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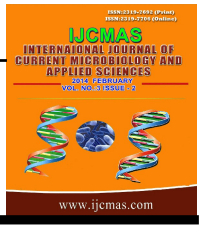

Original Research Article

Identification of sources of resistance in mungbean genotypes and influence of fungicidal application to powdery mildew epidemics

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Keywords

Mungbean; *Vigna radiate*; *Erysiphe Polygoni*; genotypes and management.

A B S T R A C T

Sixty five genotypes were screened against the Powdery mildew of mungbean during *Kharif* 2011-2012 at Anand, among them one genotype LGG-460 was found resistant, while PDM-288, IPM-02-1, GM-9926, TMV-37, SAPTARI LOCAL, GM - 02-21, GM - 03-06, GM - 03-08, GM - 03-15 and GM - 03-16 moderately resistant, however rests of the genotypes moderately susceptible to susceptible. Whereas, one genotype BRS-2435 was found highly susceptible against the disease. Minimum disease intensity (9.2%) and Maximum disease control (72.0%) was recorded in the foliar application of Carbendazim (12%) + Mancozeb (63%) 75% WP at 0.2% concentration. However, maximum disease intensity was recorded in untreated check i.e. 32.9 per cent.

Introduction

Mungbean is one of the most important pulse crops for protein supplement in subtropical zones of the world. Mungbean is extensively cultivated in India, China, Thailand, Philippines, Indonesia, Burma, Bangladesh, Vietnam, Laos and Cambodia as well as also in hot and dry regions of Southern Europe and the Southern United States. In India mung bean is mostly grown in states like Andhra Pradesh, Maharashtra, Orissa, Rajasthan, Gujarat, Madhya Pradesh, West Bengal, Punjab, and Uttar Pradesh etc. Mung bean is grown in summer and *Kharif* season in northern India and in southern India; it is also grown in winter season. It is contains 51% carbohydrate, 24–26% protein, 4% mineral, and 3% vitamins (Afzal *et al*, 2008).

Diseases are the major biological factor which constrain the productivity of these pulse crops. Mungbean is vulnerable to various fungal, viral, bacterial and nematode diseases. Powdery mildew (*Erysiphepolygoni* D.C.) is the most devastating disease of mungbean which is favored by dry season and cool weather conditions. The disease has been reported from Australia, India, Philippiens, Sri Lanka, Taiwan, Colombia, Ethiopia, Thailand, Korea and U.S.A. Yield reduction on farmers' field ranges from 9

to 50%. (AVRDC, 1982). Its epidemic form covers all parts of the plant with white floury patches; thereby adversely affecting the photosynthetic activity of the plants which in turn reduces yield as well as its market price thus causing enormous economic loss to farmers. The yield losses of powdery mildew in mungbean are reported to be 20–40% (Fernandez and Shamugasundaram, 1987) and 100% when it occurs at the seedling stage (Reddy *et al*, 1994). Therefore, it is necessary to develop resistant varieties as well as explore high efficacy, low cost fungicides to reduce the disease population and the production cost as well as to protect the environment. Hence the present studies were conducted to find the resistance source of this disease.

Materials and Methods

Evaluation of Genotypes for resistance

Sixty five mungbean genotypes obtained from Indian Institute of Pulse Research, Kanpur and Department of Plant Pathology, B. A. College of Agriculture, Anand were screened against powdery mildew under disease epiphytotic conditions. Each test entry was sown in a row of 5 m with 30 cm apart and 10 cm distance from plant to plant alone with variety IR 16 as susceptible check after every 5 test entries. This variety was confirmed to be susceptible to the disease during the previous seasons. Initial plant count was taken 10-15 days after sowing. The data on severities of powdery mildew on 10 randomly selected plants in each row were recorded. The severities were recorded as per the method described by Mandhare and Suryawanshi (2008) at before flowering, pod formation and at physiological maturity. The genotypes were graded on the basis of disease intensity as Resistant (R): 0-10.00 PDI, Moderately Resistant (MR): 10.1-25.00, Moderately Susceptible (MS): 25.1-50.00, Susceptible (S): 50.1-75.00 and Highly Susceptible (HS):>75.1 PDI, respectively.

Management of powdery mildewdisease

Thesusceptible variety IR 16 was sown in rows 30 cm apart and 10 cm distance from plant to plant in plot size of 5 x 3 m. The treatments were replicated thrice in a randomized block design (RBD). Standard agronomical practices were followed to raise the crop. Fungicides and botanicals were sprayed just after initiation of disease and repeated twice at 15 days interval. Plots without sprays served as check. Observations on disease reactions assessing disease development were recorded 7 days after last sprays of fungicides as well as botanicals. Randomly selected five plants were assessed individually from each treatment and the mean disease intensity was calculated as per scale described by Bennett and Westcott, (1982) using a 0 to 9 scale in which 0 = no disease and 9 = more than 90 percent of plant tissue diseased. Ratings on this scale can be made using standard area diagrams to assess disease severity.

Results and Discussion

The results present (Table.1) showed significant considerable difference between the genotypes for the level of resistance against the disease. Powdery mildew of Mungbean showed distinct severity among the test genotypes with pooled data ranging from 1.2 (TMV-37) to 27.6% (IR-16).Out of sixty five genotypes, one genotype LGG-460 was found resistance, Whereas, PDM-288, IPM 02-1, GM-9926, TMV-37, SAPTARI LOCAL, GM - 02-21, GM - 03-06, GM - 03-08, GM - 03-15 and GM - 03-16 were

Table.1 Evaluation of mung bean genotypes against powdery mildew (Pooled: *kharif* 2011 and 2012)

Sr. No	Genotypes	Powdery mildew intensity (Pooled)	Powdery mildew incidence (Pooled)	Reaction
1	LGG-460	0.00* (0.07)**	0.2(2.70)	R
2	PDM-262	9.3(16.96)	30.1(33.26)	MS
3	PDM-11	12.4(20.04)	38.4(38.27)	MS
4	PDM 84-143	11.7(19.80)	30.9(33.73)	MS
5	PDM-288	12.1(20.29)	21.1(27.32)	MR
6	IPM 02-3 RED	18.8(23.05)	61.2(51.47)	S
7	IPM 02-1	8.9(16.66)	22.6(28.28)	MR
8	PDM-87	13.1(21.12)	31.1(33.84)	MS
9	IPM 99-125	21.9(26.84)	59.2(50.26)	S
10	PDM-139	26.0(29.89)	68.0(55.56)	S
11	IPM 02-14	18.4 (23.69)	60.8 (51.20)	S
12	BRS-2435	26.6 (28.58)	78.8 (62.55)	HS
13	GM-9926	10.2 (18.43)	18.7 (25.61)	MR
14	TMV-37	1.2 (5.35)	10.7 (19.04)	MR
15	SAPTARI LOCAL	2.8 (9.5)	22.7 (28.33)	MR
16	K-851	24.3 (27.69)	67.5 (55.24)	S
17	MEHA	25.3 (28.95)	68.9 (56.08)	S
18	IR-16	27.6 (31.08)	70.9 (57.30)	S
19	GM-3	12.6 (19.82)	40.4 (39.46)	MS
20	GM-4	18.9 (25.72)	40.7(39.59)	MS
21	GM-9703	15.6(22.95)	43.6(41.28)	MS
22	GM - 9705	21.0(27.27)	42.3(40.55)	MS
23	GM - 9917	17.9(24.92)	30.4(33.45)	MS
24	GM - 9918	17.8(24.88)	39.3(38.80)	MS
25	GM - 9925	17.1(24.12)	42.3(40.52)	MS
26	GM – 9926	22.4(27.04)	58.7(49.97)	S
27	GM - 2k-5	19.4(26.08)	39.8(39.08)	MS

28	GM - 2k-14	23.4(28.49)	61.3(51.53)	S
29	GM - 02-01	20.8(26.18)	61.2(51.43)	S
30	GM - 02-02	19.9(24.72)	59.5(50.44)	S
31	GM - 02-03	17.3(24.55)	30.3(33.38)	MS
32	GM - 02-04	15.3(22.61)	41.2(39.93)	MS
33	GM - 02-05	10.5(18.35)	30.0(33.21)	MS
34	GM - 02-06	16.1(23.23)	38.1(38.10)	MS
35	GM - 02-07	15.2(22.88)	31.7(34.22)	MS
36	GM - 02-08	11.8(19.81)	30.0(33.12)	MS
37	GM - 02-09	17.7(23.10)	61.5(51.63)	S
38	GM - 02-10	16.6(20.87)	60.4(51.00)	S
39	GM - 02-11	17.9(22.23)	63.0(52.52)	S
40	GM - 02-12	8.9(16.18)	31.4(34.03)	MS
41	GM - 02-13	9.3(16.14)	30.6(33.58)	MS
42	GM - 02-14	8.8(16.13)	29.8(33.04)	MS
43	GM- 02-15	13.6(21.19)	40.0(39.18)	MS
44	GM - 02-16	11.8(19.92)	30.9(33.75)	MS
45	GM - 0 2-17	8.8(16.61)	31.6(34.20)	MS
46	GM - 02-18	17.9(22.96)	60.4(50.96)	S
47	GM - 02-19	14.1(21.21)	39.7(39.01)	MS
48	GM - 02-20	18.7(24.23)	56.6(48.70)	S
49	GM - 02-21	6.9(14.33)	19.1(25.87)	MR
50	GM - 03-01	14.2(20.22)	48.2(43.96)	MS
51	GM - 03-02	12.4(18.37)	39.4(38.85)	MS
52	GM - 03-03	8.7(15.76)	30.2(33.30)	MS
53	GM - 03-04	17.4(22.50)	59.7(50.60)	S
54	GM - 03-05	16.0(20.18)	60.9(51.27)	S
55	GM - 03-06	6.2(11.88)	20.5 (26.89)	MR
56	GM - 03-07	8.5(13.88)	31.9(34.33)	MS
57	GM - 03-08	8.1(16.19)	20.2(26.69)	MR

58	GM - 03-09	9.2(16.79)	28.7(32.37)	MS
59	GM - 03-10	10.0(17.78)	30.6(33.58)	MS
60	GM - 03-11	13.1(17.42)	45.9(42.62)	MS
61	GM - 03-12	11.2(17.85)	41.1(39.87)	MS
62	GM - 03-13	8.4(15.61)	30.9(33.73)	MS
63	GM - 03-14	8.2(14.87)	29.6(32.92)	MS
64	GM - 03-15	5.3(12.54)	20.9(27.16)	MR
65	GM - 03-16	4.7 (11.80)	18.9(25.77)	MR
CD (P=0.05)		1.97	1.75	--

* represents original value

**represents angular transformed value

Table.2 Field evaluation of different fungicides and botanicals against powdery mildew of mungbean in disease epiphytotic conditions

Treatments	**Concentration (%)**	**Mean Per cent Disease Intensity**		**Pooled**	**Disease control (%)**	**Mean Yield (Q/ha)**		**Pooled**
		2010-11	**2011-12**			**2010-11**	**2011-12**	
T_1: Propineb 70%WP	0.30	13.2	14.6	13.9	57.7	8.2	8.3	8.2
T_2: Carbendazim (12%) + Mancozeb (63%) 75 %WP	0.20	8.5	9.9	9.2	72.0	9.8	9.9	9.9
T_3: Copper Oxychloride 50% WG	0.24	21.6	22.6	22.1	32.8	7.5	7.7	7.6
T_4: Chlorothalonil 75% WP	0.2	11.7	13.0	12.3	62.6	6.2	6.7	6.4
T_5: Hexaconazole (5 %) + Captan (70 %) 75% WP	0.05	10.8	11.6	11.2	65.9	9.6	9.8	9.7
T_6: Mancozeb75%WP	0.20	11.0	12.3	11.7	64.4	9.4	9.7	9.5
T_7: Azadirachtaindica	10	12.9	13.9	13.4	59.2	6.3	6.3	6.3
T_8: Daturastramonium	10	23.8	23.9	23.9	27.3	5.9	6.1	6.0
T_9: Catharanthusroseus	10	26.9	27.6	27.2	17.3	5.5	5.8	5.7
T_{10}: Untreated Check	--	32.3	33.5	32.9	--	5.1	5.7	5.4
S.Em±	--	1.62	1.64	1.59	--	0.69	0.71	0.70
C.D. at 5%	--	3.40	3.43	3.42	--	1.45	1.49	1.46
C.V. %	--	11.48	10.96	11.21	--	11.57	11.50	11.54

categorized into moderately resistant, while rests of the genotypes were grouped into moderately susceptible to susceptible. However, one genotype BRS-2435 was found highly susceptible against the disease. Earlier Scientist has been worked to identification resistance source of mungbean genotypes by Mandhare and Suryawanshi (2008) Vaibhav, BPMR-145, TARM-18, Phule M-2003-3, Phule M-2002-13, Phule M-2002-17, Phule M-2001-3 and Phule M-2001-5 were resistant to powdery mildew in mungbean. Hegde, (1999) evaluated 269 green gram genotypes against powdery mildew under natural epiphytotic conditions and genotypes viz. DHMC 9601, DHMC 9602 and DHMC 9603, DHMC 9604 were found highly resistant to resistant, respectively, whereas three genotypes i.e. DHMC 9605, DHMC 9606 and DHMC 9607 moderately resistant. On the basis of present investigations, it can be proposed that LGG-460 genotype identified as resistant may be exploited in the breeding programme aimed at the development of high level resistant cultivar of mungbean against powdery mildew disease (Table 1).

The two year pooled analysis data indicated that all fungicides as well as botanicals tested significantly reduced the disease as compared to untreated check (Table 2). Minimum disease intensity (9.2%) and Maximum disease control (72.0%) was recorded in the foliar application of Carbendazim (12%) + Mancozeb (63%) 75% WP at 0.2% concentration. However, maximum disease intensity was recorded untreated check i.e. 32.9 per cent. Whearas, Hexaconazole (5 %) + Captan (70 %) 75 % WP @ 0.05%, Mancozeb 75% WP @ 0.2% and Chlorothalonil 75% WP @ 0.2% were also found statically at par with 11.2, 11.7 and 12.3 disease intensity and percent disease control were 65.9, 64.4 and 62.6 per cent, respectively. Among the botanicals, satisfactory results were not obtained from any of the three botanicals tested. Further, all the treatments significantly increased the mungbean yield over untreated check. The highest mean yield of 9.9 Q/ha was recorded in Carbendazim (12%) + Mancozeb (63%) 75 %WP followed by Hexaconazole (5 %) + Captan (70 %) 75 % WP and Mancozeb 75% WP with 9.7 and 9.5 Q/ha, respectively (Table 2). Present result agreement with the findings of Rakhonde*et al.* (2011) they reported that maximum disease reduction (69.11%) of powdery mildew in green gram with tridemorph and difenconazole which applied @ 0.05% and 0.1%, respectively. However, Suryawanshi*et al*. (2009) found karathane @ 0.1% as most effective fungicide, recorded least mean powdery mildew intensity (15.14%) and highest grain yield (1425 kg/ha) and test weight (58.00 g) in green gram.

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