Original Research Article

Evaluation of pigeonpea genotypes against sterility mosaicdisease

ABSTRACT

Pigeonpea (Cajanus cajan L.) belonging to family leguminosae is an important leguminous pulse crop of semi-arid tropic and subtropic regions (Asia and Africa). It is also known as red gram, arhar, tur dal. The crop is affected by several phytopathogens, of which, pigeonpea sterility mosaic disease/virus, and transmissible by eriophyid mites (A. cajani) has been major bottleneck. Yield losses up to 95 per cent or even 100 per cent in severe Sterility Mosaic Disease incidence were reported. Therefore, present investigation on screening of pigeon pea genotypes against the sterility mosaic disease was carried out during Kharif, 2018 at the Department of Plant Pathology, College of Agriculture, Latur.

In present study, about 27 entries of pigeonpea were screened under natural epiphytotics against pigeonpea sterility mosaic disease. Of these GRG-152, ICP-2376, BRG-5, BRG-4, ICPL-15048, BSMR853, BSMR-736, BRG-1and BRG-3 were resistant; MPV-106, RVSA-16-1, IPA-16-8 and BRG-2 were moderately resistant, whereas, PUSA-2017-01, TDRG-58, ICP-8863, PUSA-2018, PUSA-2018-1, PUSA-2018-2, PUSA-2018-3 ,PUSA-2018-5, AKTE-12-04, KRG-244, PADT-16, RKPV-912, JKM-189 and TJT-501 were susceptible to Sterility Mosaic disease.

Key words: Sterility mosaic of disease, Pigeonpea, Screening, Genotypes.

Introduction:

Pigeonpea(*Cajanuscajan*L.) is an important pulse crop of semi-arid tropic and subtropic regions *viz.,* Asia and Africa.Pigeonpea is grown in India over an area of 5.39 M ha with an annual production of 4.60 M tones and productivity of 854 kg/ha, whereas, in Maharashtra these were 1037.0 ha, 661.0 tonnes and 637 kg/ha, respectively (Anonymous, 2017).

Pigeonpea crop being affected by around 50 diseases/pathogens, in mild to severe form. Of these, Sterility Mosaic (SM), *Fusarium* wilt and *Phytophthora* blight are economically important. SMD causes substantial yield losses up to 95 per cent (Ganapathy*et al.*2011).

Sterility Mosaic Disease (SMD) caused by Pigeonpea Sterility Mosaic Virus (PPSMV) is a widespread and economically important disease. It is transmitted by the eriophyid mite(*A. cajani).* Sterility Mosaic Disease (SMD), was first described in 1931 from Pusa, Bihar State of India (Mitra, 1931), is a major disease limiting the pigeonpeaproduction in the Indian sub-continent.

During recent years, research programs have focused on the development of high yielding genotypes with combined resistance to PPSMV and *Fusarium*wilt, as both these diseases are endemic in the subcontinent.Therefore, the present study was carried out with aimed to screen the pigeonpea genotypes against sterility mosaic disease to identify the resistant sources.

Material and Methods:

A field experiment was conducted in the research farm at the Department of Plant Pathology, College of Agriculture, Latur during *Kharif* 2018-19. All twenty seven pigeonpeagermplasms, cultivars and varieties obtained from different sources were evaluated for their reactions against pigeonpea sterility mosaic disease (SMD). These genotypes were planted in each row with row to row spacing of 60 cm and plant to plant spacing of 15 cm. SMD check (Maruthi) was included after every 10 test rows. Based on disease reactions, 27 test entries of pigeonpea were categorized as given below, by applying the rating scale of AICRP on Pigeonpea.

Table 1.Pigeonpea SMD rating scale

Sr. No.	Disease incidence	Reactions
1	0-10%	Resistant
2	11-30%	Moderately Resistant
3	>30%	Susceptible

Per cent disease incidence (PDI) was calculated by using following formula

$$PDI = \frac{\text{Number of diseased plants}}{\text{Total number of plant observed}} \times 100$$

Result and Discussion:

Twenty sevenpigeonpea elite entries were screened against sterility mosaic disease (SMD) under field conditions, at the research farm Department of Plant Pathology, College of Agriculture, Latur. Average per cent incidence of SMD was calculated and accordingly the test entries were categorized.

The result (Table 2) revealed zero disease incidence in ICP-2376, BRG-4, BRG-5, BSMR-853, BRG-1 and BRG-3, followed by ICPL-15048 (2.22%) and BSMR-736 (2.94%). Whereas, highest disease incidence (100%) was reported in ICP-8863, PUSA-2018 and AKTE-12-04, followed by PUSA-2018-2 (97.56%) and PUSA-2018-1 (86.84%).

Based on per cent SMD incidence, the test pigeonpea entries were categorized (Table 3), which revealed the entries *viz.,* GRG-152, ICP-2376, BRG-4, BRG-5, ICPL-15048, BSMR-853, BSMR-736, BRG-1 and BRG-3 as resistant with the

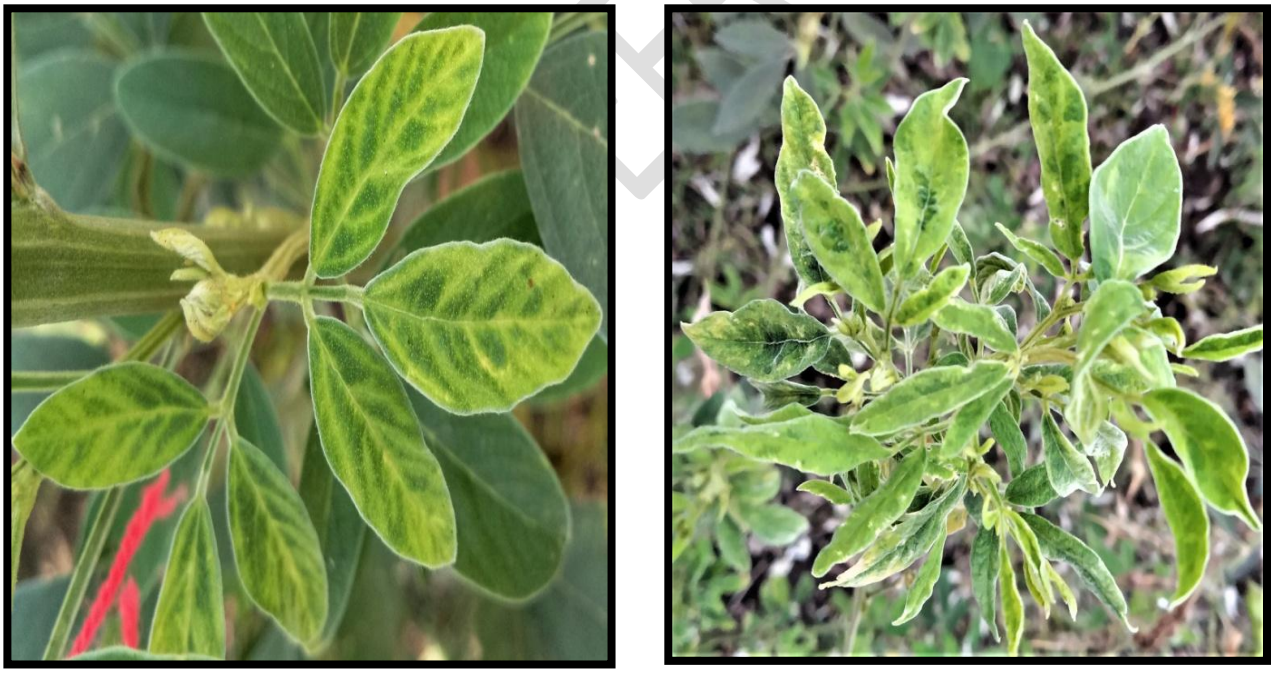
SMD incidence in the range of 0-10 per cent. The entries *viz.,* MPV-106, RVSA-16-1, IPA-16-18 and BRG-2 were moderately resistant (11-30% incidence) and the entries *viz.,* PUSA-2017-01, TDRG-58, ICP-8863, PUSA-2018, PUSA-2018-1, PUSA-2018-2, PUSA-2018-3, PUSA-2018-5, AKTE-12-04, KRG-244, PADT-16, RKPV-912, JKM-189, TJT-501 were susceptible (> 30% incidence).

Healthy plant **Infected sterile plant**

Comparison between healthy plant and infected plant

Various stages of sterility mosaic symptoms development

Bushy and pale green appearance **Increase in secondary and tertiary branches**



Mosaic pattern of leaves **Mottling of leaves**

Fig 1. Symptoms produced in experimental field

Table 2.Screening of pigeonpea genotypes against PPSMV

Sr. No.	Entries	Total plants	SMD plants	% Disease Incidence	Disease Reactions
1.	GRG-152	44	4	9.09	R
2.	MPV-106	43	12	27.90	MR
3.	PUSA- 2017-01	48	29	60.41	S
4.	RVSA-16-1	38	11	28.94	MR
5.	TDRG-58	39	17	43.58	S
6.	ICP-8863 (S.Check)	44	44	100	S
7.	PUSA-2018	37	37	100	S
8.	PUSA-2018-1	38	33	86.84	S
9.	PUSA-2018-2	41	40	97.56	S
10.	PUSA-2018-3	35	25	71.42	S
11	PUSA-2018-5	31	19	61.29	S
12	ICP-2376	42	0	0	R
13.	AKTE-12-04	32	32	100	S
14.	IPA-16-18	30	5	16.66	MR
15.	KRG-244	29	19	65.51	S
16.	PADT-16	30	19	63.33	S
17.	RKPV-912	32	14	43.75	S
18.	BRG-2	38	11	28.94	MR
19.	BRG-4	33	0	0	R
20.	BRG-5	37	0	0	R
21.	ICPL-15048	45	1	2.22	R
22.	JKM-189	39	12	30.76	S
23.	TJT-501	33	17	51.51	S
24.	BSMR-853	41	0	0	R
25.	BSMR-736	34	1	2.94	R
26.	BRG-1	36	0	0	R
27.	BRG-3	43	0	0	R

SMD: Sterility mosaic diseased R:Resistant MR:Moderately Resistant S: Susceptible

Table 3. Categorization of pigeonpeatest entries based on reactions to SMD disease, during *Kharif*2018-19.

Sr. No.	Disease Reactions	List of entries
1.	Resistant (0-10%) Entries= 09	GRG-152, ICP-2376, BRG-4, BRG-5, ICPL-15048, BSMR-853, BSMR-736, BRG-1, BRG-3
2.	Moderately resistant (11-30%) Entries= 04	MPV-106, RVSA-16-1, IPA-16-18, BRG-2
3.	Susceptible (>30%) Entries= 14	PUSA-2017-01, TDRG-58, ICP-8863, PUSA-2018, PUSA-2018-1, PUSA-2018-2, PUSA-2018-3, PUSA-2018-5, AKTE-12-04, KRG-244, PADT-16, RKPV-912, JKM-189, TJT-501

These results on the reactions of pigeonpeaentries against SMD are reported on similar line to the reports of several earlier workers such as Manjunatha*et al.* (2013), Barhate*et al.* (2000), Bhaskar (2016), Sudharani*et al.* (2017) and Roy and Kumar (2018).Manjunatha*et al.* (2013) reported BRG-3 as resistant to SMD with high seed yield, BRG-2 as

moderately resistant and ICP-8863 as susceptible.Barhate*et al.* (2000) reported 100 per cent incidence (100%) of sterility mosaic in cv.ICP-8863. Bhaskar (2016) reported BSMR-736 and BSMR-853 as resistant to sterility mosaic, BRG-2 as moderately resistant and ICP-8863 as susceptible to sterility mosaic disease. Sudharani*et al.* (2017) reported cv.GRG-152 as moderately resistant to SMD, Roy and Kumar (2018) reported PADT-16, ICP-8863, TDRG-58 and JKM-189 as susceptible to sterility mosaic disease.

Conclusion:

These results on the reactions of pigeonpeaentries against SMD are nine genotypes are resistant, four are moderately resistant and fourteen were susceptible to the pigeonpea sterility mosaic disease. Need further investigation for resistant breeding.

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