

REACTION OF SOME ACCESSIONS OF MUSTARD (*BRASSICA JUNCEA* (L.) CZERN AND COSS) TO *ALTERNARIA* BLIGHT.

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Reaction of a number of accessions of mustard against the blight fungus, *Alternaria brassicae* were observed under natural conditions in the field. Most of the accessions were susceptible or highly susceptible. Some of the accessions remained free from the disease and some others showed a varying degree of resistance. In artificial inoculations, all the accessions found disease-free, resistant and moderately resistant under natural conditions, became susceptible or highly susceptible. The resistance thus was not based on genotypic characteristics of the accessions.

Key words : Accessions, resistance, field trial.

Mustard (*Brassica juncea* (L.) Czern and Coss) is an important oilseed crop and grown on a large scale in many different areas of India including Indo-Gangetic plains. The crop is commonly attacked by *Alternaria brassicae* (Berk.) Sacc. and considerable yield losses result. The seeds from diseased plants become poor in oil content (Chohan, 1978; Ansari, 1987; Ansari *et al.* 1988a). The disease has assumed greater significance in the current perspective in India because of low oilseed production in the country. A number of accessions/cultivars of mustard are under trial for determining their various characteristics and performance before introduction and cultivation on commercial scale. However, the reaction of the accessions/cultivars to *A. brassicae* causing *Alternaria* blight of the crop has not yet been ascertained. Therefore, in this study we observed reaction of a number of accessions of mustard to *A. brassicae* in natural conditions in field plots.

MATERIALS AND METHODS

Reaction of a large number of accessions of mustard (*B. juncea*) were observed under natural conditions in the field. The seeds of the accessions were sown at a rate of 5 kg/ha in field plots of 5 x 3 m size at the farm of C.S.A. University of Agriculture & Technology, Kanpur. The plots were arranged in complete randomized blocks with four replicates of each accession.

The intensity of the naturally appearing *Alternaria* blight disease was assessed on each accession by comparison with a score chart prepared beforehand

spanning the range of disease intensity. For preparing the score chart, mustard leaves were collected from heavily infected plants in a field. The leaves were pressed dried and the total leaf area and disease area of each were measured with a planimeter. The leaves were then arranged into six groups representing up to 0, 3, 10, 25, 40 or more than 40% disease intensity and a score chart was constructed accordingly.

The percent intensity of the disease on each accession was determined by collecting leaf samples randomly from each experimental plot and comparing them with the chart to assign scores. The mean % disease intensity was calculated as the sum of the products of the scores for each accession. n_a, n_b, \dots, n_f being the numbers of leaves in each category thus:

$$(n_a 0 + n_b 3 + n_c 10 + n_d 25 + n_e 40 + n_f > 40) / (\text{Sum of } n_a, \dots, n_f).$$

The degree of resistance was allocated to the score categories as : infection-free (F) = nil infection; resistant (R) = 1-3%; moderately resistant (MR) = 4-10%; moderately susceptible (MS) = 11-25%; susceptible (S) = 26-40% and highly susceptible (HS) = more than 40%.

The accessions found infection-free, resistant and moderately resistant in the field trial were subsequently tested under artificial inoculations in the glasshouse. For this, plants of each accession were raised from surface sterilized seeds in autoclaved soil filled in clay pot of 30 cm size. One-month-old plants were inoculated by spraying spore suspension

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(10,000 spores/lit.) of pure culture of *A. brassicae*. The intensity of the infection was determined a week after inoculation.

RESULTS AND DISCUSSION

It is evident from Table 1 that most of the accessions were susceptible or highly susceptible. Only a few showed resistance in the field. Five accessions were disease free, 38 resistant, 68 moderately resistant, 140 moderately susceptible, 1082 susceptible and 169 highly susceptible. The accessions of mustard found disease-free (five), resistant (38) and moderately resistant (68) in the field trial were again screened by artificial inoculations with *A. brassicae*. The results given in the Table 2 show that the plants of all the accessions were found to be susceptible or highly susceptible to the pathogen in artificial inoculations in glasshouse.

Table 1. Assessment of the resistance of accessions of mustard (*Brassicae juncea*) to *Alternaria brassicae* under natural conditions.

Degree of resistance	Accessions
F	CSR-Nos. 43, 142, 440, 622, 741.
R	CSR-Nos. 18, 45, 46, 57, 74, 100, 102, 103, 113, 141, 150, 195, 196, 200, 218, 225, 245, 258, 263, 276, RH-836, 839, DIRM-5-6, RF-25, PKT-1, RK-8406, Kranti, RH-7846, 7847, 8113, 8114, RW-33-2, RH-841, PR-2030, RLC-1138, 1141, CSR-83-121, 27.
MR	CSR Nos. 291, 297, 307, 314, 366, 369, 671, 683, 728, 746, 781, 817, 951, 960, 1046, 1137, 1210, 1225, 1254, 1301, 1344, 1347, RH-832, 8315, RHMG-17, DIRM-55, DIRM-11-12, RF-20-5-1, RF-32, RS-97, RLC-1105, 1124, RK-8404, 105, Varuna, RIK-803, CSR-83-152, 216, 62, 13, 194, 5, 212, 25, 123, 87, 133, RK-14, RLM-701, R-715, RH-765, RLM-524, RH-7387, 7823, DIR-226, RW-2-2, RH-842-844, DIR-202, 251, RS-90, 92, 99, 89, RK-8401-8403.
MS	CSR-Nos. 320, 321, 343, 359, 368, 371, 407, 408, 412, 430, 445, 451, 455, 459, 465, 470, 478, 479, 485, 491, 494, 495, 536, 579, 584, 585, 598, 604, 608, 627, 645, 692-694, 709, 717, 720, 721, 756, 766, 767, 770, 788, 800, 808, 810, 816, 884, 814, 867, 875, 876, 881, 882, 891, 893, 901, 910, 916, 932, 939, 940, 942, 943, 959, 971, 1011, 1014, 1020, 1026, 1031, 1067, 1092, 1096, 1097, 1099, 1131, 1138, 1139, 1152, 1177, 1184, 1190, 1198, 1200, 1201, 1205, 1207-1209, 1212, 1216, 1219, 1221, 1228, 1229, 1235, 1237, 1246, 1255, 1256, 1261-1263, 1275, 1278, 1283, 1285, 1296, 1305, 1307, 1323, 1325, 1326, 1335, 1336, 1446, DIR-138, KR-1289, RIK-802, RND-1, RK-8204, 8301, 8304, RH-8406, DIRM-11-2, RH-8404, RK-8405, RW-15-6, CSR-83-45, 217, 1, 197-202, 218, RLM-29/22, RLM-543, 391, DIR-247, PR-350.
S	CSR-Nos. 1-16, 19-29, 33-41, 44, 47-56, 58-67, 69-73, 75-79, 82-99, 101, 104-112, 114-126, 128-134, 136, 140, 143-148, 151-169, 171, 173-176, 180, 182-188, 190-194, 197-199, 201-203, 205-214, 216, 217, 219, 222, 227-239, 241, 243, 244, 246, 247, 249-253, 256, 257, 259-262, 264-269, 271, 272, 275, 278-280, 282-285, 287-290, 292-295, 298, 299, 301, 303-306, 308, 309, 311-313, 315, 317, 318, 322-334, 338-342, 344-350, 353-356, 358, 360-365, 367, 370, 372, 376-378, 380-382, 385-406, 409-411, 413-420, 422-426, 428, 429, 431-436, 439, 441-444, 448-450, 452-454, 456-458, 466-469,

471-477, 480-484, 486-490, 492, 493, 496-518, 525-535, 537-567, 570-572, 574-578, 580-583, 586-589, 592-596, 599, 600, 602, 603, 605-607, 609, 610-621, 623-626, 628-643, 646-652, 654-656, 658, 659, 661-670, 672-675, 677-679, 681, 682, 684-691, 695, 697-706, 708, 710, 711, 713-716, 718, 719, 722-727, 729, 730, 733, 734, 736-740, 743-745, 747-755, 757, 760-765, 768, 769, 771-774, 776-780, 782-785, 787, 789-791, 794-799, 801-805, 807, 809, 811, 813, 815, 818-820, 822-824, 826-836, 840, 841-866, 868-871, 878-880, 883, 885-890, 892, 894-899, 902, 904-909, 911, 912, 914, 915, 917, 919, 920, 924-931, 933-936, 938, 941, 944, 947-949, 952-958, 961-963, 965-970, 972-1005, 1010, 1012, 1013, 1015, 1016-1019, 1021-1025, 1027, 1029, 1030, 1032-1035, 1037-1045, 1048-1064, 1066, 1069, 1070, 1072-1076, 1078, 1079, 1081-1087, 1089-1091, 1093, 1095, 1098, 1100-1102, 1105, 1106, 1111-1130, 1132-1134, 1141-1146, 1150, 1151, 1154-1168, 1170-1176, 1178, 1179, 1181-1183, 1185-1187, 1189, 1195-1197, 1199, 1202-1204, 1206, 1213, 1214, 1217, 1218, 1222, 1223, 1226, 1230-1232, 1234, 1236, 1238-1245, 1247-1253, 1257-1260, 1264-1269, 1271-1274, 1276, 1277, 1279-1282, 1284, 1286-1291, 1293-1295, 1297-1300, 1302, 1303, 1308, 1310, 1312-1316, 1319-1321, 1324, 1327-1334, 1337-1340, 1350-1365, 1368, 1370, 1372-1376, 1379-1384, 1387-1394, 1400-1425, 1429-1434, 1441, 1442, RK-8302, RS-101, RW-29-6, CSR-83-146.

HS CSR-NOS. 30-32, 42, 68, 80, 81, 127, 135, 137-139, 149, 170, 172, 177-179, 181, 189, 204, 215, 220, 221, 223, 224, 226, 240, 242, 248, 254, 255, 270, 273, 274, 277, 281, 286, 296, 300, 302, 310, 316, 319, 335-337, 351, 352, 357, 373-375, 379, 383, 384, 427, 437, 438, 446, 447, 460-464, 519-524, 568, 569, 573, 591, 601, 644, 653, 657, 660, 676, 680, 696, 707, 731, 732, 735, 742, 758, 759, 775, 786, 792, 793, 806, 821, 825, 837-839, 872-874, 877, 900, 903, 913, 918, 921-923, 937, 945, 946, 950, 964, 1006-1009, 1028, 1036, 1065, 1068, 1071, 1077, 1080, 1088, 1103, 1104, 1107-1110, 1135, 1136, 1140, 1147-1149, 1153, 1169, 1180, 1188, 1191-1194, 1211, 1215, 1220, 1224, 1229, 1233, 1270, 1292, 1304, 1306, 1309, 1311, 1317, 1318, 1322, 1340, 1341, 1343, 1345, 1346, 1348, 1366, 1367, 1369, 1371, 1377, 1378, 1385, 1386, 1395-1399, 1426-1428, 1435-1440, 1443-1445.

F = infection-free; R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible; HS = highly susceptible.

The results of the study showed that the accessions included in the study in general lacked resistance against the pathogen. Field resistance shown by some accessions disappeared and the accessions became susceptible or highly susceptible in artificial inoculations. This shows the resistance was not stable since it was not controlled by the genotypic characters of the accessions. All the accessions thus lacked gene for resistance to *Alternaria* blight and are liable to suffer great damages if environmental conditions become favourable for the pathogen. This observation is of great significance for their future cultivation in India. If these accessions of the mustard are to be introduced for commercial cultivation, this aspect, in relation to *Alternaria* blight should be fully taken into consideration and effective measures other than host resistance is most economical and sure measure of disease management. Immediate attention should be paid towards breeding of cultivars of mustard

Table 2. Assessments of the resistance of accessions of mustard (*Brassica juncea*) to *Alternaria brassicae* in artificial inoculations.

Accessions	Degree of resistance under	
	natural conditions	artificial inoculations
CSR-Nos. 43, 142, 440, 622, 741	F	S
CSR-Nos. 18, 45, 113, 141, 150, 195, 258, 263, 276, RLC-1138, 1141, RW-33-2.	R	HS
CSR Nos. 46, 57, 74, 100, 102, 103, 196, 200, 218, 225, 245, RH-836, 839, DIRM-5-6, RK-8406, Kranti, RF-25, PKT-1, CSR-83-121, 27, RH-7846, 7847, 8113, 8114, RH-841, PR-2030.	R	S
CSR-Nos. 291, 297, 671, 683, 728, 746, 1046, 1137, 1210, 1347, RH-832, DIRM-11-12, RLC-1105, RIK-803, RH-765, RLM-524.	MR	HS
RH-7387, 7823, RH-842-844, DIR-251, RS-90, 92, 89, RK-8401, CSR-Nos. 307, 314, 366, 369, 781, 817, 951, 960, 1225, 1254, 1301, 1344, 8315, RHM-17, DIRM-55, RF-20-5-1, RF-32, RS-97, 1124, RK-8404, 105, Varuna, RS-99, RK-8402, 8403, DIR-226, RW-2-2, DIR-202, CSR-83-152, 216, 62, 13, 194, 5, 212, 25, 123, 87, 133, RK-14, RLM-701, R-715.	MR	S

F = infection-free; R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible; HS = highly susceptible.

making blight-resistance genotypes as a basis. In the management strategy of the disease, breeding of truly resistant cultivars is greatly needed. A number of accessions/cultivars of rapeseed have also been

found to lack resistance against *A. brassicae* (Ansari *et al.*, 1989) which is the chief causal organism of the disease in the Indo-Gangetic plains (Ansari, 1987; Ansari *et al.* 1988b). In view of general lack of resistance in rapeseed and mustard, breeding aspect should be given due importance for greater oilseed production in the country.

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