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EVALUATION OF SOME PIGEONPEA GENOTYPES AGAINST MAJOR INSECT PESTS

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Pigeonpea genotypes with different levels of resistance to major insect pests were evaluated for their ability to withstand pod and grain damage or recover from damage based on loss in grain yield under field conditions. Among all the genotypes the highest reduction in per cent pod damage was found in case of T-P-1 from 27.5% in unprotected condition to 6% in protected condition. The lowest reduction in per cent pod damage by pod bug was found in the genotype KAWR-92-2E from 10.5% in unprotected condition to 7% damage in protected condition. The highest reduction in per cent pod damage by lepidopterous pod borer was found in case of PDA-88-2E, the grain damage under protected condition was less than 3.5% in all the genotypes while, grain damage under unprotected condition was above 10% in all the genotypes. Highest grain yield was recorded in PDA-87-3E (962 kg/ha), followed by KAWR-92-2E (925kg/ha), PDA-89-2E (870 kg/ha) and PDA-85-5E (814 kg/ha).

Key words: Pigeonpea, genotypes, resistance.

INTRODUCTION

Pigeonpea (*Cajanus cajan* (L.) Millsp.) is grown throughout the tropics but most widely in south and south-east Asia, where it is a preferred source of vegetable protein. It is one of the major grain legumes (pulses) in the semi-arid tropics (SAT) (Nene & Sheila, 1990). Pigeonpea yields have remained stagnant for the past 3 to 4 decades, largely due to insect pest damage. Resistant or less susceptible cultivars would provide an equitable and environmentally sound tool for sustainable pest management. Insect pests cause around 10-15 per cent reduction in yield and are one of the potential constraints that limit pulse production in India (Pai & Dhuri, 1991; Akhilesh Kumar & Paras Nath, 2003). Especially pod borers influence the productivity to a greater extent (Sahoo & Senapati, 2000). Identification and utilization of cultivars resistant / tolerant to major pests would have a number of advantages, particularly for an ecofriendly crop such as pigeonpea. Resistant or less susceptible cultivars would provide an equitable and environmentally sound tool for sustainable pest management.

Since levels of resistance to these pests in the cultivated pigeonpeas are low to moderate, it is important to identify wild relatives of pigeonpea with high levels of resistance for use in crop improvement.

MATERIALS AND METHODS

The study was conducted to test the performance of 6 different pigeonpea varieties under net protected and unprotected conditions at Agriculture Research Farm, Banaras Hindu University, Varanasi during the year 2009-10 and 2010-11. Each genotype was raised in 10 m × 4 m plots with plant to plant spacing of 20 cm and row to row spacing of 75 cm having 10 rows in each plot. Normal agronomic practices were followed for raising the crop. The trial was laid out in two rows, with treatments (protected and unprotected), in first row each varieties were grown separately covered with nylon net and in other row the same varieties were grown without covering net. The crop was covered with nylon net under protected condition at flowering stage while under unprotected condition crop was not covered with net. Five plants in each plot from the three rows were selected randomly and all the pods from five plants were pooled together and finally 200 pods were picked up for pod and grain damage assessment and yield was recorded for each plot.

Statistical analysis : The data were subjected to analysis of variance using paired t-test. The difference between the two observations on each pair was calculated, the mean difference and the standard deviation of the differences were worked out and this is used to calculate the standard error of the mean difference. The t-statistic was calculated by using the following formula.

$$t = \frac{\bar{d}}{\sqrt{s^2/n}}$$

Where d bar is the mean difference between two samples, s^2 is the sample variance, n is the sample size and t is a paired sample t-test with n-1 degrees of freedom.

After calculating the parameter, compare the calculated value with the table value. If the calculated value is greater than the table value, then we will reject the null hypothesis for the paired sample t-test. If the calculated value is less than the table value, then we will accept the null hypothesis and say that there is no significant mean difference between the two paired samples.

RESULTS AND DISCUSSION

Pod damage : The per cent pod damage by pod fly was found highly significant among two protection regime, the pod damage under protected condition was less than 10% in case of KAWR-92-2E (9%) and T-P-1 (6%) compared to 11 % damage in PDA-89-2E, PDA-88-2E and PDA-85-5E. Among all the genotypes the highest reduction in per cent pod damage was found in case of T-P-1 from 27.5% in unprotected condition to 6% in protected condition (Table I). The percent pod damage by pod bug was less in case of T-P-1 (4%) in protected condition compared to 12% pod damage in unprotected condition and it was followed by PDA-87-3E, PDA-85-5E and PDA-88-2E. The lowest reduction in per cent pod damage by pod bug was found in the genotype KAWR-92-2E *from* 10.5% in unprotected condition to 7% damage in protected condition. The per cent pod damage by Lepidopterous pod borer was found significant among the two treatments, among all the genotypes the highest reduction in per cent pod damage was found in case of PDA-88-2E from 7.5% in unprotected condition to 0.5% damage in protected condition. The lowest reduction in per cent pod damage by Lepidopterous pod borer was found in the genotype PDA-89-2E from 4.5 % in unprotected condition to 1% damage in protected condition. The levels of resistance to *H. armigera* in the germplasm accessions are low to moderate, and this has necessitated the need for selecting genotypes with greater ability to tolerate or recover from the pod borer damage (Lateef & Pimbert, 1990; Sharma *et al.*, 2005).

Table. I : Per cent pod damage caused by pod borers in some pigeonpea genotypes under protected and unprotected conditions (pooled data of two years).

Genotypes	Pod fly		Pod bug		Lepidopterous pod borer	
	pro-tected	unpro-tected	pro-tected	unpro-tected	pro-tected	unpro-tected
PDA-89-2E	11	30	6	12.5	1	4.5
KAWR-92-2E	9	29	7	10.5	0.5	5.0
PDA-88-2E	11	28	4	11	0.5	7.5
PDA-87-3E	10	29.5	4	11.5	1	6
PDA-85-5E	11	28	5	12.5	0.5	5
T-P-1	6.0	27.5	4	12	0.5	6
Std error mean	1.23		1.13		0.82	
S D±	1.76		1.63		1.18	
Cal t value	15.44		5.89		6.09	

Table II : Per cent grain damage by pod borers and grain yield in some pigeonpea genotypes under protected and unprotected conditions (pooled data of two years).

Genotypes	Pod fly		Pod bug		Lepidopterous pod borer		Grain yield (kg/ha)	
	pro--tected	unpro-tected	pro-tected	unpro-tected	pro-tected	unpro tected	pro-tected	unpro-tected
PDA-89-2E	3.5	11.77	1.68	3.31	0.28	2.38	870	655
KAWR-92-2E	3.01	10.51	1.91	2.42	0.14	1.88	925	500
PDA-88-2E	2.52	12.5	1.12	3.63	0.28	1.95	643	366
PDA-87-3E	1.5	12.7	1.11	3.51	0.57	1.62	962	648
PDA-85-5E	3.5	13.58	1.39	4.61	0.30	2.63	814	379
T-P-1	2	11.23	1.14	4.10	0.28	1.91	648	488
Std error mean	0.54		0.40		0.18		45.37	
S D±	1.33		0.99		0.44		110	
Cal t value	17.05		5.41		9.72		6.70	

Table value of t for 5 d.f. at 5% level of significance 2.01 & at 1% level of significance 3.36;
S D± Standard Deviation.

Grain damage : The per cent grain damage by pod fly was found highly significant among two protection regime, the grain damage under protected condition was less than 3.5% in all the genotypes while, grain damage under unprotected condition was above 10% in all the genotypes (Table II). The highest reduction in grain damage was found in the genotypes PDA-87-3E from 12.7% in unprotected condition to 1.5% damage in protected condition followed by PDA-85-5E which recorded 3.5% grain damage under protected condition compared to 13.58% grain damage in case of unprotected condition. The lowest reduction in grain damage was found in KAWR-92-2E from 10.51% in unprotected condition to 3.01% damage in protected condition. The highest reduction in per cent grain damage by pod bug was found in the genotype PDA-85-5E from 4.61% in unprotected condition to 1.39% damage in protected condition. Lowest reduction in grain damage by pod bug was found in KAWR-92-2E which records 1.91% in protected condition compared to 2.42% in unprotected condition. The per cent grain damage by Lepidopterous pod borer was found significant among the two protection regime, among all the genotypes the highest reduction in per cent grain damage was found in case of PDA-85-5E from 2.63% in unprotected condition to 0.3% damage in protected condition. The lowest reduction in per cent grain damage by Lepidopterous pod borer was found in the genotype PDA-87-3E from 1.62 % in unprotected condition to 0.57% damage in protected condition.

Grain yield : The grain yield was significantly higher under protected conditions compared to that under unprotected conditions (Table II). Highest grain yield was recorded in PDA-87-3E (962 kg/ha), followed by KAWR-92-2E (925kg/ha), PDA-89-2E (870 kg/ha) and PDA-85-5E (814 kg/ha). The lowest grain yield under protected condition was found in PDA-88-2E (643 kg/ha) which was followed by T-P-1 (648 kg/ha). Under unprotected condition, the highest grain yield was obtained in PDA-89-2E (655 kg/ha) followed by PDA-87-3E (648 kg/ha) and KAWR-92-2E (500 kg/ha). The highest increase in yield was found in PDA-85-5E which records 435 kg/ha increased grain yield when it was grown under protected condition, which is followed by KAWR-92-2E which records 425 kg/ha increased grain yield when it was grown under protected condition. The lowest reduction in grain yield was found in T-P-1 from 648 kg/ha in protected condition to 488 kg/ha in unprotected condition.

REFERENCES

KUMAR, A.L. & NATH, P. 2003. Pest complex and their population dynamics on medium-late variety of pigeonpea Bahar. *Indian J. Pulses Research.* **16**(2): 150-154.

LATEEF, S.S. & PIMBERT, M.P. 1990. The search for host plant resistance of *Helicoverpa armigera* in chickpea and pigeonpea at ICRISAT. Pages 14-18 *in* Proceedings of the Consultative Group Meeting on the Host Selection Behavior of *Helicoverpa armigera*, 5-7 March 1990. ICRISAT.

NENE, Y.L. & SHEILA, V.K. 1990. Pigeonpea: Geography and importance. In : *The Pigeonpea,* (Y.L. Nene, Hall, S.D. & Sheila, V.K. Eds.). pp. l-14. CAB International, Wallingford.

PAI, K.M. & DHURI, A.V. 1991. Incidence of insect pest in early variety of cowpea, *Vigna unguiculata* (L.) Walp, *Indian J. Ent.*, **53** : 329-331.

SAHOO, B.K. & SENAPATI, B. 2000, Influence of seed characters on the incidence of pod borers in pigeonpea. *Indian J. Pl. Protec.* **28** : 57-60.

SHARMA, H.C., AHMAD, R., UJAGIR, R., YADV, R.P., SINGH, R. & RIDSDILL-SMITH, T. J. 2005. Host plant resistance to cotton bollworm/legume pod borer, *Heliothis/Helicoverpa.* pp. 167-208. Oxford and IBH Publishers, and Enfield, USA: Science Publishers Inc., New Delhi, India.