

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
21 December 2000 (21.12.2000)

PCT

(10) International Publication Number
WO 00/77165 A3

- (51) International Patent Classification⁷: C12N 15/54, 15/62, 15/82, C08B 30/00, A01H 5/00, 5/10, A23L 1/0522
- (21) International Application Number: PCT/NL00/00406
- (22) International Filing Date: 13 June 2000 (13.06.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
99201862.2 11 June 1999 (11.06.1999) EP
- (71) Applicant (for all designated States except US): LAND-BOUWUNIVERSITEIT WAGENINGEN [NL/NL]; P.O. Box 9101, NL-6700 HB Wageningen (NL).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): VISSER, Richard, Gerardus, Franciscus [NL/NL]; Emmalaan 17, NL-6721 Bennekom (NL). VINCKEN, Jean-Paul [NL/NL]; Willebrordweg 23, NL-6871 ZS Renkum (NL).
- (74) Agent: JORRITSMA, Ruurd; Nederlandsch Octrooibureau, Scheveningsweg 82, P.O. Box 29720, NL-2502 LS The Hague (NL).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, 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.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, 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:
— With international search report.
- (88) Date of publication of the international search report:
12 July 2001
- 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.



WO 00/77165 A3

(54) Title: EXPRESSION IN PLANTS OF STARCH BINDING DOMAINS AND/OR OF PROTEIN FUSIONS CONTAINING STARCH BINDING DOMAINS

(57) Abstract: The invention relates to a method for expressing a desired protein or polypeptide in a plant, in which the protein or polypeptide is expressed as a fusion with at least one starch binding domain. The plant is preferably a plant that contains or produces starch or starch granules in at least one of its parts, such as potato, sweet potato, cassava, pea, taro, sago, yam, banana and/or cereals such as rice, maize, wheat and barley. The protein or polypeptide can be an enzyme, in particular an enzyme that can convert, modify, alter, degrade or otherwise influence starch (granules); or can be a receptor or a structural protein. The invention further relates to the fusions thus obtained, to genetic constructs that encode the above fusions and to plants transformed with said constructs. The method of the invention can in particular be used to provide modified starches and/or to provide complexes of starch (granules) and the above fusions. In another embodiment, one or more starch binding domains are expressed in a plant, to provide a plant producing modified starches.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 00/00406

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C12N15/54 C12N15/62 C12N15/82 C08B30/00 A01H5/00
 A01H5/10 A23L1/0522

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 C08B A01H A23L

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CHEN L ET AL: "IMPROVED ADSORPTION TO STARCH OF A BETA-GALACTOSIDASE FUSION PROTEIN CONTAINING THE STARCH-BINDING DOMAIN FROM ASPERGILLUS GLUCOAMYLASE" BIOTECHNOLOGY PROGRESS, vol. 7, - 1991 page 225-229 XP002056940 ISSN: 8756-7938 cited in the application the whole document	19
X	WO 92 11376 A (AMYLOGENE HB) 9 July 1992 (1992-07-09) the whole document	24, 25, 28, 30, 31, 33, 34
	--- -/--	

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

24 January 2001

Date of mailing of the international search report

30/01/2001

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

INTERNATIONAL SEARCH REPORT

Intern. Application No
PCT/NL 00/00406

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CA 2 061 443 A (VISSER RICHARD G F ;JACOBSEN EVERT (NL); FEENSTRA WILLEM J (NL)) 19 August 1993 (1993-08-19) the whole document -----	24,25, 28-36
X	WO 98 14601 A (EXSEED GENETICS L L C) 9 April 1998 (1998-04-09) the whole document -----	1-36
A	WO 98 16190 A (NOVONORDISK AS ;TSUCHIYA RIE (DK); FUGLSANG CLAUS CRONE (DK)) 23 April 1998 (1998-04-23) cited in the application the whole document -----	1-19
A	WO 99 15636 A (NOVONORDISK AS) 1 April 1999 (1999-04-01) the whole document -----	1-19

INTERNATIONAL SEARCH REPORT

Information on patent family members

Intern. Patent Application No

PCT/NL 00/00406

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9211376 A	09-07-1992	SE 467358 B	06-07-1992
		AU 9114891 A	22-07-1992
		CA 2098171 A	21-06-1992
		EP 0563189 A	06-10-1993
		EP 0788735 A	13-08-1997
		EP 0921191 A	09-06-1999
		FI 932804 A	17-06-1993
		HU 66754 A	28-12-1994
		JP 6507064 T	11-08-1994
		KR 210352 B	15-07-1999
		NO 932227 A	11-08-1993
		PL 169848 B	30-09-1996
US 5824798 A	20-10-1998		
CA 2061443 A	19-08-1993	NONE	
WO 9814601 A	09-04-1998	AU 4803097 A	24-04-1998
		BR 9713242 A	18-01-2000
		CN 1239514 A	22-12-1999
		EP 0935665 A	18-08-1999
		US 6107060 A	22-08-2000
WO 9816190 A	23-04-1998	AU 4550897 A	11-05-1998
		EP 1001736 A	24-05-2000
WO 9915636 A	01-04-1999	AU 9254198 A	12-04-1999
		EP 1023438 A	02-08-2000