

Disease Reaction of Mungbean (*Vigna radiata*) and Urdbean (*Vigna mungo*) Genotypes against Mungbean Yellow Mosaic Virus under Natural Condition in the Lower Gangetic Plains of West Bengal, India

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Abstract—Field screening for Mungbean Yellow Mosaic Virus (MYMV) disease resistance in mungbean and urdbean genotypes were carried out at the District Seed Farm (AB Block), Bidhan Chandra Krishi Viswavidyalaya, Kalyani, Nadia during the kharif season in the year 2015. Twenty four different genotypes of mungbean and twenty six genotypes of urdbean were screened in the field under natural condition to find the resistance potentials of the genotypes. Two genotypes of mungbean (Pusa 1571 and ML 2412) were found to immune reaction and fourteen genotypes were observed to resistant reaction against the MYMV disease. Seven genotypes of urdbean (NIRB 003, TU 22, RUG 59, RUG 55, IPU 11-2, NRB 004, Uttara) were found to immune reaction and eight genotypes were observed to resistant reaction against the MYMV disease. These genotypes would be utilized as donors to develop MYMV resistant lines.

Keywords: Mungbean, urdbean, MYMV, Disease reaction, Resistance.

1. INTRODUCTION

Mungbean and urdbean are important pulse crops grown worldwide. India grows a variety of pulse crops under a wide range of agro-climatic conditions. In India mungbean and urdbean are mostly grown in states like Andhra Pradesh, Maharashtra, Orissa, Rajasthan, Gujarat, Madhya Pradesh, West Bengal, Punjab, and Uttar Pradesh etc. The crops suffer from several diseases, especially cercospora leaf spot (*C. canescens*, *C. cruenta*), powdery mildew (*Erysiphe polygoni*), root disease complex (*Pythium* spp., *Rhizoctonia solani*, *Fusarium* spp.) and the reniform (*Rotylenchulus reniformis*) and root knot (*Meloidogyne* spp.) nematodes. Moreover mungbean and

urdbean are harbours of different viruses namely, alfalfa mosaic virus, bean common mosaic virus, cucumber mosaic virus, leaf crinkle virus, leaf curl virus, mosaic mottle virus and mungbean yellow mosaic virus. Among all the viruses, mungbean yellow mosaic virus (MYMV) is the most destructive one. Presently in India, nearly all the varieties of mungbean and urdbean are susceptible to Mungbean yellow Mosaic viruses and rate of infection may vary from 10-100% (Nene, 1972)[3]. It depends upon the susceptibility of the variety, time of infection, population of vector, *Bemisia tabaci* and other favorable conditions. The major vector is abundantly present and the environmental conditions prevailing in West Bengal are most congenial for rapid building up of its population. Yellow mosaic is reported to be the most destructive viral disease not only in India, but also in Pakistan, Bangladesh, Sri Lanka and contiguous areas of South East Asia. Varma *et al.* (1992)[5] has shown that, an annual loss of US\$ 300 million was caused by 'Mungbean yellow mosaic virus' by reducing the yield of mungbean, black gram, soybean. Controlling MYMV incidence is only possible by the way of reducing the vector viz., whitefly population using insecticides which are ineffective under severe infestations. Use of virus resistant variety is the most efficient approach to alleviate the occurrence of MYMV disease. Screening of mungbean and urdbean germplasm against MYMV for the identification of resistant genotypes is very much essential. Considering the potentiality of the spread of the virus disease this investigation was undertaken to study the natural incidence of MYMV to identify the genetic resistance of mungbean and urdbean.

2. MATERIALS AND METHODS

Field screening for Mungbean Yellow Mosaic Virus (MYMV) disease resistance in mungbean and urdbean genotypes were carried out at the District Seed Farm (AB Block), Bidhan Chandra Krishi Viswavidyalaya, Kalyani, Nadia during the *kharif* season in the year 2015. Twenty four different genotypes of mungbean and twenty six genotypes of urdbean were screened in the field under natural condition to find the resistance potentials of the genotypes. Each entry is sown in single row of three meter length with the spacing of 30 × 10 cm in two replications. All the recommended agronomic practices were followed. No insecticidal spray was given in order to allow the whitefly population to spread the disease. Disease incidence was recorded periodically and Percentage Disease Incidence was worked out using the formula $PDI = \frac{[\text{Sum of numerical rating} / \text{total number of observations taken} \times \text{maximum disease score}]}{100}$. The genotypes were categorized using (0-5) arbitrary scale as Immune (I), Resistant (R), Moderately Resistant (MR), Moderately Susceptible (MS), Susceptible (S) and Highly Susceptible (HS) based on disease severity (Table 1).

3. RESULT AND DISCUSSION

Evaluation of resistant varieties is considered to be the most feasible and durable solution of controlling MYMV disease. Screening of mungbean and urdbean germplasm against MYMV disease under natural condition is the first step in identifying the resistant donors for development mungbean and urdbean varieties with YMV resistance. Per cent disease incidence was worked out and it varied from 0.00 to 30.00 per cent in mungbean and from 0.00 to 98.00 per cent in urdbean. The study revealed that maximum number of entries was grouped under resistant to moderately resistant categories in mungbean and immune to resistant categories in urdbean. Among twenty four mungbean germplasms, Pusa 1571 and ML 2412 were rated as immune and IPM 312-20, Pusa 1572, RMG 1082, PM 10-18, IGKM 06-4-2, COGG 11-02, MH 921, SPM 48, ML 2410, IPM 2-3, PM 12-2, KM 2348, MH 729A, NVL 825, IPM 312-19 were found as resistant (Table 3) with less than ten percent disease severity. Out of twenty six urdbean genotypes, seven genotypes *i.e.* NIRB 003, TU 22, RUG 59, RUG 55, IPU 11-2, NRB 004, Uttara were categorized as immune with 0 per cent disease severity whereas eight genotypes *i.e.* KUG 725, Shekhar 3, NDUK 15-9, KU 14-1, IPU 13-1, PU 10-16, VBG 11-053, KPU 524-65 gave resistant reaction (Table 3). It could be noticed that the resistant level was relatively quite high as compared to susceptible status (Fig. 1 and 2). Among the screened entries of mungbean only 8% was found immune, 63% resistant, 25% moderately resistant and 4% moderately susceptible against MYMV (Fig. 1). In case of urdbean 27% was found immune, 31% resistant, 11% moderately resistant, 12% moderately susceptible, 4% susceptible and 15% highly susceptible against MYMV (Fig. 2). The results of present screening were

in accordance with several other findings. Iqbal *et al.* (2011)[1] screened 100 lines of mungbean germplasm and out of which only four lines shows resistance under field condition. Shad *et al.* (2006)[4] found that there was no resistant line against MYMV and identification of seven susceptible and 247 as highly susceptible lines exhibited meager resistance in mungbean. Munawwar *et al.* (2014) [2] evaluated 21 urdbean germplasm lines but twelve resistant lines were found. The genotypes grouped under immune and resistant category would be utilized as donors to develop MYMV resistant lines.

Table 1: 5 scale for rating disease severity of MYMV disease in mungbean and urdbean

Grade	Severity (%)	Reaction
0	0.0	Immune
1	0.1-10.0	R
2	10.1-20.0	MR
3	20.1-30.0	MS
4	30.1-50.0	S
5	Above 50.1	HS

Table 2 : Grouping of genotypes screened against YMV in mungbean and urdbean during *Kharif*, 2015

Scale	Reaction	Mungbean genotypes		Urdbean genotypes	
		Number	Name	Number	Name
0	Immune	02	Pusa 1571, ML 2412	07	NIRB 003, TU 22, RUG 59, RUG 55, IPU 11-2, NRB 004, Uttara
1	R	15	IPM 312-20, Pusa 1572, RMG 1082, PM 10-18, IGKM 06-4-2, COGG 11-02, MH 921, SPM 48, ML 2410, IPM 2-3, PM 12-2, KM 2348, MH 729A, NVL 825, IPM 312-19	08	KUG 725, Shekhar 3, NDUK 15-9, KU 14-1, IPU 13-1, PU 10-16, VBG 11-053, KPU 524-65
2	MR	06	PM 4, AKM 12-17, VGG 10-008, GM 05-08, NDMK 14-24, LGG 574	03	KKW D-5011, NIRB 002, PU 10-23

3	MS	01	BM 2012-9	03	VBG 12-062, TBG 123, KPU 129-104
4	S	00	--	01	IU 05-1
5	HS	00	--	04	COBG 11-03, AKU 11-15, MU 46, DBG 11

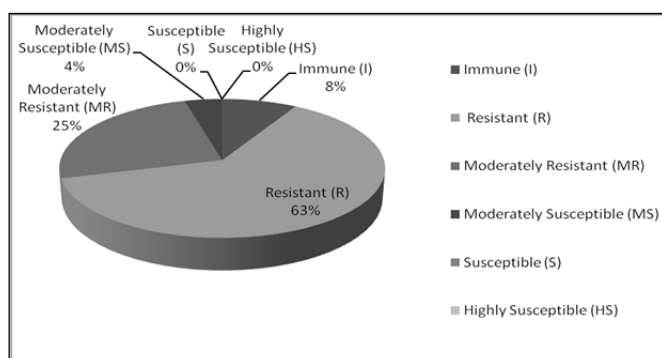


Fig. 1: Grouping percentage of mungbean genotypes against MYMV disease

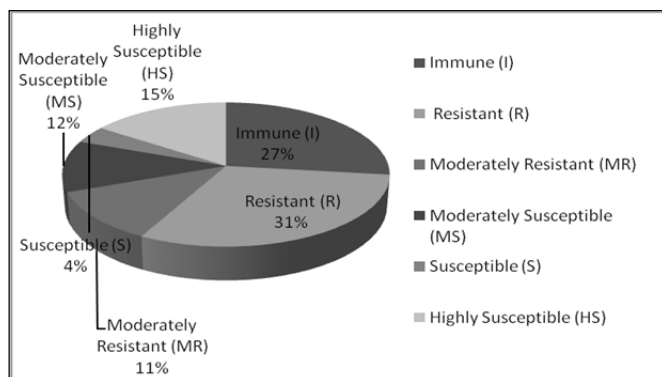


Fig. 2: Grouping percentage of urdbean genotypes against MYMV disease

Table 3: Reaction of mungbean and urdbean germplasm lines against MYMV

MYMV disease Severity (%) of Mungbean				MYMV disease Severity (%) of Urdbean			
Sl. No.	Genotypes	Mean	Reaction	Sl. No.	Genotypes	Mean	Reaction
1	IPM 312-20	6.0 (14.18)	R	1	KKW D-5011	12.0 (20.27)	MR
2	Pusa 1572	2.0 (8.13)	R	2	COBG 11-03	98.0 (81.87)	HS
3	PM 4	18.67 (25.60)	MR	3	KUG 725	2.0 (8.13)	R

4	AKM 12-17	15.00 (22.79)	MR	4	Shekhar 3	6.0 (14.18)	R
5	VGG 10-008	14.00 (21.97)	MR	5	AKU 11-15	94.00 (75.82)	HS
6	RMG 1082	2.0 (8.13)	R	6	NDUK 15-9	2.0 (8.13)	R
7	Pusa 1571	0.0 (0.00)	I	7	KU 14-1	4.0 (11.54)	R
8	PM 10-18	2.0 (8.13)	R	8	VBG 12-062	30.00 (33.21)	MS
9	IGKM 06-4-2	4.0 (11.54)	R	9	NIRB 003	0.0 (0.00)	I
10	COGG 11-02	2.0 (8.13)	R	10	IPU 13-1	2.0 (8.13)	R
11	GM 05-08	15.00 (22.79)	MR	11	TU 22	0.0 (0.00)	I
12	MH 921	7.0 (15.34)	R	12	PU 10-16	4.0 (11.54)	R
13	SPM 48	6.0 (14.18)	R	13	NIRB 002	18.00 (25.10)	MR
14	ML 2410	2.0 (8.13)	R	14	TBG 123	29.67 (33.00)	MS
15	BM 2012-9	30.00 (33.21)	MS	15	VBG 11-053	2.0 (8.13)	R
16	KM 2348	2.0 (8.13)	R	16	KPU 524-65	10.00 (18.43)	R
17	NDM K 14-24	16.00 (23.58)	MR	17	RUG 59	0.0 (0.00)	I
18	ML 2412	0.0 (0.00)	I	18	PU 10-23	14.00 (21.97)	MR
19	IPM 2-3	2.0 (8.13)	R	19	KPU 129-104	22.00 (27.97)	MS
20	PM 12-2	0.0 (0.00)	R	20	MU 46	98.00 (81.87)	HS
21	IPM 312-19	2.0 (8.13)	R	21	IU 05-1	46.00 (42.71)	S
22	LGG 574	11.00 (19.37)	MR	22	RUG 55	0.0 (0.00)	I
23	MH 729A	10.00 (18.43)	R	23	IPU 11-2	0.0 (0.00)	I
24	NVL 825	2.0 (8.13)	R	24	NRB 004	0.0 (0.00)	I
				25	DBG 11	68.00 (55.55)	HS
				26	Uttara	0.0 (0.00)	I

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