, 13-15, 17,19,20
P,X	DATABASE EMEST14 'Online! EMBL Heidelberg, Germany AC/ID AI899863, 28 July 1999 (1999-07-28) SHOEMAKER R ET AL.: "Glycine max cDNA clone similar to: glutamine amidotransferase/cyclase" XP002136030 abstract	1,3-8, 11, 13-15, 17,19,20
P,X	DATABASE NEW_TREMBL 'Online! EMBL Heidelberg, Germany AC/ID CAB36536, 17 June 1999 (1999-06-17) BEVAN M ET AL.: "Glutamine amidotransferase/cyclase" XP002136028 abstract	10

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 99/25950

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.

INTERNATIONAL SEARCH REPORT

International Application No. PCT/ US 99/25950

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: (1-23 partially)

   An isolated polynucleotide encoding glutamine amidotransferase from impatiens as set forth in SEQ ID NO: 1, a chimeric gene, a host cell, a virus, a polypeptide as set forth in SEQ ID NO: 2, a method of selecting an isolated polynucleotide, a method of obtaining a nucleic acid, a method for evaluating an inhibitory compound, a compositions, an expression cassette, a method for positive selection comprising said polynucleotide.

2. Claims: (1-23 partially)
   same as invention 1 but comprising a corn glutamine amidotransferase as set forth in SEQ ID NO: 3-8

3. Claims: (1-23 partially)

   same as invention 1 but comprising a rice glutamine amidotransferase as set forth in SEQ ID NO: 9 and 10.

4- Claims: (1-23 partially)

   same as invention 1 but comprising a soybean glutamine aminotransferase as set forth in SEQ ID NO: 11-14.