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(74) Agent: VARLEY, Karen, K.; Pioneer Hi-Bred International, Inc., 7250 N.W. 62nd Avenue, Johnston, IA 50131-0552 (US).

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(71) Applicant (for all designated States except US): PIONEER HI-BRED INTERNATIONAL, INC. [US/US]; 7100 N.W. 62nd Avenue, Johnston, IA 50131-1014 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): ZHANG, Yongping [CA/CA]; 14 Prada Court, Brampton, Ontario L6P 2K1 (CA). PATEL, Jayantilal, D. [CA/CA]; 21 Bayhampton Crescent, Thornhill, Ontario L4J 7H1 (CA). TULSIERAM, Lomas [CA/CA]; 2795 Gulfstream Way, Mississauga, Ontario L5N 6K2 (CA).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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Declarations under Rule 4.17:

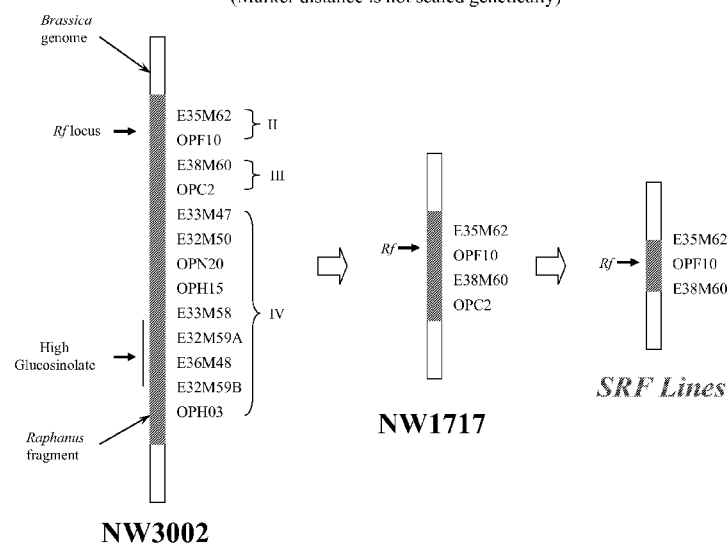
— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

[Continued on next page]

(54) Title: NEW BRASSICA OGURA RESTORER LINES WITH SHORTENED RAPHANUS FRAGMENT (SRF)

Fig. 1 Raphanus Fragment Reduction in SRF Lines

(Marker distance is not scaled genetically)



(57) Abstract: New Brassica Ogura fertility restorer lines with a shortened Raphanus fragment are provided. The new lines lack the OPC2 marker and are capable of fully restoring fertility in Ogura cytoplasmic male sterile (cms) plants. The improved lines were developed using a new breeding method. The new breeding method can be used to shorten an exotic insertion comprising a gene of interest in any plant.



Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

— with sequence listing part of description (Rule 5.2(a))

(88) Date of publication of the international search report:
12 November 2009

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/033153

A. CLASSIFICATION OF SUBJECT MATTER

INV. C12N15/82 A01H1/04 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)

C12N A01H C12Q

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, WPI Data, 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	WO 98/56948 A (PIONEER HI BRED INT [US]; TULSIERAM LOMAS K [CA]; RIDDELL CHRISTINE M) 17 December 1998 (1998-12-17) cited in the application the whole document	1-5, 7, 9, 11-18, 20, 26-28, 40-44
X	WO 97/02737 A (ZENCO NO 4 LTD [US]) 30 January 1997 (1997-01-30) the whole document	1-5, 7, 9, 11-18, 20
X	EP 1 493 328 A (AGRONOMIQUE INST NAT RECH [FR]) 5 January 2005 (2005-01-05) the whole document claim 1	21-24, 30-33
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☒ 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

7 September 2009

Date of mailing of the international search report

25/09/2009

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Blanco Urgoiti, B

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2009/033153

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DELOURME R ET AL: "IDENTIFICATION OF RAPD MARKERS LINKED TO A FERTILITY RESTORER GENE FOR THE OGURA RADISH CYTOPLASMIC MALE STERILITY OF RAPESEED (BRASSICA NAPUS L.)" THEORETICAL AND APPLIED GENETICS, SPRINGER, BERLIN, DE, vol. 88, no. 6/07, 1 January 1994 (1994-01-01), pages 741-748, XP002043620 ISSN: 0040-5752 cited in the application the whole document	26-28, 40,41
X	HONG DENG FENG ET AL: "AFLP and SCAR markers linked to the suppressor gene (Rf) of a dominant genetic male sterility in rapeseed (Brassica napus L.)" EUPHYTICA, KLUWER ACADEMIC PRESS, AMSTERDAM, NL, vol. 151, no. 3, 1 October 2006 (2006-10-01), pages 401-409, XP002463859 ISSN: 0014-2336 the whole document	26-28, 40,41
X	DATABASE EMBL [Online] 2 February 2006 (2006-02-02), "Strongylocentrotus purpuratus clone R3-3024G19, WORKING DRAFT SEQUENCE, 16 unordered pieces." XP002543896 retrieved from EBI accession no. EMBL:AC180800 Database accession no. AC180800 Nucleotides 9096 to 9076	26
A	WO 00/54574 A (UNIV CHICAGO [US]; PREUSS DAPHNE [US]; COPENHAVER GREGORY [US]) 21 September 2000 (2000-09-21)	

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.1

Claims Nos.: 6,8,10,19,39

The subject-matter of claims 6, 8, 10, 19 and 39 relate, respectively, to a plant variety and to essentially biological methods for the production of plants for which an International Search Report is not required (R. 39.1(ii) PCT).

Continuation of Box II.2

Claims Nos.: -

The present claims 25, 30 and 39 encompass plants defined only by the method for breeding it, contrary to the requirements of clarity of Article 6 PCT, because the result-to-be-achieved type of definition does not allow the scope of the claim to be ascertained. The skilled person would not have knowledge beforehand as to whether any plant would fall within the scope claimed, except for those disclosed in the description, namely lines R1439, R1815 and R1931.

The search of claims 25, 30 and 39 was consequently restricted to lines R1439, R1815 and R1931.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2)PCT declaration be overcome.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/033153

Box No. 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.: 6, 8, 10, 19, 39
because they relate to subject matter not required to be searched by this Authority, namely:
The subject-matter of claims 6, 8, 10, 19 and 39 relate, respectively, to a plant variety and to essentially biological methods for the production of plants for which an International Search Report is not required (R. 39.1(ii) PCT).
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:
see FURTHER INFORMATION sheet PCT/ISA/210
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 No. 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 allsearchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
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.:
1-25, 29-39, 42-44 (all complete); 26-28, 40, 41 (all partially)
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 and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ 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:

Invention 1: claims 1-3,12-20 all partially; complete claims 6,7,42

Brassica plant characterized by DNA markers and represented by plant R1439; progeny, inbred lines, seeds, plant cells, parts and crushed seed thereof; method of producing oil thereof; use of the plant for breeding.

Invention 2: claims 1-3,5, 12-20 all partially; complete claims 4,8,9,43

Brassica plant characterized by DNA markers and represented by plant R1815; progeny, inbred lines, seeds, plant cells, parts and crushed seed thereof; method of producing oil thereof; use of the plant for breeding.

Invention 3: claims 1-3,5,12-20, all partially; and complete claims 10,11,44

Brassica plant characterized by DNA markers and represented by plant R1931; progeny, inbred lines, seeds, plant cells, parts and crushed seed thereof; method of producing oil thereof; use of the plant for breeding.

Invention 4: claims 21-25,29-39, all complete

Methods of breeding comprising mutagenesis, crossing and selection; methods of producing a selection ; methods of recombining; plants obtained by the methods,

Invention 5: claims 26-28,40-41 all partially

Isolated nucleic acids of SEQ ID NOS: 1 and 2 and uses thereof; the molecular marker of SEQ ID NO:159 and uses thereof

Inventions 6-83: claims 26-28,40,41 all partially

Invention 6 being idem to invention 5 but related to SEQ ID NOS: 3,4 and 160; invention 7 being idem to invention 5 but related to SEQ ID NOS: 5,6 and 161;...; invention 83 being idem to invention 5 but related to SEQ ID NOS: 157,158 and 237

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2009/033153

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9856948	A	17-12-1998	AU 8004898 A	30-12-1998
			CA 2206673 A1	10-12-1998
			JP 2002512523 T	23-04-2002

WO 9702737	A	30-01-1997	AU 705706 B2	27-05-1999
			AU 6453096 A	10-02-1997
			CA 2198125 A1	30-01-1997
			EP 0784424 A1	23-07-1997
			US 5973233 A	26-10-1999

EP 1493328	A	05-01-2005	AU 2004253363 A1	13-01-2005
			CA 2531051 A1	13-01-2005
			WO 2005002324 A2	13-01-2005
			US 2007256150 A1	01-11-2007

WO 0054574	A	21-09-2000	AU 3891700 A	04-10-2000
			EP 1176864 A2	06-02-2002
