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(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, CL, 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, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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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**:
20 December 2012

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(54) **Title**: DIAGNOSTIC MOLECULAR MARKERS FOR SEED LOT PURITY TRAITS IN SOYBEANS

(57) **Abstract**: The present invention is in the field of plant breeding. More specifically, the invention includes a method for breeding and selecting plants that uniform for one or more seed lot purity traits such as, such as distinct flower color, pubescence color, hilum color, and pod wall color. The invention further includes molecular markers associated with distinct flower color, pubescence color, hilum color, and pod wall color for uses in a breeding program.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/035259

A. CLASSIFICATION OF SUBJECT MATTER
INV. C12Q1/68 A01H1/04 A01H5/10
ADD.

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)
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 practicable, search terms used)
EPO-Internal, WPI Data, BIOSIS, 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	ZABALA, G., ET AL.: "A rearrangement resulting in small tandem repeats in the F3'5'H gene of white flower genotypes is associated with the soybean W1 locus", CROP SCIENCE, vol. 47, no. S2, 16 July 2007 (2007-07-16) , XP002680558,	1-5
Y	Pages S113 - S124, Suppl.1 and 2 the whole document	35-38, 69,70
Y	WO 2009/108513 A2 (MONSANTO TECHNOLOGY LLC [US]; BEHM JAMES [US]; CERNY LIESA [US]; FLOYD) 3 September 2009 (2009-09-03) claims 50,51; example 6	35-38, 69,70

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[X] Further documents are listed in the continuation of Box C.

[X] 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 application or patent 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	Date of mailing of the international search report
23 July 2012	07/11/2012

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, Fax: (+31-70) 340-3016	Maddox, Andrew

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Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	YANG KIWOUNG ET AL: "Genetic Analysis of Genes Controlling Natural Variation of Seed Coat and Flower Colors in Soybean", JOURNAL OF HEREDITY, vol. 101, no. 6, November 2010 (2010-11), pages 757-768, XP002680559, ISSN: 0022-1503 the whole document	1-5, 35-38, 69,70
A	SHULTZ JEFFRY L ET AL: "A soybean mapping population specific to the early soybean production system", DNA SEQUENCE, NEW YORK, NY, US, vol. 18, no. 2, 1 April 2007 (2007-04-01), pages 104-111, XP008094812, ISSN: 1042-5179, DOI: 10.1080/10425170601108613	1-5, 35-38, 69,70
A	IWASHINA TSUKASA ET AL: "Analysis of flavonoids in pubescence of soybean near-isogenic lines for pubescence color loci", JOURNAL OF HEREDITY, OXFORD UNIVERSITY PRESS, CARY, GB, vol. 97, no. 5, 19 September 2006 (2006-09-19), pages 438-443, XP009118650, ISSN: 0022-1503, DOI: 10.1093/JHERED/ESE1027 the whole document	1-5, 35-38, 69,70
A	US 2006/288444 A1 (MCCARROLL ROBERT [US] ET AL) 21 December 2006 (2006-12-21) the whole document	1-5, 35-38, 69,70
A	DATABASE EMBL [Online] 9 June 2007 (2007-06-09), "Glycine max flavonoid 3'5' hydroxylase (w1) gene, complete cds.", XP002680560, retrieved from EBI accession no. EMBL:EF174666 Database accession no. EF174666 the whole document	1-5, 35-38, 69,70

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DATABASE EMBL [Online] 9 June 2007 (2007-06-09), "Glycine max flavonoid 3'5' hydroxylase (W1) gene, complete cds.", XP002680561, retrieved from EBI accession no. EMBL:EF174665 Database accession no. EF174665 the whole document -----	1-5, 35-38, 69,70

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/035259

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.:
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 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 all searchable 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.:

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.:

1-5(completely); 35-38, 69, 70(partially)

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:

1. claims: 1-5(completely); 35-38, 69, 70(partially)

   Methods of identifying soybean plants based on genotypes for flower colour using the SEQ ID NOS: as specified in the corresponding claims.

   ---

2. claims: 7-14, 39-46, 71, 72(completely); 35-38, 69, 70(partially)

   Methods of identifying soybean plants based on genotypes for pubescence colour using the SEQ ID NOS: as specified in the corresponding claims.

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3. claims: 15-20, 27-30, 47-62(completely); 35-38, 69, 70(partially)

   Methods of identifying soybean plants based on genotypes for hilum colour using the SEQ ID NOS: as specified in the corresponding claims.

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4. claims: 21-26, 31-34, 63-68(completely); 35-38, 69, 70(partially)

   Methods of identifying soybean plants based on genotypes for pod wall colour using the SEQ ID NOS: as specified in the corresponding claims.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2012/035259

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2009108513 A2	03-09-2009	AR 070615 A1	21-04-2010
		CA 2711572 A1	03-09-2009
		US 2011010793 A1	13-01-2011
		WO 2009108513 A2	03-09-2009
US 2006288444 A1	21-12-2006	US 2006288444 A1	21-12-2006
		US 2009208964 A1	20-08-2009