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Evaluation of Genotypes For Resistance against Moongbean Yellow Mosaic Virus & Powdery Mildew Disease of Moongbean (*Vigna Radiata* (L.) Wilczek)

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ABSTRACT

Twenty genotypes/lines of mungbean germplasm were evaluated against MYMV and Powdery mildew disease during kharif season under field conditions at College of Agriculture ,Indore, M.P. in Randomized block design with two replications in 2016. The germplasm was categorized in to resistant and susceptible depending upon severity of disease. Ten lines were found resistant against MYMV and only two lines were found resistant against Powdery Mildew while only one entry i.e. Pant Mung -5 was found resistant against both the diseases.

KEYWORDS: *Mungbean, Mungbean Yellow mosaic virus (MYMV), Replication, Powdery mildew, Germplasm, Genotypes , Resistance*

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INTRODUCTION

Mungbean is the mature fruit seed of (*Vigna radiata* L. Wilczek) cultivated in China more than 2000 years, planted in many provinces as crops in tropical and subtropical regions of the Indian subcontinent and in South East Asian countries like Thailand, Philippines, Vietnam, Indonesia, Malaysia, South China and Korea. India is the biggest producer of Mungbean where about 3.83 million ha are cultivated with 1.60 million tonne production [1]. Mungbean is excellent source of high quality protein and mineral. The seeds have high (28%) protein that is easily digestible, are easy to cook and lack flatulence factors in contrast to other legumes [12]. Mungbean is a rich source of protein (14.6–33.0 g/100 g) and iron (5.9–7.6 mg/100 g) [2]. Mungbean contains 1-3% fat, 50.4% carbohydrates, 3.5-4.5% fibers and 4.5-5.5% ash, while calcium and phosphorus are 132 and 367 mg per 100 grams of seed, respectively [3, 4]. In Madhya Pradesh during Twelfth Plan (2012-2017) the total area covered under Mungbean 2.51 lakh ha with 1.16 lakh tones total production and productivity was 464 kh/ha [1]. Analysing the Madhya Pradesh state, the mungbean crop, district Hoshangabad covered maximum area i.e. 10.2 thousand hectare with followed by Dhar with 7.062 and Chhatarpur, Khargone, Satna and Rewa coverage around 6 thousand hectare. The highest production was in Dhar i.e. 4.70 million tonnes with 7.3% production tops in the state whereas Hoshangabad with 4.32 million tonnes with 6.7% on second position and at third position Khargone & Sidhi around 3 million tonnes. The main diseases of mungbean are mungbean yellow mosaic virus (MYMV), leaf crinkle virus (LCV), cercospora leaf spot, bacterial blight and charcoal rot, anthracnose, wilt and powdery mildew. Mungbean yellow mosaic virus is caused by the mungbean yellow mosaic virus (MYMV) belonging to Gemini group of viruses. The disease starts as small yellow specks along the veinlets and in severe form covers the entire lamina. Whitefly (*Bemisia tabaci*) transmits this geminivirus in the persistent (circulative) manner. The economic losses due to this virus account up to 85% in green gram which is spreading faster towards newer areas [6]. Powdery mildew of mungbean caused by Erysiphae polygoni DC. is a serious foliar disease of mungbean. The losses are much higher when the pathogen infects the crop before flowering.

MATERIAL AND METHODS

Trial was conducted in a Randomized Block Design (RBD) with two replications during Kharif-2016 at farm of College of Agriculture, Indore, (Madhya Pradesh) . Recommended agronomic practices were followed**.**

Twenty Green gram varieties were evaluated under natural environmental field conditions at CoA, Indore during Kharif-2016. Varieties were planted in two rows of 4 meter length with row spacing of 40 cm and 10 cm between plants. The trial was laid out with two replications in RBD.

Screening experiment

The disease incidence was calculated by:

$$\text{Percent disease incidence} = \frac{\text{No. infected plant}}{\text{Total no. of plants}} \text{ x100}$$

RESULT AND DISCUSSION

Mungbean Yellow Mosais Virus Disease incidence

Mungbean Yellow mosaic disease incidence in twenty Green gram germplasms lines was from 0% to 88%. Based on the mean disease incidence of both replications during Kharif-2016,ten lines were found resistant namely IPM-99-125, IPM-02-14, Sweta, SML-832, PUSA-5931, MH-125, Pant Mung 4, Pant Mung 5 and MH 421 and two were found moderately resistant i.e. PDM-54 and HUM-16, four entries viz.,HUM-1,PDM-11,PUSA-105, PDM-139 were moderately susceptible, IPM-02-03 was found immune and remaining entries were found susceptible to Mungbean Yellow Mosaic disease (Table 1). Singh *et al*., [13] reported an incidence ranging from 0% to 58.5 % among various varieties during their evaluation program for resistance against MYMV from Uttar Pradesh. Pathak and Jhamaria [8] evaluated fourteen Mung bean varieties for resistance against YMV and found ML-5 and MUM-2 with resistance of 2.22% and 3.12% infection as against 100% infection in K-851a check cultivar.

Table 1: MungbeanYellow MosaicVirus on Green gram (0-9 scale-Mayee and Datar,1986)

Disease Scale	Per cent leaf area coverage	Description	Reaction
0	0	No visible sysmptoms on leaves	Immune
1	< 1	Small yellow specks covering 0.1 to 1%	Resistant (R)
3	1-10	Yellow mottling of leaves covering 1.1 to 10% leaf area	Moderately Resistant (MR)
5	11-25	Yellow mottling of leaves covering leaf area 11 to 25 %	Moderately Susceptible (MS)
7	26- 50	Yellow mottling and discoloration of 26 -50% leaf area	Susceptible (S)
9	>50	Pronounced yellow mottling,discoloration of leaves and pods, reduction in leaf size and pod size, stunting of plants and no pod formation (Above 50% leaf area and pod)	Highly Susceptible (HS)

Table.2 Screening of Green gram genotypes against Mung bean Yellow Mosaic Virus (MYMV) disease

S.No	Genotypes	Percent leaf area infection	MYMV (0-9 scale)	Reaction
1.	HUM-1	24	5	MS
2.	HUM-12	44	5	HS
3.	IPM-99-125	7	3	R
4.	IPM-02-14	4	3	R
5.	Sweta	6	3	R
6.	SML-832	3	1	R
7.	PUSA-5931	6	3	R
8.	JM-721	8	3	MR
9.	MADHIRA PESARA 347	46	7	S
10.	PDM-11	23	5	MS
11.	PDM-54	8	3	MR
12.	HUM-16	7	3	MR
13.	MH-125	4	3	R
14.	PUSA-105	18	5	MS
15.	IPM-02-03	3	1	R
16.	PANT MUNG-5	6	3	R
17.	TMB-37	88	9	HS
18.	PDM-139	24	5	MS
19.	PANT MUNG 4	6	3	R
20.	MH 421	6	3	R

[Resistant(R), Susceptible(S), Moderately Resistant (MR), Moderately Susceptible (MS), Highly Susceptible (HS)]

Powdery mildew disease incidence

Powdery mildew disease incidence in twenty Green gram germplasms lines was from 3% to 68%. Based on the mean disease incidence of both replications during Kharif-2016, only two entries i.e.PDM-11 and Pant mung 5 were found resistant and five entries were found moderately resistant i.e. Sweta, Pusa 5931,HUM- 16, PDM-139 and remaining entries susceptible to powdery mildew disease**.** Jameel Akhtar *et al*., [5] found 13 genotypes viz., KGS 83, MH 96-1, Pusa 572, GS 33-5, AKM 99-4, GS 21-5, COGG 936, ML 1299, TMB 47, HUM 1, MH 429, MH 429 and MH 530 were highly resistant reaction to powdery mildew disease in Green gram. Only one entry Pant Mung-5 was found resistant to Mungbean Yellow Mosaic Virus disease and Powdery mildew diseases of Mungbean. Genetic studies using different resistance sources revealed different modes of inheritance [11-15], suggested that there are different mechanisms or genes conferring resistance to powdery mildew disease. Further work on disease resistance should be done to identify new resistance genes from new lines.

Table 3:Powdery mildew on Green gram (0-5 Scale -Gawande and Patil, 2003)

Disease Scale	Percent Leaf Area Coverage	Description	Reaction
0	0	Plants free from infection	Highly Resistant (HR)
1	1-10	Plant showing traces up to 10 % infection on leaves, stem free from infection	Resistant (R)
2	10.1-25	Slight infection with thin coating of powdery growth on leaves covering 10.1-25 per cent leaf area, slight infection on stem, pods usually free	Moderately Resistant (MR)
3	25.1-50	Dense powdery coating covering covering 25.1 to 50% leaf area, moderate infection on stems, slight infection on pods	Moderately Susceptible (MS)
4	50.1-75	Dense powdery coating covering 50.1 to 75% leaf area, stem heavily and pods moderately infected. Infected portion turns grayish	Susceptible(S)
5	>75	Severe infection with dense powdery growth, covering more than 75 % area of the whole plant including pods, plants resulting in premature defoliation and drying	Highly Susceptible (HS)

Table.4 Screening of Green gram genotypes against Powdery Mildew Disease

S.No	Genotypes	Percent leaf area infection	Powdery Mildew (0-5 scale)	Reaction
1.	HUM-1	35	7	S
2.	HUM-12	22	5	MS
3.	IPM-99-125	20	5	MS
4.	IPM-02-14	41	7	S
5.	Sweta	16	2	MR
6.	SML-832	56	4	S
7.	PUSA-5931	12	2	MR
8.	JM-721	46	3	MS
9.	MADHIRA PESARA 347	32	3	MS
10.	PDM-11	6	1	R
11.	PDM-54	68	4	S
12.	HUM-16	18	2	MR
13.	MH-125	41	3	MS
14.	PUSA-105	40	3	MS
15.	IPM-02-03	40	3	MS
16.	PANT MUNG-5	3	1	R
17.	TMB-37	60	4	S
18.	PDM-139	20	2	MR
19.	PANT MUNG 4	68	4	S
20.	MH 421	20	2	MR

[Resistant(R), Susceptible(S), Moderately Resistant (MR), Moderately Susceptible (MS), Highly Susceptible (HS)]

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