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Rakesh Punia

Department of Plant Pathology,
CCS HAU, Hisar, Haryana,
India

AS Rathi

Department of Plant Pathology,
CCS HAU, Hisar, Haryana,
India

Anil Kumar

Department of Plant Pathology,
CCS HAU, Hisar, Haryana,
India

Pavitra Kumari

Department of Plant Pathology,
CCS HAU, Hisar, Haryana,
India

Ram Avtar

Oilseed Section, Department of
Genetics & Plant Breeding, CCS
HAU, Hisar, Haryana, India

Corresponding Author:

Rakesh Punia

Department of Plant Pathology,
CCS HAU, Hisar, Haryana,
India

Assessment of indigenous and exotic rapeseed-mustard genotypes against *Alternaria* blight disease

Rakesh Punia, AS Rathi, Anil Kumar, Pavitra Kumari and Ram Avtar

Abstract

The present study was conducted with objective to assess the resistance source against *Alternaria* blight in Indigenous and exotic rapeseed-mustard genotypes at Oilseeds section, Department of Genetics & Plant Breeding, CCS HAU, Hisar *rabi* during 2015-16. None of germplasm lines was found completely free from *Alternaria* blight. Sixty-four germplasm lines showed moderately resistant reaction ($\leq 10\%$ disease severity) against *Alternaria* leaf blight under artificial inoculation conditions. Many of these moderately resistant lines might have escaped the high infection due to their early maturity. Hence, few lines *viz.*, EC-766106, EC-766108, EC-766110, EC-766111, EC-766121, EC-766123, EC-766124, EC-766129, EC-766136, EC-766143, EC-766144, EC-766145, EC-766147, EC-766152, EC-766156, EC-766158, EC-766161, EC-766178, EC-766195, EC-766202, EC-766204, EC-766231, EC-766313, EC-766315, EC-766404 and EC-766417 could be considered for further use in resistance programmes for at least general (horizontal) resistance.

Keywords: Rapeseed mustard, *Alternaria*, disease resistance, artificial inoculation

Introduction

Indian mustard [*Brassica juncea* (L.) Czern & Coss.] is one of the major oilseed crop cultivated in India and around the world. Among the various oilseed crops cultivated in India, the rapeseed mustard is accounted for 25 per cent total area and 1/3 of total oil production in the country after groundnut. India ranked third after Canada and China in area (19.3%), and production *i.e.* 11.1 per cent (Shekhawat *et al.*, 2012; Saharan *et al.*, 2016) [12, 11]. Rapeseed mustard crops are cultivated on an area of 66.52 lack hectare in India with a production of 71.09 lack tonnes and with an average yield of 1069 kg/ha (Anonymous, 2017). This group of crops is gaining importance because of their high yield potential (17-20 q/ha), wide adaptability and high oil content (44.6%) of good quality. *Alternaria* blight disease has been reported to be one of the most widespread and destructive fungal diseases of rapeseed-mustard throughout the world. In Haryana state the *Alternaria* disease appears every year in severe form at pod initiation stage (Rathi and Singh, 2009) [10]. It affects seed germination as well as quality and quantity of oil (Meena *et al.*, 2010) [7]. As no known source of transferable resistance is available in cultivated varieties of oilseed *Brassica*, efforts have been made to identify the tolerant/ resistant varieties (Gupta *et al.*, 2001) [3]. Kolte *et al.* (2000) [4] reported tolerance in *B. juncea* cv. Divya against *Alternaria* blight. The rate of disease development was more in varieties belonging to *B. juncea* and *B. rapa* as compared to *B. carinata*, *B. napus* and *B. alba* genotypes (Mehta *et al.*, 2008) [8]. *B. juncea* genotypes PR 8988 and PR 9024 exhibited high degree of resistance while Kranti and PR 8943 showed moderate degree of resistance (Kumar and Kolte, 2006; Kumar, 2008) [6]. The ultimate and most economical mean of managing the *Alternaria* blight disease of rapeseed-mustard would be the use of resistance varieties. Host resistance forms an integral element of integrated disease management system and therefore demands a comprehensive study of the host pathogen responses. Complete resistance against *A. brassicae* is not reported elsewhere with confirmation. The disease remains overlooked at farmers field at a time when no remedy is possible because of economics of recommended fungicidal control at that crop stage. However, the research on finding sources of resistance against this disease through inter specific hybridization has been a continued effort throughout country and elsewhere in world, but field resistance among available genotypes need be assessed for further use in conventional resistance breeding programmes.

Materials and Methods

The field experiment was conducted at Research Area of Oilseeds Section, Department of Genetics and Plant breeding, CCS HAU, during *rabi* 2015-16 to evaluate indigenous and exotic rapeseed-mustard genotypes for resistance against *Alternaria* blight. We received one thousand rapeseed-mustard genotypes of diverse origin (Indigenous and exotic origin) from DRMR Bharatpur, through NBPGR, which enabled us to screen the material for their relative resistance to *Alternaria* blight disease under artificial inoculation conditions in field using augmented design. Test plants were inoculated twice at flowering and pod initiation stage in afternoon with conidial suspension (10^5 spores/ml) of pure culture of *Alternaria brassicae* to ensure high disease pressure. Infector row of highly susceptible variety Varuna was also repeated after every ten test entries. Observation on per cent disease severity was recorded after 90-100 days after sowing on leaves and 15 days before harvest on pods. Per cent disease severity was calculated by using 0-6 scale (Conn *et al.*, 1990) [2].

Per cent disease severity was calculated by using 0-6 scale

Rating scale	Leaf area (%) covered by pustule
0	No symptoms
1	0-5
2	5-10
3	10-20
4	20-35
5	35-50
6	More than 50

The per cent disease severity was calculated by using following formula:

$$\text{Per cent disease severity} = \frac{\text{Sum of all numerical ratings}}{\text{No. of leaves examined} \times \text{maximum grade}} \times 100$$

Results and Discussion

During the present investigation one thousand genotypes of diverse origin (indigenous and exotic origin) were screened

for their relative resistance to *Alternaria* blight disease under artificial inoculation conditions in field during *rabi* 2015-16. Thirteen germplasm lines were not germinated in field (Table 2). Among nine hundred eighty-seven germplasm lines, none of the germplasm lines was found completely free from *Alternaria* blight disease. However, sixty-four germplasm lines showed moderately resistance reaction ($\geq 10\%$ disease severity) against *Alternaria* leaf blight under artificial inoculation conditions (Table 1). Among the sixty-four moderately resistance germplasm lines twenty-six germplasm lines might have escaped the high infection due to their early maturity. However, thirty eight germplasm lines *viz.*, IC-385787, EC-333564, EC-401550, EC-699027, EC-766027, EC-766087, EC-766099, EC-766126, EC-766176, EC-766189, EC-766190, EC-766191, EC-766199, EC-766241, EC-766260, EC-766266, EC-766268, EC-766303, EC-766304, EC-766307, EC-766311, EC-766316, EC-766423, EC-766426, EC-766431, EC-766444, EC-766538, EC-766542, EC-766566, EC-766570, EC-766576, EC-766577, EC-766591, EC-766599, EC-766601, EC-766602, EC-766623 and EC-766628 showed moderately resistance reaction (1-10%) to *Alternaria* leaf blight. Two hundred eighty-nine genotypes showed moderately susceptible reaction (11-25%), while five hundred eighty-five genotypes remained susceptible (26-50%) to *Alternaria* leaf blight and forty-nine germplasm lines showed highly susceptible reaction ($> 50\%$). It could be noticed that the susceptibility level was relatively quite high as compared to resistance status (Fig. 1). Different researchers evaluated the rapeseed-mustard germplasm lines and our results are in accordance with those in many cases. Where there is some deviation that may be due to different geographical conditions and differences among genotypes and race of pathogens. Rahman *et al.*, (2010) found varying degree of disease severity while evaluating 26 germplasm lines of rapeseed-mustard during their extensive research on *Alternaria* blight at RARS, Jamalpur. On the basis of disease severity index, none of the lines found resistant to *Alternaria* blight. *B. juncea* genotypes PR 8988 and PR 9024 exhibited high degree of resistance while Kranti and PR 8943 showed moderate degree of resistance (Kumar and Kolte, 2006; Kumar, 2008) [6].

Table 1: Disease reaction of rapeseed- mustard genotypes screened under artificial inoculation conditions during *rabi* 2015-16

Disease Reaction	Disease severity (%)	Germplasm lines	
		Number	Name
Resistant	0	0	Nil
Moderately resistant	1-10	64	IC-385787, EC-333564, EC-401550, EC-699027, EC-766027, EC-766087, EC-766099, EC-766106, EC-766108, EC-766110, EC-766111, EC-766121, EC-766123, EC-766124, EC-766126, EC-766129, EC-766136, EC-766143, EC-766144, EC-766145, EC-766147, EC-766152, EC-766156, EC-766158, EC-766161, EC-766176, EC-766178, EC-766189, EC-766190, EC-766191, EC-766195, EC-766199, EC-766202, EC-766204, EC-766231, EC-766241, EC-766260, EC-766266, EC-766268, EC-766303, EC-766304, EC-766307, EC-766311, EC-766313, EC-766315, EC-766316, EC-766404, EC-766417, EC-766423, EC-766426, EC-766431, EC-766444, EC-766538, EC-766542, EC-766566, EC-766570, EC-766576, EC-766577, EC-766591, EC-766599, EC-766601, EC-766602, EC-766623, EC-766628
Moderately susceptible	11-25	289	IC-76780, IC-121668, IC-121706, IC-121722, IC-113036, IC-121689, IC-121717, IC-121731, IC-113037, IC-121696, IC-121719, IC-122020, IC-122031, IC-122137, IC-122156, IC-122157, IC-122032, IC-122139, IC-122185, IC-122196, IC-122033, IC-122140, IC-122206, IC-122218, IC-122125, IC-122141, IC-122207, IC-122225, IC-122127, IC-122142, IC-122208, IC-122227, IC-122129, IC-122148, IC-122231, IC-122234, IC-122131, IC-122286, IC-122414, IC-122418, IC-122132, IC-122287, IC-122415, IC-212031, IC-122133, IC-122288, IC-267691, IC-296507, IC-122135, IC-122406, IC-310804, IC-336456, IC-342773, IC-361670, IC-398076, IC-398655, IC-398765, IC-399318, IC-426316, IC-398763, IC-426384, IC-491002, IC-491577, IC-570281, IC-426404, IC-491311, IC-491600, EC-206723, IC-657015, IC-491361, IC-571654, EC-206740, IC-427206, IC-491428, IC-571685, EC-206748, IC-470935, IC-520375, IC-571702, EC-206753, IC-481631, IC-541052, IC-589661, EC-206754, EC-321424, EC-333590, IC-589677, EC-385604, EC-

			<p>322093, EC-333591, EC-482973, EC-500176, EC-482961, EC-333593, EC-491565, EC-620075, EC-699023, EC-699030, EC-699055, EC-766076, EC-699050, EC-699035, EC-766032, EC-766084, EC-766105, EC-766107, EC-766033, EC-766091, EC-766112, EC-766122, EC-766037, EC-766092, EC-766128, EC-766133, EC-766140, EC-766095, EC-766170, EC-766134, EC-766242, EC-766098, EC-766173, EC-766196, EC-766142, EC-766125, EC-766258, EC-766198, EC-766236, EC-766276, EC-766146, EC-766208, EC-766271, EC-766278, EC-766265, EC-766210, EC-766272, EC-766280, EC-766148, EC-766275, EC-766283, EC-766306, EC-766150, EC-766312, EC-766412, EC-766317, EC-766267, EC-766400, EC-766430, EC-766456, EC-766153, EC-766401, EC-766468, EC-766480, EC-766194, EC-766402, EC-766470, EC-766539, EC-766200, EC-766297, EC-766595, EC-766543, EC-766160, EC-766298, EC-766596, EC-766561, EC-766566, EC-766592, EC-766607, EC-766562, EC-766598, EC-766593, EC-766609, IC-491269, EC-766587, EC-766625, EC-766610, IC-491271, EC-766590, IC-491505, EC-766611, IC-491294, EC-766584, IC-491147, IC-491509, IC-491318, IC-491572, IC-491582, IC-491246, IC-491321, IC-491573, IC-491587, IC-491268, IC-491323, IC-491274, IC-491295, IC-491296, IC-491341, IC-491277, IC-491432, IC-491297, IC-491342, IC-491439, IC-491436, IC-491299, IC-491401, IC-491440, IC-491463, IC-491457, IC-491413, IC-491602, IC-491466, IC-491303, IC-491426, IC-491625, IC-491467, IC-491306, IC-491450, IC-491626, IC-491469, IC-491319, IC-491452, IC-491634, IC-491478, IC-491322, IC-491453, IC-491114, IC-491500, IC-491324, IC-491454, IC-491116, IC-491504, IC-491325, IC-491458, IC-491136, IC-491539, IC-491326, IC-491461, IC-491140, IC-491549, IC-491340, IC-491462, IC-491273, IC-491556, IC-491344, IC-491464, IC-491345, IC-491176, IC-491350, IC-491448, IC-491536, IC-491245, IC-491139, IC-491160, IC-491033, IC-491120, IC-491141, IC-491170, IC-491584, IC-491121, IC-491377, IC-491423, IC-491157, IC-491336, IC-491378, IC-491016, IC-491062, IC-490996, IC-491379, IC-491023, IC-491097, IC-490997, IC-491384, IC-491039, IC-491070, IC-491001, IC-491389, IC-491444, IC-491071, IC-491004, IC-491390, IC-491445, IC-4910472, IC-491184, IC-491397, IC-491476, IC-491215, IC-491497, IC-491257, IC-491206, IC-491187</p>
Susceptible	26-50	585	<p>IC-122407, IC-07122, IC-07124, IC-07130, IC-07138, IC-264122, IC-12209, IC-20167, IC-23087, IC-23115, IC-264123, IC-23112, IC-23118, IC-49921, IC-57845, IC-267705, IC-58388, IC-73189, IC-73219, IC-73220, IC-267707, IC-73221, IC-73222, IC-73231, IC-73224, IC-267714, IC-73225, IC-73226, IC-73227, IC-73228, IC-268306, IC-73229, IC-73231, IC-73232, IC-73233, IC-268308, IC-73234, IC-73235, IC-94090, IC-94280, IC-277699, IC-76773, IC-94448, IC-121666, IC-121667, IC-296684, IC-113347, IC-121669, IC-121690, IC-121718, IC-296690, IC-121656, IC-121674, IC-121694, IC-121721, IC-313380, IC-121657, IC-121676, IC-121709, IC-121724, IC-355344, IC-121659, IC-121678, IC-121710, IC-121726, IC-355359, IC-121697, IC-121679, IC-121712, IC-122021, IC-363297, IC-121698, IC-121681, IC-121714, IC-122022, IC-371719, IC-121699, IC-121685, IC-121715, IC-122026, IC-385683, IC-121700, IC-121688, IC-122030, IC-122136, IC-385690, IC-121702, IC-122154, IC-122186, IC-122197, IC-385707, IC-122158, IC-122155, IC-122212, IC-122204, IC-391283, IC-122161, IC-122220, IC-122215, IC-122205, IC-395540, IC-122162, IC-122229, IC-122232, IC-122235, IC-395542, IC-122163, IC-122261, IC-122290, IC-122236, IC-39559, IC-122164, IC-122263, IC-122294, IC-122237, IC-395564, IC-122165, IC-122264, IC-122300, IC-122238, IC-395572, IC-122170, IC-122269, IC-122313, IC-122239, IC-395573, IC-122180, IC-122271, IC-122315, IC-122240, IC-395577, IC-122417, IC-122285, IC-122319, IC-122253, IC-395578, IC-122419, IC-122439, IC-122328, IC-122254, IC-398085, IC-122421, IC-122440, IC-122346, IC-122255, IC-399317, IC-122423, IC-122441, IC-122348, IC-122256, IC-411515, IC-122424, IC-122442, IC-122363, IC-248997, IC-417480, IC-122427, IC-122443, IC-122369, IC-249001, IC-427202, IC-122430, IC-122449, IC-122377, IC-249624, IC-426331, IC-122431, IC-123134, IC-122391, IC-253063, IC-482968, IC-122432, IC-253075, IC-570292, IC-570328, IC-482983, IC-560698, IC-253077, IC-589689, IC-571236, IC-18285, EC-182925, IC-261425, EC-206709, EC-206741, EC-206734, EC-199744, EC-206724, EC-206712, EC-287711, EC-206736, EC-204233, EC-206751, EC-206714, EC-289660, EC-206738, EC-206796, EC-347852, EC-206721, EC-386781, EC-333571, EC-223400, EC-347853, EC-392288, EC-399318, EC-333575, EC-258158, EC-347854, EC-399289, EC-400082, EC-333582, EC-414312, EC-347855, EC-399298, EC-435720, EC-401468, EC-414310, EC-347857, EC-399304, EC-435722, EC-620088, EC-697072, EC-367883, EC-491579, EC-470331, EC-620096, EC-698998, EC-699065, EC-699008, EC-470333, EC-620099, EC-698999, EC-699037, EC-699010, EC-481007, EC-634290, EC-699000, EC-699040, EC-699012, EC-481037, EC-634291, EC-699044, EC-699066, EC-699014, EC-766164, EC-634292, EC-766055, EC-716080, EC-766192, EC-766167, EC-634293, EC-766061, EC-720967, EC-766193, EC-766205, EC-634296, EC-766090, EC-720971, EC-766211, EC-766207, EC-634297, EC-766232, EC-732035, EC-766214, EC-766237, EC-766273, EC-766233, EC-766252, EC-766222, EC-766300, EC-766274, EC-766292, EC-766269, EC-766224, EC-766337, EC-766320, EC-766332, EC-766343, EC-766230, EC-766418, EC-766321, EC-766333, EC-766345, EC-766460, EC-766475, EC-766324, EC-766448, EC-766346, EC-766464, EC-766477, EC-766325, EC-766489, EC-766380, EC-766467, EC-766478, EC-766327, EC-766498, EC-766381, EC-766594, EC-766588, EC-766561, EC-766506, EC-766389, EC-766597, EC-766589, EC-766586, EC-766512, EC-766391, EC-766600, IC-491200, EC-766616, EC-766519, EC-766396, IC-491468, IC-491244, IC-491510, EC-766531, IC-491574, IC-491475, IC-491595, IC-491522, IC-491195, IC-491575, IC-491499, IC-491080, IC-491524, IC-491197, IC-491247, IC-491278, IC-491158, IC-491525, IC-491201, IC-491248, IC-491281, IC-491173, IC-491538, IC-491205, IC-491249, IC-491285, IC-491175, IC-491545, IC-491208, IC-491266, IC-491288, IC-491177, IC-491553, IC-491210, IC-491392, IC-491289, IC-491301, IC-491563, IC-491217, IC-491394, IC-491404, IC-491459, IC-491568, IC-491219, IC-491395, IC-491409, IC-491460, IC-491447, IC-491222, IC-491396, IC-491411, IC-491471, IC-491451, IC-491223, IC-491398, IC-491422, IC-491481, IC-491456, IC-491437, IC-491399, IC-</p>

			491424, IC-491484, IC-491503, IC-491507, IC-491569, IC-491427, IC-491485, IC-491589, IC-491511, IC-491580, IC-491430, IC-491498, IC-491591, IC-491513, IC-491581, IC-491431, IC-491603, IC-491592, IC-491516, EC-151982, IC-491144, IC-491604, IC-491593, IC-491518, IC-491007, IC-491149, IC-491606, IC-491185, IC-491520, IC-491049, IC-491152, IC-491616, IC-491190, IC-491531, IC-491061, IC-491172, IC-491617, IC-491194, IC-491581, IC-491076, IC-491253, IC-491618, IC-491196, IC-491280, IC-491079, IC-491256, IC-491620, IC-491198, IC-491282, IC-491093, IC-491258, IC-491622, IC-491202, IC-491284, IC-491346, IC-491088, IC-491366, IC-491211, IC-491287, IC-491348, IC-491091, IC-491368, IC-491220, IC-491290, IC-491349, IC-491272, IC-491369, IC-491221, IC-491291, IC-491362, IC-491479, IC-491371, IC-491226, IC-491298, IC-491523, IC-491489, IC-491373, IC-491230, IC-491302, IC-491526, IC-491494, IC-491382, IC-491232, IC-491309, IC-491528, IC-491506, IC-491383, IC-491242, IC-491310, IC-491530, IC-491551, IC-491393, IC-491585, IC-491317, IC-491044, IC-491077, IC-491400, IC-491590, IC-491329, IC-491047, IC-491078, IC-491405, EC-171039, IC-491123, IC-491050, IC-491083, IC-491406, IC-490999, IC-491124, IC-491051, IC-491087, IC-491412, IC-491008, IC-491127, IC-491056, IC-491100, IC-491418, IC-491013, IC-491128, IC-491064, IC-491103, IC-491419, IC-491015, IC-491138, IC-491065, IC-491104, IC-491433, IC-491026, IC-491145, IC-491066, IC-491106, IC-491435, IC-491162, IC-491150, IC-491067, IC-491108, IC-491354, IC-491259, IC-491151, IC-491068, IC-491111, IC-491357, IC-491262, IC-491155, IC-491075, IC-491112, IC-491367, IC-491292, IC-491167, IC-491186, IC-491117, IC-491372, IC-491304, IC-491168, IC-491212, IC-491118, IC-491415, IC-491305, IC-491178, IC-491213, IC-491218, IC-491421, IC-491327, IC-491181, IC-491214, IC-491224, IC-491441, IC-491332, IC-491519, IC-491486, IC-491227, IC-491442, IC-490998, IC-491544, IC-491487, IC-491238, IC-491443, IC-491000, IC-491010, IC-491495, IC-491239, IC-491017, IC-491019, IC-491011, IC-491493, IC-491240, IC-491018, IC-491020, IC-491012, IC-491003, IC-491254, IC-491024, IC-491045, IC-491029, IC-491048, IC-491041, IC-491025, IC-491046, IC-491030, IC-491052, IC-491031, IC-491035, IC-491055, IC-491036, IC-491053, IC-491032, IC-491038, IC-491057, IC-491037, IC-491054, IC-491034, IC-491058, IC-491059
Highly susceptible	>50	49	IC-07131, IC-11721, IC-73236, IC-121660, IC-122433, IC-253066, IC-121661, IC-122435, EC-182921, IC-121662, IC-264124, EC-401467, IC-121665, IC-399854, EC-435704, IC-248999, EC-657030, EC-699002, IC-341164, EC-699036, EC-699003, EC-399314, EC-699051, EC-699005, EC-699060, EC-766234, EC-699007, EC-699061, EC-766329, EC-766334, EC-766338, EC-766330, EC-766335, EC-766342, EC-766331, EC-766336, IC-491353, IC-491403, IC-491365, IC-491363, IC-491588, IC-491465, IC-491381, IC-491255, IC-491514, IC-491359, IC-491165, IC-491535, IC-491060

Table 2: Screening of indigenous and exotic mustard germplasm lines against alternaria blight under artificial inoculation conditions at Hisar during *rabi* 2015-16

Sr. No.	Entry code	ALB Severity (%) 90-100 DAS	APB severity (%) 15 days before harvest
1	IC-07122	38.33	22.50
2	IC-07124	45.83	34.17
3	IC-07130	34.17	20.83
4	IC-07131	52.50	38.33
5	IC-07138	42.50	19.17
6	IC-11721	56.67	28.33
7	IC-12209	35.83	21.67
8	IC-20167	30.83	24.17
9	IC-23087	31.67	20.83
10	IC-23115	42.50	29.17
11	IC-23112	38.33	17.50
12	IC-23118	44.17	25.83
13	IC-49921	48.33	36.67
14	IC-57845	37.50	23.33
15	IC-58388	28.33	20.83
16	IC-73189	41.67	24.17
17	IC-73219	45.83	31.67
18	IC-73220	31.67	22.50
19	IC-73221	37.50	19.17
20	IC-73222	33.33	23.33
21	IC-73723	35.83	21.67
22	IC-73224	42.50	25.83
23	IC-73225	46.67	24.17
24	IC-73226	37.50	21.67
25	IC-73227	26.67	17.50
26	IC-73228	35.80	23.33
27	IC-73229	26.67	20.83
28	IC-73231	29.17	22.50
29	IC-73232	33.33	24.17
30	IC-73233	32.50	20.83

31	IC-73234	31.67	22.50
32	IC-73235	43.33	26.67
33	IC-73236	56.67	34.17
34	IC-76773	30.83	21.17
35	IC-76780	24.17	19.17
36	IC-94090	40.83	24.17
37	IC-94280	28.33	20.83
38	IC-94448	36.67	18.33
39	IC-113036	22.50	16.67
40	IC-113037	21.67	17.50
41	IC-113347	42.50	25.83
42	IC-121656	43.33	26.67
43	IC-121657	32.50	22.50
44	IC-121659	36.67	23.33
45	IC-121660	53.33	34.17
46	IC-121661	59.17	35.83
47	IC-121662	50.83	31.67
48	IC-121665	52.50	32.50
49	IC-121666	41.67	27.50
50	IC-121667	35.83	19.17
51	IC-121668	18.33	13.33
52	IC-121669	39.17	20.83
53	IC-121674	43.33	24.17
54	IC-121676	31.67	23.33
55	IC-121678	35.83	22.50
56	IC-121679	41.67	24.17
57	IC-121681	27.50	17.50
58	IC-121685	29.17	14.17
59	IC-121688	25.83	15.83
60	IC-121689	22.50	16.67
61	IC-121690	33.33	22.50
62	IC-121694	31.67	18.33
63	IC-121696	23.33	17.50
64	IC-121697	34.17	19.17
65	IC-121698	30.83	20.83

66	IC-121699	27.50	22.50
67	IC-121700	39.17	19.17
68	IC-121702	42.50	26.67
69	IC-121706	24.17	17.50
70	IC-121709	35.00	23.33
71	IC-121710	25.83	21.67
72	IC-121712	31.67	24.17
73	IC-121714	30.83	20.83
74	IC-121715	26.67	17.50
75	IC-121717	20.83	14.17
76	IC-121718	34.17	18.33
77	IC-121719	22.50	19.17
78	IC-121721	35.83	17.50
79	IC-121722	24.67	20.83
80	IC-121724	37.50	22.50
81	IC-121726	29.17	21.67
82	IC-121731	22.50	17.50
83	IC-122020	19.17	12.50
84	IC-122021	25.83	18.33
85	IC-122022	29.17	19.17
86	IC-122026	31.67	20.83
87	IC-122030	32.50	21.67
88	IC-122031	20.83	15.83
89	IC-122032	24.17	14.17
90	IC-122033	19.17	13.33
91	IC-122125	22.50	19.17
92	IC-122127	21.67	18.33
93	IC-122129	15.83	11.67
94	IC-122131	21.67	17.50
95	IC-122132	17.50	15.83
96	IC-122133	22.50	16.67
97	IC-122135	20.83	15.83
98	IC-122136	26.67	21.67
99	IC-122137	20.83	20.83
100	IC-122139	22.50	13.33
101	IC-122140	19.17	12.50
102	IC-122141	31.67	23.33
103	IC-122142	21.67	16.67
104	IC-122148	16.67	14.17
105	IC-122154	24.17	18.33
106	IC-122155	18.33	12.50
107	IC-122156	52.50	38.33
108	IC-122157	20.83	15.83
109	IC-122158	32.50	21.67
110	IC-122161	23.33	17.50
111	IC-122162	22.50	14.17
112	IC-122163	19.17	12.50
113	IC-122164	33.33	22.50
114	IC-122165	37.50	21.67
115	IC-122170	28.33	18.33
116	IC-122180	42.50	31.67
117	IC-122185	31.67	21.67
118	IC-122186	27.50	22.50
119	IC-122196	28.33	19.17
120	IC-122197	21.67	17.50
121	IC-122204	22.50	16.67
122	IC-122205	39.17	20.83
123	IC-122206	24.17	14.17
124	IC-122207	20.83	15.83
125	IC-122208	21.67	13.33
126	IC-122212	22.50	15.83
127	IC-122215	41.67	24.17
128	IC-122218	60.83	40.83
129	IC-122220	26.67	19.17
130	IC-122225	20.83	17.50
131	IC-122227	32.50	23.33
132	IC-122229	26.67	19.17
133	IC-122231	32.50	22.50
134	IC-122232	25.83	20.83

135	IC-122234	22.50	14.17
136	IC-122235	33.33	16.67
137	IC-122236	32.83	18.33
138	IC-122237	29.17	17.50
139	IC-122238	30.83	19.17
140	IC-122239	36.67	20.83
141	IC-122240	32.50	16.67
142	IC-122253	29.17	18.33
143	IC-122254	40.83	26.67
144	IC-122255	37.50	19.17
145	IC-122256	41.67	23.33
146	IC-122261	35.83	20.83
147	IC-122263	27.50	16.67
148	IC-122264	29.17	15.83
149	IC-122269	35.83	17.50
150	IC-122271	30.00	19.17
151	IC-122285	26.67	15.83
152	IC-122286	22.50	16.67
153	IC-122287	21.67	18.33
154	IC-122288	22.50	14.17
155	IC-122290	27.50	17.50
156	IC-122294	26.67	19.17
157	IC-122300	30.83	18.33
158	IC-122313	37.50	23.33
159	IC-122315	42.50	27.50
160	IC-122319	35.83	21.67
161	IC-122328	29.17	20.83
162	IC-122346	25.83	18.33
163	IC-122348	31.67	21.67
164	IC-122363	34.17	22.50
165	IC-122369	35.83	19.17
166	IC-122377	32.50	20.83
167	IC-122391	26.67	17.50
168	IC-122406	22.50	14.17
169	IC-122407	25.83	16.67
170	IC-122414	21.67	15.83
171	IC-122415	20.83	13.33
172	IC-122417	27.50	17.50
173	IC-122418	22.50	14.17
174	IC-122419	43.33	26.67
175	IC-122421	26.67	18.33
176	IC-122423	34.17	22.50
177	IC-122424	35.83	23.33
178	IC-122427	31.67	21.67
179	IC-122430	36.67	19.17
180	IC-122431	30.83	20.83
181	IC-122432	45.83	24.17
182	IC-122433	51.67	29.17
183	IC-122435	52.50	31.67
184	IC-122439	45.83	32.50
185	IC-122440	41.67	30.83
186	IC-122441	35.83	21.67
187	IC-122442	29.17	19.17
188	IC-122443	27.50	20.83
189	IC-122449	26.67	18.33
190	IC-123134	25.83	16.67
191	IC-212031	21.67	15.83
192	IC-248997	36.67	22.50
193	IC-248999	55.83	33.33
194	IC-249001	31.67	21.67
195	IC-249624	45.83	24.17
196	IC-253063	37.50	20.83
197	IC-253066	50.83	31.67
198	IC-253075	41.67	24.17
199	IC-253077	35.83	17.50
200	IC-261425	45.83	23.33
201	IC-264122	49.17	25.83
202	IC-264123	44.17	26.67
203	IC-264124	51.67	30.83

204	IC-267691	42.50	24.17
205	IC-267705	26.67	21.67
206	IC-267707	31.67	22.50
207	IC-267714	30.83	20.83
208	IC-268306	37.50	23.33
209	IC-268308	25.83	19.17
210	IC-277699	26.67	21.67
211	IC-296507	19.17	12.50
212	IC-296684	37.50	22.50
213	IC-296690	28.33	19.17
214	IC-310804	21.67	16.67
215	IC-313380	34.17	23.33
216	IC-336456	18.33	14.17
217	IC-341164	61.67	37.50
218	IC-342773	22.50	18.33
219	IC-355344	37.50	21.67
220	IC-355359	30.83	22.50
221	IC-361670	22.50	17.50
222	IC-363297	26.67	19.17
223	IC-371719	45.83	24.17
224	IC-385683	41.67	23.33
225	IC-385690	27.50	20.83
226	IC-385707	45.83	26.67
227	IC-385787	9.17	6.67
228	IC-391283	25.83	17.50
229	IC-395540	26.67	18.33
230	IC-395542	22.50	15.83
231	IC-39559	33.33	23.33
232	IC-395564	31.67	22.50
233	IC-395572	35.83	21.67
234	IC-395573	32.50	20.83
235	IC-395577	39.17	23.33
236	IC-395578	25.83	17.50
237	IC-398076	22.50	14.17
238	IC-398085	26.67	16.67
239	IC-398655	20.83	15.83
240	IC-398763	17.50	18.33
241	IC-398765	22.50	12.50
242	IC-399317	30.83	19.17
243	IC-399318	21.67	16.67
244	IC-399854	55.83	38.33
245	IC-411515	26.67	19.17
246	IC-417480	25.83	17.50
247	IC-426316	21.67	16.67
248	IC-426331	33.33	22.50
249	IC-426384	20.83	14.17
250	IC-426404	21.67	15.83
251	IC-427202	25.83	17.50
252	IC-427206	21.67	19.17
253	IC-470935	15.83	12.50
254	IC-481631	16.67	14.17
255	IC-482968	26.67	16.67
256	IC-482983	32.50	22.50
257	IC-491002	15.83	13.33
258	IC-491311	19.17	14.17
259	IC-491361	20.83	15.83
260	IC-491428	18.33	12.50
261	IC-491577	27.50	20.83
262	IC-491600	31.67	22.50
263	IC-520375	19.17	14.17
264	IC-541052	16.67	13.33
265	IC-560698	40.83	24.17
266	IC-570281	17.50	11.67
267	IC-570292	31.67	21.67
268	IC-570298	NG	NG
269	IC-570328	35.83	23.33
270	IC-571236	34.17	25.83
271	IC-571654	22.50	19.17
272	IC-571685	23.33	16.67

273	IC-571702	21.67	17.50
274	IC-589661	18.33	14.17
275	IC-589677	17.50	12.50
276	IC-589689	32.50	22.50
277	IC-657015	21.67	15.83
278	IC-18285	32.50	21.67
279	EC-182921	50.83	28.33
280	EC-182925	37.50	17.50
281	EC-199744	38.33	16.67
282	EC-204233	29.17	13.33
283	EC-206709	25.83	15.83
284	EC-206712	40.83	23.33
285	EC-206714	29.17	21.67
286	EC-206721	26.67	20.83
287	EC-206723	24.17	14.17
288	EC-206724	25.83	19.17
289	EC-206734	37.50	22.50
290	EC-206736	31.67	24.17
291	EC-206738	30.83	19.17
292	EC-206740	24.17	18.33
293	EC-206741	35.83	21.67
294	EC-206748	23.33	17.50
295	EC-206751	40.83	23.33
296	EC-206753	15.83	11.67
297	EC-206754	17.50	12.50
298	EC-206796	29.17	22.50
299	EC-223400	27.50	21.67
300	EC-258158	36.67	23.33
301	EC-287711	31.67	20.83
302	EC-289660	35.83	24.17
303	EC-321424	21.67	16.67
304	EC-322093	15.83	13.33
305	EC-333564	5.83	4.17
306	EC-333571	29.17	17.50
307	EC-333575	27.50	18.33
308	EC-333582	26.67	19.17
309	EC-333590	20.83	14.17
310	EC-333591	16.67	12.50
311	EC-333593	14.17	11.67
312	EC-347852	32.50	18.33
313	EC-347853	37.50	21.67
314	EC-347854	40.83	29.17
315	EC-347855	41.67	31.67
316	EC-347857	45.83	32.50
317	EC-367883	49.17	33.33
318	EC-385604	21.67	17.50
319	EC-386781	25.83	18.33
320	EC-392288	26.67	19.17
321	EC-399289	29.17	21.67
322	EC-399298	30.83	22.50
323	EC-399304	44.17	35.83
324	EC-399314	50.83	38.33
325	EC-399318	31.67	19.17
326	EC-400082	37.50	22.50
327	EC-401467	51.67	28.33
328	EC-401468	46.67	24.17
329	EC-401550	5.83	3.33
330	EC-414312	36.67	19.17
331	EC-414310	30.83	22.50
332	EC-435704	52.50	35.83
333	EC-435716	NG	NG
334	EC-435720	35.83	20.83
335	EC-435722	25.83	18.33
336	EC-470331	34.17	21.67
337	EC-470333	39.17	22.50
338	EC-481007	40.83	26.67
339	EC-481037	31.67	18.33
340	EC-482961	22.50	15.83
341	EC-482973	18.33	9.17

342	EC-491565	16.67	8.33
343	EC-491579	35.83	19.17
344	EC-500176	15.83	11.67
345	EC-620075	22.50	17.50
346	EC-620088	32.50	20.83
347	EC-620096	33.33	22.50
348	EC-620099	27.50	21.67
349	EC-634290	31.67	23.33
350	EC-634291	27.50	19.17
351	EC-634292	40.83	28.33
352	EC-634293	35.83	21.67
353	EC-634296	44.17	27.50
354	EC-634297	49.17	30.83
355	EC-657030	55.83	38.33
356	EC-697072	29.17	22.50
357	EC-698998	37.50	24.17
358	EC-698999	35.83	25.83
359	EC-699000	29.17	21.67
360	EC-699064	NG	NG
361	EC-699065	49.17	31.67
362	EC-699002	55.83	33.33
363	EC-699003	56.67	34.17
364	EC-699005	52.50	32.50
365	EC-699007	55.83	37.50
366	EC-699008	37.50	21.67
367	EC-699010	42.50	25.83
368	EC-699012	45.83	24.17
369	EC-699014	36.67	20.83
370	EC-699023	17.50	11.67
371	EC-699027	5.83	4.17
372	EC-699030	29.17	22.50
373	EC-699035	27.50	21.67
374	EC-699036	51.67	27.50
375	EC-699037	40.83	24.17
376	EC-699040	26.67	18.33
377	EC-699042	NG	NG
378	EC-699044	35.83	20.83
379	EC-699045	NG	NG
380	EC-699046	NG	NG
381	EC-699050	12.50	10.83
382	EC-699051	50.83	26.67
383	EC-699053	NG	NG
384	EC-699054	NG	NG
385	EC-699055	35.83	21.67
386	EC-699056	NG	NG
387	EC-699058	NG	NG
388	EC-699060	50.83	34.17
389	EC-699061	51.67	35.83
390	EC-699062	NG	NG
391	EC-699063	NG	NG
392	EC-699066	26.67	19.17
393	EC-716080	29.17	21.67
394	EC-720967	27.50	20.83
395	EC-720971	36.67	23.33
396	EC-732035	40.83	26.67
397	EC-766027	5.83	4.17
398	EC-766032	21.67	17.50
399	EC-766033	18.33	13.33
400	EC-766037	24.17	19.17
401	EC-766055	35.83	22.50
402	EC-766061	27.50	21.67
403	EC-766076	22.50	15.83
404	EC-766084	20.83	17.50
405	EC-766087	4.17	3.33
406	EC-766090	49.17	26.67
407	EC-766091	19.17	12.50
408	EC-766092	18.33	11.67
409	EC-766095	20.83	14.17
410	EC-766098	17.50	12.50

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413	EC-766106	6.67	4.17
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415	EC-766108	4.17	2.50
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417	EC-766111	5.00	3.33
418	EC-766112	13.33	11.67
419	EC-766121	6.67	5.83
420	EC-766122	21.67	20.83
421	EC-766123	5.83	2.50
422	EC-766124	4.17	3.33
423	EC-766125	15.83	11.67
424	EC-766126	6.67	3.33
425	EC-766128	12.50	10.83
426	EC-766129	5.83	4.17
427	EC-766133	13.33	12.50
428	EC-766134	15.83	9.17
429	EC-766136	5.00	3.33
430	EC-766140	22.50	15.83
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432	EC-766143	5.83	4.17
433	EC-766144	6.67	3.33
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435	EC-766146	14.17	10.83
436	EC-766147	5.00	4.17
437	EC-766148	12.50	9.17
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439	EC-766152	5.83	3.33
440	EC-766153	14.17	10.83
441	EC-766156	6.67	4.17
442	EC-766158	5.83	2.50
443	EC-766160	12.50	9.17
444	EC-766161	5.83	3.33
445	EC-766164	41.67	24.17
446	EC-766167	25.83	18.33
447	EC-766170	23.33	17.50
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468	EC-766211	35.83	25.83
469	EC-766214	26.67	19.17
470	EC-766222	27.50	21.67
471	EC-766224	30.83	22.50
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473	EC-766231	5.83	4.17
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479	EC-766241	4.17	2.50

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497	EC-766283	17.50	13.33
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889	IC-491128	42.50	33.33
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892	IC-491141	24.17	17.50
893	IC-491145	30.83	21.67

894	IC-491150	31.67	20.83
895	IC-491151	40.83	29.17
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897	IC-491157	21.67	14.17
898	IC-491162	33.33	22.50
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919	IC-491257	20.83	13.33
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925	IC-491327	45.83	34.17
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934	IC-491378	24.17	17.50
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992	IC-491057	25.83	19.17
993	IC-491058	26.67	20.83
994	IC-491059	35.83	24.17
995	IC-491060	56.67	42.50
996	IC-491062	15.83	11.67
997	IC-491097	40.83	30.83
998	IC-491070	39.17	27.50
999	IC-491071	35.83	23.33
1000	IC-4910472	29.17	21.67
	Varuna (SC)	62.50	40.83
	Location severity index (LSI)	29.61	20.30

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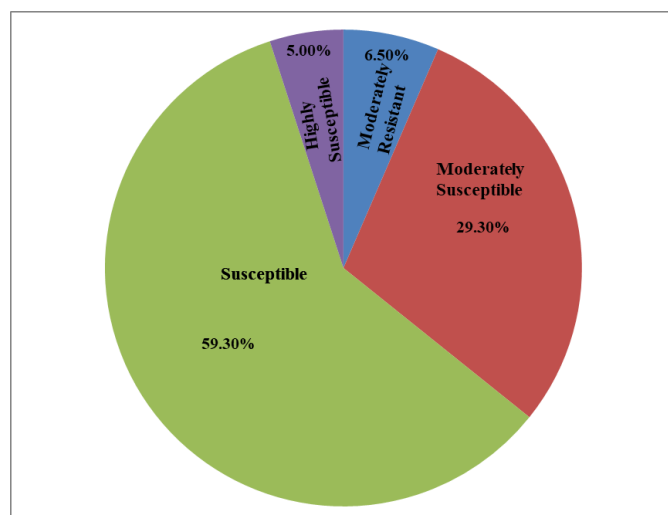


Fig 1: Screening of Rapeseed-mustard germplasm lines against *Alternaria* blight

References

1. Anonymous. Directorate of rapeseed-mustard research, 2017. www.drmr.res.in
2. Conn KL, Tiwari JP, Awasthi RP. A disease assessment key for *Alternaria* black spot in rapeseed and mustard. *Can Pl Dis Swv.* 1990; 70:19-22.
3. Gupta K, Saharan GS, Singh D. Sources of resistance in Indian mustard against white rust and *Alternaria* blight. *Cruciferae Newsletter.* 2001; 23:59-60.
4. Kolte SJ, Awasthi RP, Vishwanath. Divya mustard: a useful source to create *Alternaria* black spot tolerant dwarf varieties of oilseed brassicas. *Pl vari Seeds.* 2000; 13:107-111.
5. Kumar B. Assessment of slow blighting (*Alternaria brassicae*) resistance and yield in Indian mustard [*Brassica juncea* (L.) Czern. & Coss.]. *Ind Phytopath.* 2008; 61:171-183.
6. Kumar B, Kolte SJ. Development of *Alternaria* blight in genotypes of Indian mustard (*Brassica juncea* (L.) Czern. & Coss.) under field. *Ind Phytopath.* 2006; 39:314-317.
7. Meena PD, Awasthi RP, Chattopadhyay C, Kolte SJ, Kumar A. *Alternaria* blight: a chronic disease in rapeseed-mustard. *J Oilseed Bra.* 2010; 1:1-11.
8. Mehta N, Sangwan MS, Kumar R, Niwas R. Progression of *Alternaria* blight on different varieties of rapeseed-mustard in relation to weather parameters. *Pl Dis Res.* 2008; 23:28-33.
9. Rahman MM, Elahi FE, Goswami BK. Screening of rapeseed-mustard varieties against *Alternaria* blight disease. *Ann Rep Bangladesh Agri Res Inst Gazipur.* 2010, 1-2.
10. Rathi AS, Singh D. Integrated management of *Alternaria* blight and white rust in Indian mustard. Paper presented in 16th Australian Research Assembly on Brassica held at Ballart Mercure Hotel, Ballart, Victoria, Australia from September 14-16, 2009. In: Conference proceedings, 2009, 51-54.
11. Saharan GS, Mehta N, Meena PD. *Alternaria* Disease of crucifers: Biology, ecology and management. Springer Pub., The Netherlands. 2016, 297.
12. Shekhawat K, Rathore SS, Premi OP, Kandpal BK, Chauhan JS. Advance in agronomic management of Indian mustard (*Brassica juncea* (L.) Czernj. Cosson): An Overview. In *J Agro.* 2012; .14.