VARIETAL SCREENING OF MUNGBEAN GENOTYPES FOR THEIR RESISTANCE AGAINST PEST COMPLEX OF MUNGBEAN

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ABSTRACT

An experiment was carried out to evaluate the mungbean to key pests, i.e., aphid, whitefly, spotted pod borer (M. vitrata), stem fly and pod weevil in mungbean sown with spacing of 30 cm x 10 cm. Total ten genotypes were used and experiment was conducted in Randomized Block Design with three replications. The lowest mean aphid population was recorded on genotype, PHULE M-702-1 (2.78 aphids per inch of shoot per plant), while the highest (3.64) on genotype PKV AKM. The mean whitefly population was lowest on genotype, PKV GREEN GOLD (1.00 whiteflies per leaf) while the highest (1.90) was recorded on genotype, AKM 12-14. In case of spotted pod borer (M. vitrata), lowest population was observed on genotype, PKV GREEN GOLD (0.96 larvae per plant) and highest population (1.76) was observed on genotype AKM 12-14 and AKM 12-23. The lowest stem fly population was observed on genotypes, BM 4 and VAIBHAV (0.04 larvae per plant) while highest stem fly population was observed on genotype PKV AKM-4 (0.19 larvae per plant). Rest of the genotypes indicated moderate plant mortality due to stem fly. The lowest population of pod weevil was observed on genotype, PKV GREEN OLD (0.70 weevils per plant) while, the highest population (1.59) was recorded on genotype, BM 2011-1.

KEY WORDS: Aphid, mungbean, pod borer, screening, whitefly

INTRODUCTION

Mungbean (*Vigna radiata* L.) also known as "Greengram", belongs to the family Leguminosae. Mungbean is the most important food legume, after pigeonpea and chickpea, in India. It originated from India which is the largest producer of mungbean and accounts for 54 per cent of the world production and covers 65 per cent of the world acreage. The important mungbean growing countries in the world are India, China, Philippines, Burma, Bangladesh and Pakistan. In India, the crop is cultivated in three different seasons, *viz*., *kharif, rabi* and summer. It is grown under rainfed condition during *kharif* and on residual moisture during *rabi* in eastern and southern part of country. In Maharashtra, the area under mungbean during 2014-15 was 3.18 lakh hectare

with production of 0.89 lakh tonnes and productivity of 280 kg/ha. In Marathwada, the area under mungbean was 1.67 lakh hectare with production of 0.33 lakh tonnes and productivity of 215 kg/ha (Anonymous, 2015).

The insects pests such as jassids, whitefly, thrips, stem fly, *Epilachna* beetle, blister beetle, *Galerucid* beetle, pod sucking bug, spotted pod borer and tobacco caterpillar have more significance on mungbean throughout the year. Incidence of insect pests considerably reduces the yield and quality of mungbean (Elias *et al.*, 1986; Malik, 1994). The incidence and development of all insect pests are much dependent upon the prevailing weather conditions, such as temperature, relative humidity and precipitation (Aheer *et al.*, 1994; Yadav and Singh, 2013 and Yadav *et al.*, 2015). The whitefly causes damage to the plants by feeding on the leaf with stylets inserted into the leaf tissue. Whitefly reduces crop yield and acts as a vector of viral pathogens (Kajita and Alam, 1996).

Among the pod borers, legume pod borer, *Maruca vitrata* is the serious pest to the greengram, which causes damage mainly at reproductive phase of the crop. Because of its extensive host range and destructiveness, it became a persistent pest in pulses particularly on greengram, as it is available throughout the year in different seasons. Zahid *et al.* in 2008 had reported 20–30 per cent pod damage in mungbean. It is known to cause economic loss of 20 - 25 per cent and yield loss of 2-84 per cent in greengram (Vishakanthaiah and Jagadeesh Babu, 1980). Stem fly, *Ophiomyia phaseoli* (Tryon) is also a serious seedling stage pest of greengram and has been identified as a major pest of greengram in India. The stem fly incidence was observed on greengram and soybean from July to November and on cowpea from July to October (Agarwal and Pandey, 1996). In general, 10 per cent of sampled plants were found to be infested by stem fly. The yield loss caused by stem fly, *O. phaseoli* across the world ranged between 24.24-37.24 per cent (Pradhan *et al.*, 2000).

MATERIALS AND METHODS

Field screening technique was used for studying the crop resistance to key pests, *i.e.*, aphid, whitefly, spotted pod borer (*M. vitrata*), stem fly and pod weevil in mungbean. A total of ten genotypes were used *viz.* BM 4, PKV AKM-4, BM 2011-1, AKM 12-14, AKM 12-23, PHULE M 702-1, PKV GREEN GOLD, VAIBHAV, AKM 12-24 and BPMR 145 for screening against the key pests. Experiment was conducted in Randomized Block Design with three replications. Three lines of 3 m length of each genotype were sown with spacing of 30 cm x 10 cm. All recommended cultural and agronomical practices were followed homogeneously in all the genotypes to raise a good crop. None of the insecticides was applied to protect the crop from the infestation of key pests. Population of aphids, whiteflies, spotted pod borers (*M. vitrata*), stem flies and pod weevils along with damage were recorded on ten randomly selected plants from each genotype. Seedling mortality due to stem fly was also recorded for each week.

RESULTS AND DISCUSSION

During the cropping season, the mean population of aphids presented in Table 1 was in the range of 2.78 to 3.64 aphids per inch of shoot per plant. There were significant differences with respect to aphid population on the genotype under study. It was found

that the lowest mean aphid population *i.e.*, 2.78 aphids per inch of shoot per plant was found on the genotype PHULE M-702-1. The genotype PKV AKM-4 recorded highest mean population (3.64 aphids per inch of shoot per plant) followed by VAIBHAV (3.58 aphids per inch of shoot per plant) and BM 4 (3.45 aphids per inch of shoot per plant), which were found statistically at par with each other. Ahmad *et al.* (2007) reported that the aphid population ranged from 64.0 to 234.0 (Av. of 90 observations) per 2.5 cm terminal shoot length and foliar damage index ranged from 0.6 to 3.5 per plant on mungbean genotypes. Results are also in accordance with Patel *et al.* (2010), who reported maximum population of aphid (10.22 aphids/10 cm twig) on mungbean.

The mean population of whiteflies was in the range of 1.00 to 1.90 whiteflies per leaf. It was found that the lowest mean whitefly population was found on PKV GREEN GOLD (1.00 whiteflies per leaf) and was significantly superior over all other genotypes under study. The highest mean population was observed on genotype AKM 12-14 (1.90 whiteflies per leaf) followed by PHULE M-702-1 (1.79 whiteflies per leaf), VAIBHAV and PKV AKM-4 (1.74 whiteflies per leaf), which were statistically at par with each other. The results are also in accordance with Khattak *et al.* (2004), who reported that some of the mungbean varieties (NM 92 and NM 98) showed significantly low mean whitefly population per leaf as compared to the other three tested varieties.

The data presented in Table 1 indicated that mean spotted pod borer (*M. vitrata*) population was lowest on genotype, PKV GREEN GOLD (0.96 larvae per leaves) and was significantly superior over all other genotypes under study. The highest mean population was observed on genotypes, AKM 12-14 and AKM 12-23 (1.76 larvae per plant) followed by VAIBHAV (1.71 larvae per plant) genotype and were statistically at par with each other. The results obtained in the present investigation are in accordance with the findings of earlier workers, *viz.*, Patel *et al.* (2010), who reported that spotted pod borer (*M. vitrata*) noticed at pod setting stage and reached to its highest peak of 1.21 larvae per plant.

The data presented in Table 1 indicated that the mean population of stem fly was in the range of 0.04 to 0.19 larvae per plant. It was found that mean stem fly population was lowest on genotypes, BM 4 and VAIBHAV (0.04 larvae per plant) and were significantly superior over all other genotypes under study, while highest mean stem fly population was observed on genotype PKV AKM-4 (0.19 larvae per plant) followed by PHULE M-702-1, PKV GREEN GOLD (0.11 larvae per plant) and BM 2011-1 and AKM 12-14 (0.10 larvae per plant) and were statistically at par with each other. The results obtained in the present investigation are in accordance with the results obtained by earlier workers, *viz.*, Thapa and Timsina (1990) reported that the incidence of *O. phaseoli* was high during the 3rd week after germination on soybean and mungbean cultivars. The greatest damage (66.3% infestation) was recorded on Pagasa 2 and the least (43.4%) on a local variety.

The data presented in Table 1 indicated the stem tunneling was in the range of 24.38 to 30.75 per cent. It was found that mean stem tunneling was lowest in genotype VAIBHAV (24.38 %) and was significantly superior over all other genotypes under study. The

genotype, AKM 12-23 (30.75 %) followed by PHULE M-702-1(29.72 %) had the highest stem tunneling and were statistically at par with each other. The results obtained in the present investigation are in accordance with earlier experiments *viz*., Pradhan *et al*. (2000) reported that in black gram the intensity of stem tunneling varied significantly between sowing dates and cultivars.

The data presented in Table 1 indicated that there were significant differences with respect to plant mortality due to stem fly. The mean plant mortality was in the range of 15.00 to 17.89 per cent. It was found that mean plant mortality was lowest in genotype BM 2011-1 (15.00 per cent) and was significantly superior over all other genotypes under study. The highest mean plant mortality was observed in genotype PKV AKM-4 (17.89 per cent). The results obtained in the present investigation are in accordance to those of Thi *et al*. (2005), who found that on green gram cultivars (V 3726) the level of stem fly infestation varied according to growth stages of green gram and growing seasons.

The data presented in Table 1 indicated that the mean population was in the range of 0.70 to 1.59 weevils per plant. It was found that mean pod weevil population was lowest on genotype PKV GREEN GOLD (0.70 weevils per plant) and was significantly superior over all other genotypes under study. The genotype, BM 2011-1 (1.59 weevils per plant) followed by AKM 12-14 (1.47 weevils per plant) had highest population of pod weevil and were statistically at par with each other. The results obtained in the present investigation in relation to pod weevil are in accordance with the results of Deshmukh *et al*. (2007), who reported that pod weevil attacked green gram during pod formation stage. The average population of weevils per sweep was 20.45 adults in the month of September.

CONCLUSION

From the results, it was concluded that genotype PHULE M-702-1 was found resistance to aphid, PKV GREEN GOLD to whitefly, spotted pod borer (*M. vitrata*) and pod weevil and BM 4 and VAIBHAV to stem fly, as these genotypes recorded significantly the lowest population of respective pests in mungbean.

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Table 1: Screening of greengram genotypes against several pests

Sr. No.	Genotype	Mean Aphid Population / Inch of Shoot/Plant	Mean Whitefly Population / Leaf	Mean Spotted Pod Borer Population	Mean Stem Fly Larvae/ Plant	Mean Stem Tunneling (%) due to Stem Fly	Plant Mortality (%) due to Stem Fly	Mean Pod Weevil Population / Plant
1	**BM 4**	3.45(1.99)*	1.41(1.38)*	1.24(1.32)*	0.04(0.74)*	25.82(30.53)*	17.67(24.88)*	1.00(1.22)*
2	**PKV AKM-4**	3.64(2.03)	1.74(1.50)	1.40(1.38)	0.19(0.83)	26.13(30.72)	17.89(25.03)	1.20(1.30)
3	**BM 2011-1**	3.13(1.90)	1.46(1.40)	1.43(1.39)	0.10(0.77)	27.72(31.76)	15.00(22.79)	1.59(1.45)
4	**AKM 12-14**	3.30(1.95)	1.90(1.55)	1.76(1.50)	0.10(0.77)	27.08(31.37)	15.56(23.26)	1.47(1.40)
5	**AKM 12-23**	3.25(1.94)	1.57(1.44)	1.76(1.50)	0.06(0.75)	30.75(33.71)	16.11(23.66)	0.90(1.18)
6	**PHULE M-702-1**	2.78(1.81)	1.79(1.51)	1.33(1.35)	0.11(0.78)	29.72(33.09)	16.00(23.58)	0.97(1.21)
7	**PKV GREEN GOLD**	2.90(1.84)	1.00(1.22)	0.96(1.21)	0.11(0.78)	26.48(30.98)	17.33(24.58)	0.70(1.10)
8	**VAIBHAV**	3.58(2.02)	1.74(1.50)	1.71(1.49)	0.04(0.74)	24.38(29.60)	16.89(24.27)	0.87(1.17)
9	**AKM 12-24**	3.19(1.92)	1.13(1.28)	1.29(1.34)	0.09(0.77)	27.38(31.56)	15.11(22.87)	1.07(1.25)
10	**BPMR 145**	3.09(1.89)	1.53(1.42)	1.30(1.34)	0.05(0.74)	28.83(32.46)	17.11(24.43)	1.03(1.24)
SEm±		0.028	0.018	0.023	0.007	0.553	0.407	0.040
CD at 5%		0.0821	0.054	0.068	0.021	1.604	1.180	0.120
CV %		2.544	2.684	2.942	1.601	3.038	2.952	5.603

**** Figures in the parenthesis are the arc signed transformed values.***

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