



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : C12N 15/53, 15/54, 15/56, 15/60, 15/61, 9/08, 9/10, 9/12, 9/16, 9/18, 9/26, 9/32, 9/38, 9/40, 9/44, 9/88, 9/90, C07K 14/415, A01H 1/00, 5/00	A3	(11) International Publication Number: WO 00/22092 (43) International Publication Date: 20 April 2000 (20.04.00)						
(21) International Application Number: PCT/NZ99/00169 (22) International Filing Date: 8 October 1999 (08.10.99) (30) Priority Data: <table border="0"> <tr> <td>09/170,862</td> <td>13 October 1998 (13.10.98)</td> <td>US</td> </tr> <tr> <td>60/148,426</td> <td>11 August 1999 (11.08.99)</td> <td>US</td> </tr> </table> (71) Applicants (<i>for all designated States except US</i>): GENESIS RE- SEARCH AND DEVELOPMENT CORPORATION LIM- ITED [NZ/NZ]; 1 Fox Street, Parnell, Auckland (NZ). FLETCHER CHALLENGE FORESTS LIMITED [NZ/NZ]; 585 Great South Road, Penrose, Auckland (NZ). (72) Inventor; and (75) Inventor/Applicant (<i>for US only</i>): BLOKSBERG, Leonard, Nathan [US/NZ]; 5A Korau Road, Greenlane, Auckland (NZ). (74) Agents: BENNETT, Michael, Roy et al.; West-Walker Ben- nett, Mobil on the Park, 157 Lambton Quay, Wellington (NZ).		09/170,862	13 October 1998 (13.10.98)	US	60/148,426	11 August 1999 (11.08.99)	US	(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (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, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> (88) Date of publication of the international search report: 13 July 2000 (13.07.00)
09/170,862	13 October 1998 (13.10.98)	US						
60/148,426	11 August 1999 (11.08.99)	US						
(54) Title: MATERIALS AND METHODS FOR THE MODIFICATION OF PLANT CELL WALL POLYSACCHARIDES								
(57) Abstract Novel isolated polynucleotides and polypeptides associated with the synthesis of plant cell wall polysaccharides are provided, together with genetic constructs comprising such sequences. Methods for using such constructs for the modulation of polysaccharide content in plants are also disclosed, together with transgenic plants comprising such constructs.								

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/NZ99/00169

A. CLASSIFICATION OF SUBJECT MATTER																						
Int. Cl. ⁷ : C12N 15/53, 15/54, 15/56, 15/60, 15/61, 9/08, 9/10, 9/12, 9/16, 9/18, 9/26, 9/32, 9/38, 9/40, 9/44, 9/88, 9/90; CO7K 14/415; A01H 1/00, 5/00. 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) SEE ELECTRONIC DATABASE BOX BELOW.																						
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched SEE ELECTRONIC DATABASE BOX BELOW.																						
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EMBL, GENBANK, SWISS PROTEINS, PIR as per sequence id nos specified in inventions 1-5 stated on the extra sheets (1) and (2)..																						
C. DOCUMENTS CONSIDERED TO BE RELEVANT																						
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																				
X	EP 137280 A (CETUS CORPORATION) 17 April 1985. See the sequence in table 1 on pages 38-44.	1-5, 18 and 19. (Seq id no 125)																				
X	Sims P F G <i>et al</i> "Differential expression of multiple exocellobiohydrolase I-like genes in the lignin-degrading fungus <i>Phanerochaete chrysosporium</i> " Mol. Microbiol (1994) 12(2) 209-216. See figures 2 and 3 on pages 211 and 213.	1-9, 18 and 19. (seq id nos 129 and 130)																				
X	Genepept acc. no.. AAB37767 (5 December 1996) See the whole abstract.	1-5, 18 and 19. (seq id nos 38, 40-43, 90, 132-134 and 146.)																				
☒ Further documents are listed in the continuation of Box C ☒ See patent family annex																						
* Special categories of cited documents: <table border="0"> <tr> <td>"A"</td> <td>document defining the general state of the art which is not considered to be of particular relevance</td> <td>"T"</td> <td>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</td> </tr> <tr> <td>"E"</td> <td>earlier application or patent but published on or after the international filing date</td> <td>"X"</td> <td>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</td> </tr> <tr> <td>"L"</td> <td>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)</td> <td>"Y"</td> <td>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</td> </tr> <tr> <td>"O"</td> <td>document referring to an oral disclosure, use, exhibition or other means</td> <td>"&"</td> <td>document member of the same patent family</td> </tr> <tr> <td>"P"</td> <td>document published prior to the international filing date but later than the priority date claimed</td> <td></td> <td></td> </tr> </table>			"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 but 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		
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"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family																			
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Date of the actual completion of the international search 11 April 2000		Date of mailing of the international search report 14 APR 2000																				
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929		Authorized officer J.H. CHAN Telephone No : (02) 6283 2340																				

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NZ99/00169

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Genpept acc. No. AAC29067 (7 August 1998) See the whole abstract.	1-5, 18 and 19. (seq id nos 39, 132, 136 and 138)
X	Genpept acc. no. AAC39333 (4 February 1998) See the whole abstract.	1-5, 18 and 19. (seq id nos 39, 41, 93 and 137)
X	Genpept acc. no. AAC39336 (6 February 1998) See whole abstract.	1-5, 18 and 19. (seq id nos 37, 38, 41-43, 93 and 146)
X	EMBL acc. no. Z22528 (8 February 1996) See the whole abstract	1-5, 18 and 19. (Seq id nos 120 and 125)
X	Genbank acc. no. AF27173 (7 February 1998) See whole abstract.	1-5, 18 and 19. (seq id nos 10, 12, 122, 123, 126, 128 and 141)
X	Genbank acc. no. AF27174 (7 February 1998) See whole abstract.	1-5, 18 and 19. (seq id nos 1, 12-14, 70, 122, 124, 128 and 141)
X	Genbank acc. no. AF030052 (5 February 1998) See the whole abstract.	1-5, 18 and 19. (seq id nos 12, 67 and 70)
X	Genbank acc. no. AF062485 (8 August 1998) See the whole abstract.	1-5, 18 and 19. (seq id nos 70, 122, 128 and 144)
X	Genbank acc. no. U58283 (5 December 1996) See the whole abstract.	1-5, 18 and 19. (seq id nos 11, 12, 14, 69, 107, 121, 123, 128 and 141)
X	Genbank acc. no. U58284 (5 December 1996) See the whole abstract.	1-5, 18 and 19. (seq id nos 8, 9, 11, 14, 66, 123, 124 and 128)
X Y	WO 94/28146 A (HOECHST SCHERING AGREEVO GmbH) 8 December 1994. See whole document especially sequence id nos 2 and 4.	1-9, 11-13, and 15-19. (seq id nos 2, 15-17, 19, 59-61, 71-76, 139, and 552-554)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NZ99/00169

C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5773693 A (Diane G BURGESS and Hugo K DOONER) 30 June 1998. See the whole document, especially sequence id no 5 on columns 41-44.	1-9, 11-13 and 15-19. (seq id no 60)
X	Genpept acc. no. AAB40723 (15 January 1997) See the whole abstract.	1-5, 18 and 19. (seq id nos 32, 87 and 147)
X	Genpept acc. no. AAC49941 (9 March 1998) See the whole abstract.	1-5, 18 and 19. (seq id nos 32 and 38)
X	Genpept acc. no. AAA66057 (10 May 1995) See the whole abstract.	1-5, 18 and 19. (seq id nos 30, 31 and 83-85)
X	Genpept acc. no. AF068260 (11 June 1998) See the whole abstract.	1-5, 18 and 19. (seq id no 65)
X	Swiss-prot acc. no. P55232 (1 October 1996) See the whole abstract.	1-5, 18 and 19. (seq id nos 83, 85 and 87)
X	Swiss-prot acc. no. Q00081 (1 April 1993) See the whole abstract.	1-5, 18 and 19. (seq id nos 32, 88 and 147)
X	Genbank acc. no. U81033 (15 January 1997) See the whole abstract.	1-5, 18 and 19. (seq id nos 3 and 142)
X	Genbank acc. no. U85496 (9 March 1998) See the whole abstract.	1-5, 18 and 19. (seq id no 63)
X	Genbank acc. no. X96765 (13 March 1997) See the whole abstract.	1-5, 18 and 19. (seq id nos 1, 59 and 64)
X Y	WO 96/12814 A (DANISCO A/S) 2 May 1996. See the whole document, especially sequence id no 18	1-9, 11-13 and 15-19. (seq id nos 4-6, 57 and 140)
X Y	US 5316931 A (Jon DONSON <i>et al</i>) 31 May 1994. See the whole document, especially sequence id no 5 on columns 49-54.	1-9, 11, 12, 18 and 19. (seq id no 58)

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/NZ99/00169

C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO 90/12876 A (AKTIESELSKABET DE DANSKE SPRITFABRIKKER) 1 November 1990. See whole document especially figures 2-5.	1-9, 11-13, 15-19. (Seq id nos 34, 35, 81 and 145)
X Y	US 5688684 A (Naoshiro Yoshigi <i>et al</i>) 18 November 1997. See the whole document, especially sequence id nos 2 and 3 on columns 9-16.	1-9, 11, 12, 18 and 19. 13 and 15-17 (seq id nos 254, 256, and 260-262)
X	Mori H <i>et al</i> "Moklecular cloning of an α - amylase cDNA from germinating cotyledons of kidney bean" J Appl. Glycoscience 45(3) 261-267 (1998) See the whole document, especially the amino acid and nucleotide sequences depicted in figure 3 on page 264.	1-5, 18 and 19. (seq id nos 33, 82 and 145)
X	Genpept acc. no. AAA32935 (27 April 1993) See the whole abstract.	1-5, 18 and 19 (seq id no 34)
X	Swiss-Prot acc. no. P17859 (1 August 1990) See the whole abstract.	1-5, 18 and 19. (seq id nos 33 and 82)
X	Embl acc. no. M92090 (27 April 1993) See the whole abstract.	1-5, 18 and 19. (seq id no 253)
X	Embl acc. no. D01022(18 June 1993) See the whole abstract.	1-5, 18 and 19. (seq id nos 252, 254 and 255)
X	Genbank acc. no. Z25871 (6 September 1993) See the whole abstract.	1-5, 18 and 19. (seq id no 261)
X	Genbank acc. no. AJ225087 (25 March 1998) See the whole abstract.	1-5, 18 and 19. (seq id nos 257, 259, 260 and 262)
X	WO 97/32027 A (MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTEN EV) 4 September 1997. See the whole document, especially sequence id nos 1 and 2 on pages 17-18.	1-10, 11-13 and 15-19. (seq id nos 77 and 78)
X	Hesse H Willmitzer L "Expression analysis of a sucrose synthase gene from sugar beet" Plant Mol. Biol. 30 863-872 (1996) See the whole document, especially the sequences depicted in figure 1 on page 866.	1-10, 11-13 and 15-19. (seq id nos 45, 95-99)

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/NZ99/00169

C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Godt D E et al "Regulation of sucrose synthase expression on chenopodium rubrum characterization of sugar induced expression in photoautotropho suspension cultures and sink specific expression in plants" J Plant Physiol 146 231-238 (1995) See the whole document, especially the sequence depicted in figure 1 on page 234.	1-9, 11-13, 15-19. (seq id no 102)
X	Genbank acc. no. AF030231 (21 January 1998) See the whole abstract.	1-5, 18 and 19. (seq id nos 15, 16, 18, 105 and 139)
X	PIR acc. no. S22535 (3 May 1994) See the whole abstract.	1-5, 18 and 19. (seq id no 148)
X	Swiss-prot acc. no. Q00917 (1 April 1993) See the whole abstract.	1-5, 18 and 19. (seq id nos 45, 46, 95-97 and 100)
X	Swiss-prot acc. no. Q01390 (1 April 1993) See the whole abstract.	1-5, 18 and 19. (seq id nos 44, 48, 100, 106 and 144)
X	Swiss-prot acc. no. P13708 (1 January 1990) See the whole abstract.	1-5, 18 and 19. (seq id nos 44, 46-48, 98-100, 106 and 144)
X	Swiss-prot acc. no. P31926 (1 July 1993) See the whole abstract.	1-5, 18 and 19. (seq id nos 44, 47, 100, 101, 106 and 144)
P, X	WO 98/53085 A (ZENECA LIMITED) 26 November 1998 (Priority date 20 May 1997) See the whole document, especially sequence id no 42 on page 42-43.	1-11, 18 and 19. (seq id nos 20, 21, 79 and 80)
X	Swiss-prot acc. no. P19595 (1 February 1991) See the whole abstract.	1-5, 18 and 19. (seq id nos 49, 50, 51, 103 and 104)
X	Genbank acc. no. Z18924 (4 December 1992) See the whole abstract.; seq id nos 20, 21, 22, 79 and 80.	1-5, 18 and 19. (seq id nos 20-22, 79 and 80)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NZ99/00169

Box I 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 II 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:

The International Searching Authority has found that there are 34 separate inventions, wherein a single enzyme type or protein provides the special technical feature. This is based on the following reasons:

- 1) The international application has claimed nucleic acid sequences encoding 33 different enzymes and 1 protein (annexin), the fragments of these genes, their use in transforming plants to modulate the polysaccharides content of (to be continued on the extra sheets (1)-(5))

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 in the inventions as defined in the following::
Inventions 1, 2, 3, 4 and 5 as stated on the extra sheets (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.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NZ99/00169

Supplemental Box

(To be used when the space in any of Boxes I to VIII is not sufficient)

Continuation of Box No II:

the plant, the probes or primers based on these genes, and polypeptides coded by these genes and their variants with at least 50% homology.

2) Whilst these 908 sequences are from either *Pinus radiata* or *Eucalyptus grandis*, the invention is to these sequences *per se* and their variant which have 50% homology to the former. The invention as described is also to the use of oligonucleotide probes or primers based on these sequences. It is clear that all these nucleic acids sequences are not limited to the source from which they are isolated, as such the source from these plants cannot be the special technical feature under Rule 13.2 of the PCT. (3)

3) The nucleic acid sequences and their putative amino acid sequences have been shown to have similarity to protein or enzymes which are known to be involved in the synthesis of polysaccharides in the cell walls of plants (p 9 lines 20 to page 11 lines 2). Based on this methodology, the 909 sequences in the quoted passage have been assigned with 33 different enzymic activities and the biological activity of the annexin (a non-enzymic protein). However, these enzymes and protein are not unified by sequence homology, by a common substrate or their mode of action (eg as a non-enzyme, a hydrolase or an oxido-reductase etc.). In addition, many of these enzymes are known to have activity inside the cell and not associated directly with the syntheses of cell wall polysaccharides. Furthermore, the use of the sense or antisense constructs coding the enzymes as transgenes in plants are known. Several transgenes (eg based on branching enzyme, sucrose synthase, ADP-glucose pyrophosphorylase, UDP-glucose pyrophosphorylase and 1,3- β -glucanase) have been used to alter the polysaccharide contents in the plant or plant cells. Therefore, the use of the nucleotide sequences encoding these proteins as transgenes, either in the sense or antisense direction, to affect polysaccharide content or composition in plant is not a special technical feature under Rule 13.2 of the PCT.

For these reasons the international searching authority has identified 34 inventions; they are as listed below:

1. Nucleic and amino acid sequences SEQ ID NOS 7-14, 36-43, 66-70, 90-94, 107, 108, 119-138, 141, 146 and their at least 50% homologues coding cellulose synthase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
2. Nucleic and amino acid sequences SEQ ID NOS 1-3, 30-32, 59-65, 83-89, 142, 147 and their at least 50% homologues coding ADP-glucose pyrophosphorylase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
3. Nucleic and amino acid sequences SEQ ID NOS 4-6, 33-35, 57, 58, 81, 82, 140, 145 and 252-262 and their at least 50% homologues coding amylase, α - or β -amylase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
4. Nucleic and amino acid sequences SEQ ID NOS 15-19, 44-48, 71-78, 95-102, 105, 106, 139, 143, 144, 148 and 552-555 and their at least 50% homologues coding sucrose synthase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on

- to be continued on the extra sheet (2) -

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NZ99/00169

Supplemental Box

(To be used when the space in any of Boxes I to VIII is not sufficient)

Continuation of Box No II (continued from extra sheet (1))

these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.

5. Nucleic and amino acid sequences SEQ ID NOS 20-23, 49-51, 79, 80, 103, 104 and their at least 50% homologues coding UDP-glucose pyrophosphorylase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
6. Nucleic and amino acid sequences SEQ ID NOS 24-29, 52-56, 109-118 and their at least 50% homologues coding annexin, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
7. Nucleic and amino acid sequences SEQ ID NOS 149-185 and their at least 50% homologues coding 1, 3- β -D-glucanase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the polypeptides in the activities of these biosynthetic pathway using these constructs.
8. Nucleic and amino acid sequences SEQ ID NOS 186 and their at least 50% homologues coding 1,4- β -cellobiohydrolase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
9. Nucleic and amino acid sequences SEQ ID NOS 187-196 and their at least 50% homologues coding α , α -trehalose phosphate synthase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
10. Nucleic and amino acid sequences SEQ ID NOS 197-204 and their at least 50% homologues coding α -glucosidase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
11. Nucleic and amino acid sequences SEQ ID NOS 205-250 and their at least 50% homologues coding aldolase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.

- to be continued on the extra sheet (3) -

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/NZ99/00169

Supplemental Box

(To be used when the space in any of Boxes I to VIII is not sufficient)

Continuation of Box No II (continued from extra sheet (2)):

12. Nucleic and amino acid sequences SEQ ID NOS 251 and their at least 50% homologues coding amylopectin 6-glucanohydrolase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
13. Nucleic and amino acid sequences SEQ ID NOS 263 and their at least 50% homologues coding P-glucosidase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
14. Nucleic and amino acid sequences SEQ ID NOS 264-272 and their at least 50% homologues coding branching enzyme, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
15. Nucleic and amino acid sequences SEQ ID NOS 273-318 and their at least 50% homologues coding D-fructokinase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
16. Nucleic and amino acid sequences SEQ ID NOS 319-354 and their at least 50% homologues coding D-xylulose reductase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
17. Nucleic and amino acid sequences SEQ ID NOS 355-365 and their at least 50% homologues coding endo-1, 3-1,4-p-glucanase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
18. Nucleic and amino acid sequences SEQ ID NOS 366-371 and their at least 50% homologues coding glucan exo-1, 3-P-glucosidase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
19. Nucleic and amino acid sequences SEQ ID NOS 372-377 and their at least 50% homologues coding glucose 6-phosphate dehydrogenase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs

-to be continued on extra sheet (4)-

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/NZ99/00169

Supplemental Box

(To be used when the space in any of Boxes I to VIII is not sufficient)

Continuation of Box No II (continued from extra sheet (3)):

20. Nucleic and amino acid sequences SEQ ID NOS 378-38 and their at least 50% homologues coding glucose phosphate isomerase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
21. Nucleic and amino acid sequences SEQ ID NOS 382-389 and their at least 50% homologues coding isoamylase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
22. Nucleic and amino acid sequences SEQ ID NOS 390-393 and their at least 50% homologues coding L-ribulokinase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
23. Nucleic and amino acid sequences SEQ ID NOS 394-398 and their at least 50% homologues coding mannitol-1-phosphate 5-dehydrogenase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
24. Nucleic and amino acid sequences SEQ ID NOS 399-478 and their at least 50% homologues coding pectin methyl-esterase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
25. Nucleic and amino acid sequences SEQ ID NOS 479-506 and their at least 50% homologues coding phosphoglucomutase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
26. Nucleic and amino acid sequences SEQ ID NOS 507-508 and their at least 50% homologues coding phospho-ribulokinase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the polypeptides in the biosynthetic pathway using these constructs.
27. Nucleic and amino acid sequences SEQ ID NOS 509-521 and their at least 50% homologues coding ribulose-phosphate-3-epimerase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the polypeptides in the biosynthetic pathway using these constructs.

- to be continued on the extra sheet (5) -

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/NZ99/00169

Supplemental Box

(To be used when the space in any of Boxes I to VIII is not sufficient)

Continuation of Box No. II (continues from extra sheet (4)):

28. Nucleic and amino acid sequences SEQ ID NOS 522-530 and their at least 50% homologues coding starch phosphorylase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
29. Nucleic and amino acid sequences SEQ ID NOS 531-551 and their at least 50% homologues coding sucrose phosphate synthase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs 30. Nucleic and amino acid sequences SEQ ID NOS 556-586 and their at least 50% homologues coding transketolase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
30. Nucleic and amino acid sequences SEQ ID NOS 556-586 and their at least 50% homologues coding transketolase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
31. Nucleic and amino acid sequences SEQ ID NOS 587-591 and their at least 50% homologues coding trehalase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
32. Nucleic and amino acid sequences SEQ ID NOS 592-620 and their at least 50% homologues coding UDP-glucose 4-epimerase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
33. Nucleic and amino acid sequences SEQ ID NOS 621-902 and their at least 50% homologues coding xyloglucan endo transglycosylase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs.
34. Nucleic and amino acid sequences SEQ ID NOS 903-908 and their at least 50% homologues coding xylose isomerase, DNA probes or primers therefrom, composition containing these nucleic acids, their sense or antisense recombinant constructs, transgenic plant/plant cell based on these constructs and a method of modulating the polysaccharide content of plant or the activities of these polypeptides in the biosynthetic pathway using these constructs

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/NZ99/00169

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
EP	137280	AU	32530/84	BR	8404346	CA	1338400
		ES	535511	ES	543766	ES	543767
		ES	8602139	ES	8604304	ES	860305
		JP	60149387	JP	7051071		
WO	9428146	DE	4317596	EP	701617	HU	74394
		US	5866790				
US	5773693	US	5498831				
WO	9612814	AU	27881/95	CA	2202896	EP	787194
US	5316931	AU	40725/89	EP	406267	US	5589367
		US	5866785	US	5889190	US	5922602
		US	5529909				
WO	9012876	AU	55318/90	CA	2053230	EP	470145
		US	5498832	US	5789657		
WO	9732027	DE	19607697	EP	883689		
WO	9853085	AU	72257/98				
US	5688684	EP	713916	US	5863784	JP	8089245
END OF ANNEX							