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[Continued on next page]

(54) Title: PLANT UDP-GLUCOSE EPIMERASES

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***** ** ** ** **
SEQ ID NO:25 MVASS-QKILVTGSAGFIGTHTVVQLLNNGFNVSIIIDNFDNSVMEAVRVRVVGSNLSQ
SEQ ID NO:26 MSS---QTVLVTGGAGYIGSHTVLQLLGGFKAVVDNLDNSSETAIHRVKELAGK-FAG
SEQ ID NO:14 MVSS-QHILVTGGAGFIGTHTVVQLLKAGFSVSIIDNFDNSVMEAVDRVRQVVGPLLSQ
SEQ ID NO:16 ---AR-GSVLVTGGAGFIGTHTVLQLEKGYAVTAVDNFHNVSPEALDRVRIHVGPAALSA
SEQ ID NO:18 T-----
SEQ ID NO:20 MVSALLRTILVTGGAGYIGSHTVLQLLQGFRRVVDNLDNASELAILRVRELAGH-NAN
SEQ ID NO:22 MRD---KTVLVTGGAGYIGSHTVLQLLGGFRAVVDNLDNLSSEVAIHRVRELAGE-FGN
1 60

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SEQ ID NO:25 NLEFTLGDLRNKDDLEKLFSSKSFDAVIHFAGLKAVGESVENPRRYFDNNLVGTINLYEV
SEQ ID NO:26 NLSFHKLDLRDRDALEKIFSSSTKFDVSIHFAGLKAVGESVQKPLLYDNNLIGTIVLFEV
SEQ ID NO:14 NLQFTQGDRLNRDDEKLFSSKTFDAVIHFAGLKAVAESVAKPRRYFDNVLGTINLYEF
SEQ ID NO:16 RLQFIFGDLTIKDDLEKVFAAKDYDAVIHFAGLKAVAESVAHPMEYNNRNNIVGTVNLVDV
SEQ ID NO:18 ----RIDLRDKGALEMVFASTRFEAVIHFAGLKAVGESVQKPLLYDNNVIGTINLLEV
SEQ ID NO:20 NLDFRKVDLRDKQALDQIFSSQRFEAVIHFAGLKAVGESVQKPLLYDNNLIGTITLLQV
SEQ ID NO:22 NLSFHKVDLRDRAALDQIFSSSTQFDAVIHFAGLKAVGESVQKPLLYNNNLGTITLLEV
61 120

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SEQ ID NO:25 MAKHNCKMVFSSSATVYGQPEKIPCVEDFKLQAMNPGYGRTKLFLFEEIARDIQKAEPEWR
SEQ ID NO:26 MAAHGCKKLVFSSSATVYGLPKEVPCTEEFPLSAANPYGRTKLIEEICRDIYRAEQEWR
SEQ ID NO:14 MAKYNCKMVFSSSATVYGQPEKIPCEEDFKLQAMNPGYGRTKLFLFEEIARDIQKAEPEWR
SEQ ID NO:16 MKKHGCNKLVFSSSATVYGQPEKVPCEDESKLALNPGYGRTKLVLEEMLRDYQHANPEWR
SEQ ID NO:18 MSVHGCKKLVFSSSAAVYGSPPKNSPCTENFPLTPNPNPYGRTKLVVEDICRDIYRSDPEWK
SEQ ID NO:20 MAAHGCTKLVFSSSATVYGWPKVEVPCTEESPLCAMNPGYGRTKLVIEDMCRDLHASDPNWK
SEQ ID NO:22 MAAHGCKKLVFSSSATVYGWPKVEVPCTEESPLSAMNPGYGRTKLIEEICRDVHCAEPDCK
121 180

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(57) Abstract: This invention relates to an isolated nucleic acid fragment encoding a UDP-galactose 4-epimerase. The invention also relates to the construction of a chimeric gene encoding all or a portion of the UDP-galactose 4-epimerase, in sense or antisense orientation, wherein expression of the chimeric gene results in production of altered levels of the UDP-galactose 4-epimerase in a transformed host cell.



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MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

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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

International Application No
 PCT, US 00/03453

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 C12N15/61 C12N15/82 C12N9/90 C12N5/10 C12Q1/68
 A01H5/00

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 C12Q 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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DÖRMANN ET AL: "The role of UDP-glucose epimerase in carbohydrate metabolism of Arabidopsis" PLANT JOURNAL, GB, BLACKWELL SCIENTIFIC PUBLICATIONS, OXFORD, vol. 13, no. 5, 1 March 1998 (1998-03-01), pages 641-652, XP002082772 ISSN: 0960-7412 the whole document ---	1-22
A	WO 98 54335 A (PEDERSEN STEEN GULDAGER ;DANISCO (DK); BRUNSTEDT JANNE (DK); JOERS) 3 December 1998 (1998-12-03) the whole document --- -/--	1-22

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.
 - *Z* document member of the same patent family

Date of the actual completion of the international search 11 July 2000	Date of mailing of the international search report 01.11.00
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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 Kania, T
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INTERNATIONAL SEARCH REPORT

International Application No

PL US 00/03453

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>LAKE MARC R ET AL: "Molecular cloning and characterization of a UDP-glucose-4-epimerase gene (galE) and its expression in pea tissues." PLANT PHYSIOLOGY AND BIOCHEMISTRY (PARIS), vol. 36, no. 8, August 1998 (1998-08), pages 555-562, XP000923481 ISSN: 0981-9428 the whole document</p>	1-22
A	<p>--- DÖRMANN ET AL: "Functional expression of Uridine 5'diphospho-glucose 4-epimerase (EC 5.1.3.2) from Arabidopsis thaliana in Saccharomyces cerevisiae and Escherichia coli" ARCHIVES OF BIOCHEMISTRY AND BIOPHYSICS,US,NEW YORK, US, vol. 327, 1996, pages 27-34, XP002076759 ISSN: 0003-9861 the whole document</p>	1-22
P,X	<p>--- WALBOT V.: "Maize EST AC AW267428" EBI DATABASE,6 January 2000 (2000-01-06), XP002142269 the whole document</p> <p>-----</p>	18

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 00/03453

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:

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.:

Claims 1-22 Partially.

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

1. Claims: 1-22 partially

An isolated polynucleotide comprising a sequence encoding a polypeptide of at least 90 amino acids that has at least 95% identity to SEQ ID NO:2,10,18, or the complement thereof.

Said nucleotide sequence consisting of SEQ ID NO:1,9,17 and being derived from maize. Chimeric genes and host cells comprising said sequences.

A polypeptide of at least 90 amino acids having at least 95% identity to SEQ ID NO:2,10,18.

An isolated polynucleotide comprising at least 30 contiguous nucleotides derived from SEQ ID NO:1,9,17.

Methods for selecting an isolated polynucleotide that affects the level of UDP-galactose-4-epimerase polypeptide in a plant cell, for obtaining a nucleic acid fragment encoding a UDP-galactose-4-epimerase polypeptide, for positive selection of a transformed cell, all methods employing the said sequences and as described in the claims. Compositions comprising the said polynucleotides.

2. Claims: 1-22 partially

idem for SEQ ID NO:3,4,11,12,19,20 being derived from rice

3. Claims: 1-22 partially

idem for SEQ ID NO:5,6,13,14,21,22 being derived from soybean

4. Claims: 1-22 partially

idem for SEQ ID NO:7,8,15,16,23,24 being derived from wheat

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PL., US 00/03453

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9854335 A	03-12-1998	AU 7446398 A	30-12-1998
		BR 9809493 A	20-06-2000
		CN 1264428 T	23-08-2000
		EP 0983369 A	08-03-2000
		GB 2342920 A	26-04-2000
