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- (30) **Priority Data:**
61/740,208 20 December 2012 (20.12.2012) US
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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, BN, 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, IR, IS, JP, KE, KG, 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, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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.

- (84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

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))*

- (88) **Date of publication of the international search report:**
28 August 2014



WO 2014/100237 A3

(54) **Title:** NON-DESTRUCTIVE IMAGING OF CROP PLANTS

(57) **Abstract:** The present disclosure relates to methods for non-destructively assessing yield and/or stress tolerance in crop plants through the use of high-energy particle based imaging and analysis including X rays. Also provided are methods to non-destructively assess transgenic crop plants for the effects of a transgene on yield and/or on stress tolerance.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/076235

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.:

1-9, 17-26

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.

INTERNATIONAL SEARCH REPORT

International application No PCT/US2013/076235

A. CLASSIFICATION OF SUBJECT MATTER INV. G06T7/00 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) G06T		
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, COMPENDEX, INSPEC, IBM-TDB, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2011/167721 A1 (LEJEUNE PIERRE [BE] ET AL) 14 July 2011 (2011-07-14)	17-26
Y	paragraph [0055] - paragraph [0163] -----	1-9
X	US 2011/135161 A1 (KOUTSKY KEITH A [US] ET AL) 9 June 2011 (2011-06-09)	17-26
Y	paragraph [0016] - paragraph [0089] ----- -/--	1-9
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> 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	"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		
Date of the actual completion of the international search	Date of mailing of the international search report	
26 March 2014	08/07/2014	
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 Rockinger, Oliver	

INTERNATIONAL SEARCH REPORT

International application No PCT/US2013/076235

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ROSELL J R ET AL: "A review of methods and applications of the geometric characterization of tree crops in agricultural activities", COMPUTERS AND ELECTRONICS IN AGRICULTURE, ELSEVIER, AMSTERDAM, NL, vol. 81, 16 September 2011 (2011-09-16), pages 124-141, XP028442024, ISSN: 0168-1699, DOI: 10.1016/J.COMPAG.2011.09.007 [retrieved on 2011-09-22]	1
Y	abstract table 1 page 125 -----	1-9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2013/076235

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2011167721 A1	14-07-2011	AR 074252 A1	05-01-2011
		AU 2009294651 A1	25-03-2010
		CN 102159065 A	17-08-2011
		EP 2337441 A1	29-06-2011
		US 2011167721 A1	14-07-2011
		WO 2010031780 A1	25-03-2010

US 2011135161 A1	09-06-2011	NONE	

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-9, 17-26

method of non-destructively evaluating a crop plant for yield and/or for stress tolerance by determining at least one physical property of the crop plant or part thereof from X ray images;

2. claims: 10-16

method for high-throughput analysis of the effect of a transgene of interest on yield and/or on stress tolerance in a crop plant by determining if there is a significant difference between the a single transgenic crop plant and the population of transgenic crop plants for at least one physical property
