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EVALUATION OF MUNGBEAN GERMPLASM FOR RESISTANCE AGAINST WHITEFLY (*BEMISIA TABACI* GENN.) AND MUNGBEAN YELLOW MOSAIC VIRUS (MYMV) DISEASE

G. S. PANDURANGA, K. VIJAYALAKSHMI, K. LOKA REDDY AND H. RAJASHEKARA

Department of Entomology, College of Agriculture
Acharya N. G. Ranga Agricultural University Hyderabad-500030
E-mail: *pandurangaiari@gmail.com*

ABSTRACT

Field screening of 22 mungbean entries for resistance against whitefly and mungbean yellow mosaic virus (MYMV) were carried out during 2009 – 2010 at College Farm, College of Agriculture, Rajendranagar, Hyderabad. Resistant check (ML 267) and KM 200 recorded low whitefly population of 1.33 and 1.55/5 plants, respectively, whereas the susceptible check (WGG 2) recorded high mean population of whiteflies (9.11/5 plants) followed by MGG 350 (7.66/5 plants) and UPM 99(6.77/5 plants). The mungbean yellow mosaic virus (MYMV) incidence ranged from 5.66 to 58.29%. The resistant check ML 267 (5.66%) followed by LGG 407 (11.87%) recorded less incidence while the susceptible check WGG 2 showed high incidence (58.29%). The mungbean entries were categorized based on their resistance reaction to mungbean yellow mosaic virus (MYMV) on 0-5 scale. None of the entries were found to be highly resistant and the resistant check ML 267 (5.66%) showed resistant reaction while 12 entries with 11.87 to 19.12% disease incidence were found moderately resistant. Other 5 entries with 20.48 – 26.73% MYMV disease were moderately susceptible and the susceptible check WGG 2 with 58.29% disease incidence was categorized as highly susceptible. The entry ML 267 which showed resistant reaction to mungbean yellow mosaic virus (MYMV) recorded highest yield of 1103 kg/ha. Among the 12 moderately resistant lines, 4 lines *viz*, LGG 407, MGG 356, KM 200 and NM 1 which recorded the yield ranging from 831 to 972 kg/ha were found to be the promising lines against MYMV.

Key words: Mungbean, *Bemisia tabaci*, MYMV

Mungbean [*Vigna radiata (*L.) Wilczek], is an important short duration summer food legume and is the third most important pulse crop of India after chickpea and pigaeon pea. In India, it is grown in an area of about 3.7 million ha with an annual production of 1.5 million tonnes. In Andhra Pradesh, it is cultivated in an area of 3.19 lakh ha with an annual production of 1.49 lakh tonnes (CMIE, December 2009).

It is attacked by a variety of sucking and lepidopteran insect pests. Among these, whitefly *Bemisia tabaci*, jassids *Empoasca spp* and thrips *Thrips palmi* are of major importance (Masood *et al.*, 2004). Whitefly also acts as vector of mungbean yellow mosaic virus (MYMV), (Nariani, 1960; Chhabra and Kooner, 1981). MYMV incidence is as high as 100% in farmers field in the Indian subcontinent, often resulting in considerable yield losses (Green *et al.*, 2002).

Several efforts have been directed towards screening of mungbean germplasm against MYMV to identify the resistant sources (Kuldip *et al.*, 1996 and Bashir, 2005) It is necessary to screen the new varieties from time to time to identify the new promising lines suitable for specific environmental conditions for effective management of disease and the vector.

MATERIALS AND METHODS

The field experiment was conducted at College Farm, College of Agriculture, Rajendranagar, Hyderabad during *rabi* 2009-10 with 22 mungbean genotypes (including resistant check ML-267 and susceptible check WGG-2) obtained from Agriculture Research Station, Madhira, Khammam. Each genotype was sown in 2 rows of 2 m length with row to row spacing and plant to plant distance of 30×10 cm and each treatment was replicated three times in a Randomized Block Design (RBD). The crop was managed following recommended practices without spraying any insecticide.

The whitefly counts were taken at 35, 45 and 55 days after sowing (DAS) by selecting 5 plants from each entry and from each plant 3 leaves representing

Table 1. Disease rating scale used for categorization of mungbean varieties against MYMV

Disease scale	Percent infection	Infection category	Reaction group
0	All plants free of disease symptoms	Highly resistant	HR
1	1 – 10% infection	Resistant	RR
2	11 – 20% infection	Moderately resistant	MR
3	21 – 30% infection	Moderately susceptible	MS
4	30 – 50% infection	Susceptible	S
5	More than 50% infection	Highly susceptible	HS

top, middle and bottom part and overall mean was computed. For recording MYMV incidence, observations were recorded on total plant stand of each entry and those attacked by MYMV at 35, 45 and 55 days after sowing (DAS). Based on the severity of the MYMV incidence, the genotypes were grouped into different categories based on 0 - 5 scale (Table 1, Bashir, 2005).

The data were analyzed as per standard statistical procedures (Gomez and Gomez, 1983) following RBD. Whitefly population, data were subjected to square root transformation and for disease incidence data were subjected to angular transformation and analysis of variance P=0.05.

RESULTS AND DISCUSSION

The incidence of whiteflies (Table 2) observed on mungbean crop at 35 days after sowing revealed that significantly lowest population were recorded on resistant check ML 267 and KM 200 which were on par with each other, while significantly high population were recorded on susceptible check WGG 2 and MGG 350 which were at par. Similar trend was observed at 45 DAS, and the results revealed that the susceptible check WGG 2 continued to harbour high population of whiteflies followed by MGG 350, Pusa 9531 and UPM 99 and MGG 347 which were on par with each other.

The data at 55 DAS revealed that, the population counts ranged from 0.33 to 5.33/5plants. As observed at 35 and 45 DAS, at 55 DAS also ML 267 continued to be the least preferred entry on par with KM 200 and LGG 407. WGG 2 continued to be the most preferred entry followed by MGG 350, PDM 11 and UPM 99.

The MYMV incidence (Table 3) recorded at 35 DAS in 22 entries ranged from 1.63% to 43.76%. Significantly lowest incidence was recorded in resistant check ML 267 followed by KM 200 and LGG 407 which were on par with each other. The disease incidence increased considerably at 45 DAS in all the varieties and it ranged from 5.60 to 55.11%. The resistant check ML 267 was found to be the superior entry with less incidence.

At 55 DAS ranged from 5.66% to 58.29%. The resistant (ML 267) and susceptible (WGG 2) checks recorded significantly lowest and highest incidence of 5.66% and 58.29%, respectively. The mungbean entries were categorized based on their resistance reaction to MYMV incidence on 0-5 scale (Table 4). None of the entries were found to be highly resistant to MYMV (0 scale) and the resistant check ML 267 which recorded 5.66% disease incidence was categorized as resistant, while 12 mungbean genotypes were found moderately resistant.

ML 267 entry which showed resistant reaction to MYMV recorded significantly highest yield of 1103 kg/ha as against the lowest yield (291 kg/ha) recorded in the susceptible check WGG 2. The yield (Table 3) recorded in the moderately resistant entries ranged from 612 to 972 kg/ha. These results are in agreement with the findings of Kuldip *et al.*, (1996) Pathak and Jhamaria (2004) are Singh *et al*., (2000). Categorization of mungbean varieties was done based on 0-5 scale (Bashir, 2005). None of the test entries were free from disease incidence (0), while the resistant check ML 267 which recorded 5.66% disease incidence showed resistance reaction (1) (Table 4).

These results gain support from Muhammad *et al.* (2005), Sana *et al.*, (2007) and Awathi *et al.*, (2008).

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Table 2. Field screening of mungbean genotypes for the incidence of whitefly, *Bemisia tabaci* in mungbean (*Rabi* 2009-10)

S.No.	Entry	Mean number of whiteflies / 5 plants			Mean
		35 DAS	45 DAS	55 DAS	
1.	PDM54	2.66 (1.77)	4.66(2.27)	1.33 (1.34)	2.88 (1.79)
2.	LOG407	2.66 (1.77)	4.00 (2.11)	1.00 (1.17)	2.55 (1.69)
3.	MGG365	2.33 (1.67)	3.66 (2.03)	1.33 (1.34)	2.44 (1.68)
4.	KM 200	1.66 (1.46)	2.33 (1.67)	0.66 (1.05)	1.55 (1.39)
5.	Asha	3.66 (2.03)	5.33 (2.41)	1.66 (1.46)	3.55 (1.96)
6.	MGG330	5.00 (2.33)	6.33 (2.61)	2.66 (1.77)	4.66(2.23)
7.	EC19515	4.66(2.27)	6.33 (2.61)	2.33 (1.67)	4.44 (2.18)
8.	MGG353	3.66 (2.03)	5.33 (2.41)	1.66 (1.46)	3.55 (1.96)
9.	MGG332	5.66 (2.48)	7.66 (2.85)	2.66 (1.77)	5.32 (2.36)
10.	MGG361	7.00 (2.73)	8.33 (2.97)	3.66 (2.03)	6.33 (2.57)
11.	Pusa9531	7.00 (2.73)	9.33 (3.13)	3.33 (1.94)	6.53 (2.6)
12.	MGG335	3.66 (2.03)	4.33 (2.19)	1.00 (1.17)	3.00 (1.8)
13.	MGG347	6.66 (2.67)	9.00 (3.07)	3.33 (1.95)	6.33 (2.56)
14.	MGG350	8.00 (2.91)	10.66 (3.34)	4.33 (2.19)	7.66 (2.81)
15.	NM1	2.66 (1.77)	4.33 (2.19)	1.33 (1.28)	2.77 (1.74)
16.	PDM 11	6.66 (2.67)	8.66 (3.02)	4.33 (2.18)	6.55 (2.62)
17.	UPM99	7.00 (2.73)	9.33 (3.13)	4.00 (2.11)	6.77 (2.65)
18.	Pusa 105	6.66 (2.67)	8.66 (3.02)	3.33 (1.95)	6.21(2.54)
19.	MGG356	6.33 (2.61)	9.00 (3.07)	2.66 (1.77)	6.00 (2.48)
20.	MGG349	5.33 (2.41)	8.33 (2.97)	2.33 (1.67)	5.33 (2.35)
21.	WGG2	9.00 (3.07)	13.00 (3.67)	5.33 (2.41)	9.11(3.05)
22.	ML267	1.33 (1.34)	2.33 (1.67)	0.33 (0.87)	1.33 (1.29)
	C.D at 5 %	0.25	0.25	0.42	0.30

DAS - Days after sowing

Figures in parentheses are square root transformed values;

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Table 3. Field screening of mungbean genotypes against *MYMV*

S.No.	Entry	MYMV incidence (%) at			Yield (kg/ha)
		35 DAS	45 DAS	55 DAS	
1.	PDM54	7.70 (16.10)	13.25 (21.34)	16.91 (24.28)	736
2.	LOG 407	2.84 (9.69)	8.84"(17.29)	11.87 (20.15)	972
3.	MGG 365	4.91(12.75)	10.58 (18.97)	13.61 (21.64)	761
4.	KM 200	2.75 (9.54)	9.42 (17.86)	12.39 (20.61)	847
5.	Asha	10.73 (19.11)	17.73 (24.89)	20.48 (26.90)	594
6.	MGG 330	15.00(22.78)	20.88 (27.19)	23.84 (29.22)	550
7.	EC 19515	17.42 (24.66)	23.43 (28.94)	26.31 (30.86)	489
8.	MGG 353	11.71 (20.00)	17.75 (24.91)	20.75 (27.09)	550
9.	MGG 332	9.81 (18.24)	16.12(23.67)	19.12(25.92)	612
10.	MGG 361	10.59 (18.98)	16.42 (23.90)	19.06 (25.88)	636
11.	Pusa9531	17.55 (24.70)	23.43 (28.95)	26.73 (31.12)	440
12.	MGG 335	6.00 (14.15)	13.00 (21.12)	16.00(23.57)	792
13.	MGG 347	24.26 (29.50)	30.26(33.37)	33.59(35.42)	353
14.	MGG 350	8.15 (16.59)	14.18(22.12)	17.32 (24.59)	727
15.	NM1	2.29 (8.67)	9.30(17.74)	12.33 (20.55)	831
16.	PDM 11	8.29 (16.73)	14.29(22.21)	16.91 (24.28)	728
17.	UPM 99	8.57 (17.01)	14.57 (22.43)	17.60 (24.80)	666
18.	Pusa 105	24.33 (29.55)	30.33 (33.41)	33.43 (35.32)	385
19.	MGG 356	5.73 (13.85)	11.40 (19.73)	13.52 (21.55)	886
20.	MGG 349	28.35 (32.17)	34.45 (35.94)	37.33 (37.66)	325
21.	WGG2	43.76 (41.41)	55.11 (47.93)	58.29(49.77)	291
22.	ML 267	1.63 (7.30)	5.60 (13.65)	5.66 (13.76)	1103
	C.D at 5 %	1.25	1.18	1.14	30.47

Figures in parentheses are angular transformed values; DAS: Days after sowing

Table 4. Categorization of mungbean genotypes based on resistance reaction to MYMV (0 -5 scale, Bashir 2005)

Sl NO.	Genotypes	Disease incidence (%)	Disease scale	Disease severity	Reaction group
1			0	All plants free of disease symptoms	Highly resistant (HR)
2	ML 267*	5.66	1	1 - 10%	Resistant (R)
3	PDM 54, LOG 407, MGG 365, KM 200, MGG 332, MGG 361, MGG 335, MGG 350, NM1 PDM 11, UPM 99 and MGG 356	11.87-19.12%	2	1 1 - 20%	Moderately resistant (MR)
4	Asha, MGG 330, EC 195 15, MGG 353 and Pusa 9531	20.48 - 26.73%	3	21 - 30%	Moderately susceptible (MS)
5	MGG 347, Pusa 105 and MGG 349	33.43 - 37.33%	4	30 - 50%	Susceptible (S)
6	WGG 2**	58.29%	5	More than 50%	Highly susceptible (HS)

* Resistant Check; ** Susceptible Check

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