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(54) Title: WHEAT PLANTS RESISTANT TO POWDERY MILDEW

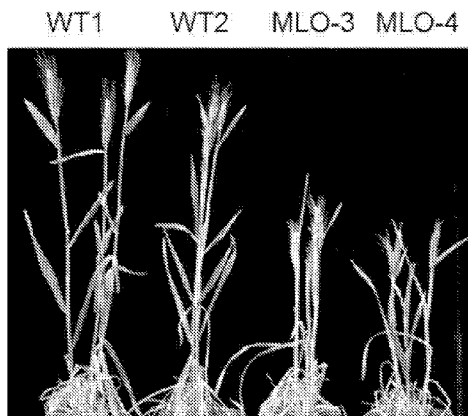


Figure 1

(57) Abstract: The present invention relates to wheat plants having increased resistance to powdery mildew due to targeted genome modification of the MLO alleles.



INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
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ADD.

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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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, 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	YANPENG WANG ET AL: "Simultaneous editing of three homoeoalleles in hexaploid bread wheat confers heritable resistance to powdery mildew", NATURE BIOTECHNOLOGY, vol. 32, no. 9, 20 July 2014 (2014-07-20), pages 947-951, XP055280360, US	29
A	ISSN: 1087-0156, DOI: 10.1038/nbt.2969 the whole document	1-28
A	WO 2014/062989 A2 (MONSANTO TECHNOLOGY LLC [US]) 24 April 2014 (2014-04-24) the whole document	1-29
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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	ÉVA VÁRALLYAY ET AL: "Virus-induced gene silencing of genes induces powdery mildew resistance in <i>Triticum aestivum</i> ", ARCHIVES OF VIROLOGY ; OFFICIAL JOURNAL OF THE VIROLOGY DIVISION OF THE INTERNATIONAL UNION OF MICROBIOLOGICAL SOCIETIES, SPRINGER-VERLAG, VI, vol. 157, no. 7, 24 March 2012 (2012-03-24), pages 1345-1350, XP035077953, ISSN: 1432-8798, DOI: 10.1007/S00705-012-1286-Y abstract -----	1-29
A	PIFFANELLI P ET AL.: "A barley cultivation-associated polymorphism conveys resistance to powdery mildew", NATURE, vol. 430, 19 August 2004 (2004-08-19), pages 887-891, XP055329819, cited in the application the whole document -----	1-29
A	ELLIOTT: "Functional conservation of wheat and rice Mlo orthologs in defense modulation to the powdery mildew fungus", MOLECULAR PLANT-MICROBE INTERACTIONS, vol. 15, no. 10, 1 January 2002 (2002-01-01), pages 1069-1077, XP055024439, ISSN: 0894-0282, DOI: 10.1094/MPMI.2002.15.10.1069 abstract -----	1-29
A,P	WO 2015/109752 A1 (INST GENETICS & DEV BIOLOG CAS [CN]) 30 July 2015 (2015-07-30) the whole document -----	1-29

INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2014062989 A2	24-04-2014	AR 093058 A1	13-05-2015
		CA 2888264 A1	24-04-2014
		CN 104870647 A	26-08-2015
		EP 2908620 A2	26-08-2015
		US 2015267222 A1	24-09-2015
		WO 2014062989 A2	24-04-2014

WO 2015109752 A1	30-07-2015	AU 2014378946 A1	08-09-2016
		CA 2937429 A1	30-07-2015
		CN 104789588 A	22-07-2015
		EP 3097194 A1	30-11-2016
		WO 2015109752 A1	30-07-2015
