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FIELD SCREENING OF SOME LONG DURATION PIGEONPEA GENOTYPES AGAINST POD FLY *MELANAGROMYZA OBTUSA* UNDER NATURAL CONDITIONS

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ABSTRACT : Thirteen long duration pigeonpea genotypes with two checks Bahar and MAL-13 were screened against pod fly damage for two consecutive years during *kharif* 2017 and 2018 at the Agricultural Research Farm, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi. In order to screen the pigeonpea genotypes the experiment was laid out in Randomized Block Design and replicated thrice and kept free from spray of insecticides. To assess the degree of infestation caused by pod fly, hundred pods were picked out randomly from each replication of each genotype at the time of harvest and the per cent pod and grain damage was assessed. Investigation revealed that none of the entry was found free from incidence of pod fly. On the basis of present study, the genotypes with lowest pod and grain damage may be used in resistant breeding programme for improvement or developing resistant varieties of pigeonpea.

Key words : Pigeonpea, pod damage, grain damage, podfly, genotypes.

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INTRODUCTION

Pigeonpea [*Cajanus Cajan* (L) Millsp.] is an important pulse crop grown in India. However, the yield levels of this crop are not very encouraging due several biotic and abiotic factors. Among the biotic factors responsible for low yield, the damage caused by insect pests is one of the major factors in pigeonpea. Pigeonpea attacked by several insect pests from seedling stage till harvesting. More than 200 species of insects have been found feeding on pigeonpea, although only a few of them have been found to cause significant and economic damage to the crop. *Melanagromyza obtusa* (Malloch) (Diptera: Agromyzidae), has emerged as a key pest causing 10.00 per cent to 80.00 per cent damage (Shanower *et al*, 1999; Kumar and Nath, 2003), which is estimated to cause a monitory annual loss of US$ 256 million [= Rs. 1500.00 Crores approx.] (Sharma *et al*, 2011 and Arbind *et al*, 2013). On an average, one third of the pigeonpea produced annually in India is lost due to the insect pest infestation and the estimated monetary value (nearly one million tonnes) is approximately Rs. 15,000 million (Srivastava and Joshi, 2011). Pod fly infested pods do not show external evidence of damage until the fully grown larvae chew holes in the pod walls. This hole provides an emergence "window" through which the adults exit the pod. The concealed mode of life within the pod makes it difficult to control, with chemical insecticides (Subharani and Singh, 2010). Farmers are frustrated to manage these insect pests with commonly available insecticides. But dependence on only chemicals lead to the problems like development of resistance, outbreak of secondary pests, pesticide residues, hazards to human and animal life, destruction of natural enemies and as well as environmental pollution. In this context, it becomes very imperative to follow alternate approach which is ecologically viable and socially acceptable. Under such circumstances use of resistant or less susceptible

cultivars is one of the most important methods of keeping insect population below economics threshold level. Host plant resistance does not involves any cost or application skill in pest control techniques. It is most useful when carefully utilized with other components of pest management. Therefore, evaluation of varieties or genotype against major pests was studied.

MATERIALS AND METHODS

Thirteen long duration pigeonpea genotypes with two checks Bahar and MAL-13 were sown on in the field during *Kharif* 2017 and *Kharif* 2018. No insecticides were applied and the crop was exposed to natural infestation and normal agronomic practices were followed during crop growth. In order to screen certain long duration pigeonpea genotypes listed in Tables 1 and 2 against *M. obtusa*, field experiment was laid with following details:

Table 1 : Details of the experiment.

i)	Location	Agricultural Research Farm, IAS, BHU, Varanasi.
ii)	Design	Randomized Block Design
iv)	No. of Treatments	13+2(Check)
v)	No. of Replications	Three
vi)	Spacing	75 cm × 30cm
vii)	Plot size	4 m × 3.5m
viii)	Length of row in each replication	4 m
ix)	No. of row in each replication	5

Tbale 2 : List of selected pigeonpea genotypes.

Treatment	Genotypes name
T_1	IVT-1-704
T_2	IVT-702
T_3	IVT- 703
T_4	IVT-706
T_5	IVT-705
T_6	IVT-701
T_7	IVT-208
T_8	IVT-907
T_9	IVT-1-901
T_{10}	IVT-12-904
T_{11}	IVT-1-903
T_{12}	IVT-1-2-908
T_{13}	IVT-1-2-902
T_{14}	Bahar (Susceptible check)
T_{15}	MAL-13 (Resistant check)

Pod and grain damage assessment

To assess the degree of infestation caused by pod fly, hundred pods were picked out randomly from each replication of each genotype at the time of harvest and the per cent pod damage will be computed by counting both infested and total number of pods from all the genotypes. The percent pod damage was carried out by the following formula (Naresh and Singh, 1984):

$$\text{Per cent pod damage} = \frac{\text{Number of damaged pods/grains}}{\text{Total number of pods/grains observed}} \times 100$$

RESULTS AND DISCUSSION

Data pertaining to screening were presented in Table 3. Investigation revealed that none of the entry was found free from incidence of pod fly. Pod damage by pod fly showed significant difference among genotypes and per cent pod damage by pod fly in different genotypes was varied and the maximum pod damage was found in IVT-1-704 (38.67%), which was at par with IVT-702 (37.67%), IVT-703 (37.33%), IVT-1-901 (37.33%) and IVT-1-2-908 (33.0%). However, the minimum pod damage was found in IVT-705 (29.0 %). While in check genotypes Bahar and Mal-13 the pod damage was found 35.67% and 31.0%, respectively. The highest grain damage was recorded from IVT-1-704 (20.77%), which is statistically at par with IVT-702 (19.36%), IVT-703 (18.89%) and IVT-1-901 (19.32%) and the lowest grain damage was recorded from IVT-1-705 (14.52%). While, check genotypes Bahar and MAL-13 were 18.26% and 13.65%, respectively. Likewise during 2018-19 the maximum pod damage was observed from IVT-1704 (31.67%), which was at par with IVT-703 (31.00%) and IVT-1-2-908 (31.33%) and the minimum pod damage was observed from IVT-705 (23.33%) while two checks were Bahar (33.00%) and MAL-13 (20.67%). Grain damage was observed maximum in IVT-1-704 (18.44%), which was at par with IVT-702 (18.38%) and IVT-1-901 (18.25%) however, minimum in IVT-907 (13.04%) when compared to check Bahar (12.27%) and MAL-13 (12.27%).

This may be due to difference in susceptibility of genotypes to pod fly. Srivastava and Mohapatra (2002) also reported that the extent of pod damage inflicted by lepidopteran pod borers and pod fly on fifteen pigeonpea genotypes varied from 1.0 to 6.3 per cent and 15.1 to 33.1 per cent, respectively and these findings are more or less similar with the results found by Gangwar *et al* (2009), Anitha *et al* (2006) and Kooner and Cheema (2006).

Table 3 : Per cent pod and grain damage by pod fly on different long duration pigeonpea genotypes.

S. no.	Genotypes	Pod damage (%) (2017-18)	Grain damage(%) (2017-18)	Pod damage (%) (2018-19)	Grain damage (%) (2018-19)	Yield (kg/ha) (2017-18)	Yield (kg/ha) (2018-19)
1.	IVT-1-704	38.67 (38.43) ^	20.77 (27.09)	31.67 (34.22)	18.44 (25.42)	672.67	502.67
2.	IVT-702	37.67 (37.84)	19.36 (26.08)	28.00 (31.90)	18.38 (25.32)	723.00	673.00
3.	IVT- 703	37.33 (37.62)	18.89 (25.74)	31.00 (33.81)	14.90 (22.68)	828.67	738.67
4.	IVT-706	31.00 (33.80)	16.33 (23.79)	25.00 (29.98)	13.40 (21.41)	1072.00	913.33
5.	IVT-705	29.00 (32.56)	14.52 (22.35)	23.33 (28.86)	13.11 (21.20)	864.00	724.00
6.	IVT-701	32.33 (34.63)	15.63 (23.24)	26.33 (30.85)	14.51 (22.38)	1075.67	935.67
7.	IVT-208	33.67 (35.44)	15.97 (23.52)	27.00 (31.27)	14.69 (22.46)	863.67	723.67
8.	IVT-907	35.33 (36.43)	14.75 (22.54)	27.33 (31.49)	13.04 (21.13)	967.00	827.00
9.	IVT-1-901	37.33 (37.63)	19.32 (26.04)	27.67 (31.70)	18.25 (25.25)	803.67	650.33
10.	IVT-12-904	31.67 (34.22)	16.84 (24.17)	25.33 (30.20)	14.18 (21.96)	913.33	753.33
11.	IVT-1-903	32.67 (34.84)	18.19 (25.20)	25.33 (30.20)	17.99 (25.08)	801.67	641.67
12.	IVT-1-2-908	38.00 (38.03)	15.58 (23.23)	31.33 (34.01)	14.10 (22.01)	778.67	618.67
13.	IVT-1-2-902	33.00 (35.04)	16.07 (23.61)	25.00 (29.98)	15.56 (23.20)	840.00	680.00
14.	Bahar (Susceptible check)	35.67 (36.64)	18.26 (25.27)	33.00 (35.04)	19.44 (26.14)	1011.67	851.67
15.	MAL-13 (Resistant check)	31.00 (33.80)	13.65 (21.66)	20.67 (27.01)	12.27 (20.43)	1253.67	1093.67
LSD @ 5%		2.689	2.385	2.244	1.544	81.454	83.589
SEM ±		0.923	0.819	0.771	0.530	27.97	28.707

^values in parenthesis are arc sin transformed value.

CONCLUSION

The present study thus revealed that none of the entries were completely free from infestation and On the basis of the above investigation it may be concluded that host plant resistance plays a very important role in governing the pest infestation level in pigeonpea and screening is an appropriate method to identify resistant genotypes. Among the thirteen genotypes with two checks Bahar and MAL-13, the extent of damage caused by podfly was ranged in between 29.0% to 38.67% and 214.52% to 20.77% in pods and grains respectively during 2017-18 and 23.33% to 31.67% in pod and 13.04% to 18.44% in grains when compared to checks and those who found to showed less damage against insect pest damage in terms of pod and grain damage can be recommended as a source of resistance to insect pests.

REFERENCES

Anitha K, Reddy J and Sharma H C (2006) Effect of grain yield in pigeonpea genotypes with different levels of resistance to the pod borer (*Helicoverpa armigera*). *Indian J. Plant Prot.* **34**(2), 184-187.

Arbind K C, Ranjeet S R, Subhojit D, Rafat S and Timmanna O (2013) Conventional and molecular approaches towards genetic improvement in pigeonpea for insects resistance. *Amer. J. Plant Sci.* **4**, 372–385.

Bant S K and Kooner H C (2006) Evaluation of pigeonpea genotypes for resistance to pod borer complex. *Indian J. Crop Sci*. **1**(1-2), 194-196.

Gangwar L K, Bajpai G C, Kerkhi S A and Sachan S K (2006) Pod borer susceptibility reaction in interspecific hybrids of pigeonpea. *Indian J. Genet*. **69**(1), 58-61.

Kumar A and Nath P (2003) Field efficacy of insecticides against pod bug (*Clavigralla gibbosa*) and pod fly (*Melanagromyza obtusa*) infesting pigeonpea. *Annals Plant Prot. Sci.* **11**(1), 31–34.

Naresh J S and Singh J (1984) Population dynamics and damage of insect pests in flowering pigeonpea [*Cajanus cajan* (L.) Millsp.]. *Indian J. Entomol*. **46**(4), 412-420.

Shanower T G, Romeis J and Minja E M (1999) Insect pests of pigeonpea and their management. *Ann. Rev. Entomol.* **44**, 77–96.

Sharma O P, Gopali J B, Yelshetty S, Bambawale O M and Garg D K (2010) Pests of pigeonpea and their management. Bhosle National Centre for Integrated Pest Management, pp. 11-12.

Srivastava C P and Joshi N (2011) Insect pest management in pigeonpea in Indian scenario: a critical review. *Indian J. Entomol.* **73**(1), 63-75.

Srivastava C P and Mohapatra S D (2002) Field scrrening of pigeonpea genotypes for resistance to major insect pests. *J Appl. Zool. Res*. **13**(2 and 3), 202-203.

Subharani S and Singh T K (2010) Biology of pod fly, *Melanagromyza obtusa* Malloch on *Cajanus cajan* (L.) Millsp. in Manipur. *Annals Plant Prot. Sci.* **18**(1): 67-69.