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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.

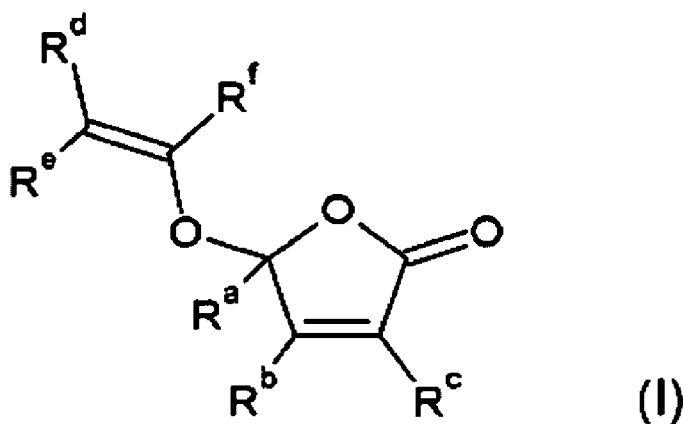
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- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

- (88) **Date of publication of the international search report:**
14 March 2013

(54) **Title:** NOVEL STRIGOLACTONE ANALOGUES AND THEIR USE



(57) **Abstract:** Novel compounds of formula (I) their use as germination trap for parasitic weeds, for the regulation of branching, tillering and root development, for enhancement of cambium growth, for the regulation of hyphal growth of mycorrhizal fungi and compositions comprising compounds of formula (I) and insecticides and/or fungicides.

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2012/001766

A. CLASSIFICATION OF SUBJECT MATTER

INV. C07D307/58 A01N43/08
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)

C07D A01N

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, EMBASE, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	BROOKS, DEE W. ET AL: "Strigol: total synthesis and preparation of analogs", ACS SYMPOSIUM SERIES , 268(CHEM. ALLELOPATHY), 437-44 CODEN: ACSMC8; ISSN: 0097-6156, 1985, XP009152090, abstract	1-3,6-17
Y	page 442 - page 443; compounds 30a,b	20,21
A	----- -/--	4



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 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

11 June 2012

Date of mailing of the international search report

23/01/2013

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/001766

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	YUKI KONDO ET AL: "Synthesis and Seed Germination Stimulating Activity of Some Imino Analogs of Strigolactones", BIOSCIENCE BIOTECHNOLOGY BIOCHEMISTRY, JAPAN SOCIETY FOR BIOSCIENCE, BIOTECHNOLOGY, AND AGROCHEMISTRY, TOKYO, JAPAN, vol. 71, no. 11, 1 January 2007 (2007-01-01), pages 2781-2786, XP008123754, ISSN: 0916-8451, DOI: 10.1271/BBB.70398	1-3,6-17
Y	the whole document	20,21
A	in particular page 2782, figure 1	4
X	----- JOHNSSON A W ET AL: "THE PREPARATION OF SYNTHETIC ANALOGUES OF STRIGOL", JOURNAL OF THE CHEMICAL SOCIETY, PERKIN TRANSACTIONS 1, CHEMICAL SOCIETY, LETCHWORTH; GB, no. 6, 1 January 1981 (1981-01-01), pages 1734-1743, XP002024940, ISSN: 0300-922X, DOI: 10.1039/P19810001734	1-3,6-17
Y	the whole document	20,21
A		4
X	----- WO 2008/152092 A2 (BAYER CROPSCIENCE SA [FR]; SUTY-HEINZE ANNE [DE]; VORS JEAN-PIERRE [FR]) 18 December 2008 (2008-12-18)	1-3,6-17
Y	abstract	20,21
A	page 9 - page 10	4
X	----- WO 2008/152091 A2 (BAYER CROPSCIENCE SA [FR]; HUNGENBERG HEIKE [DE]; THIELERT WOLFGANG [D]) 18 December 2008 (2008-12-18)	1-3,6-17
Y	abstract	20,21
A	page 10 - page 11	4
X	----- SCIENCE IN CHINA SERIES C LIFE SCIENCES, vol. 52, no. 8, August 2009 (2009-08), pages 693-700, XP002659039, ISSN: 1006-9305, DOI: DOI:10.1007/S11427-009-0104-6	1-3, 6-17,20, 21
A	1 Structure and biosynthesis of strigolactones; page 694 - page 695; figure 1	4
A	----- PLANT CELL, vol. 21, no. 5, May 2009 (2009-05), pages 1512-1525, XP002659040, ISSN: 1040-4651, DOI: DOI:10.1105/TPC.109.065987	1-17,20, 21
	abstract page 1518 page 1520 - page 1521	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2012/001766

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.:

1-4, 6-17, 20, 21(all 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: 1-4, 6-17, 20, 21(all partially)

Strigolactone analogues of the formula (I) for which Re is a non-ring substituent (/ an aliphatic rest is attached to the double bond of the enol moiety: i.e. the Re substituent is defined as the R1 substituent (excluding for this group of claims the definition of R1 as a cycloalkyl ring) or as -CH=CHR7, wherein R7 is hydrogen or alkyl), their uses and processes for their preparation.

2. claims: 1-3, 6-17, 20, 21(all partially)

Strigolactone analogues of the formula (I) for which Re is a cycloalkyl ring, their uses and processes for their preparation.

3. claims: 5(completely); 1-4, 6-17, 20, 21(partially)

Strigolactone analogues of the formula (I) for which Re is a -CH=CHR7 rest, wherein R7 is a ring, their uses and processes for their preparation.

4. claims: 1-3, 6-17, 20, 21(all partially)

Strigolactone analogues of the formula (I) for which Rd and Re form together a ring, their uses and processes for their preparation.

5. claim: 13

Use of Dwarf27 for the isomerization of all-trans carotenes.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2012/001766

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2008152092	A2	18-12-2008	AR 066157 A1 29-07-2009
		AU 2008263921 A1 18-12-2008	
		CA 2685576 A1 18-12-2008	
		CN 101730469 A 09-06-2010	
		EP 2157858 A2 03-03-2010	
		JP 2010529975 A 02-09-2010	
		KR 20100020031 A 19-02-2010	
		NZ 580800 A 30-03-2012	
		RU 2010101073 A 20-07-2011	
		TW 200904330 A 01-02-2009	
		US 2010152270 A1 17-06-2010	
		WO 2008152092 A2 18-12-2008	
		ZA 200907725 A 28-07-2010	

WO 2008152091	A2	18-12-2008	AR 066156 A1 29-07-2009
		AU 2008263920 A1 18-12-2008	
		CA 2685608 A1 18-12-2008	
		CN 101677545 A 24-03-2010	
		EP 2157857 A2 03-03-2010	
		JP 2010529974 A 02-09-2010	
		KR 20100020030 A 19-02-2010	
		NZ 580799 A 30-03-2012	
		RU 2010101111 A 20-07-2011	
		TW 200904331 A 01-02-2009	
		US 2010137373 A1 03-06-2010	
		WO 2008152091 A2 18-12-2008	
		ZA 200907936 A 28-07-2010	
