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Reaction of Pigeonpea Genotypes Against Improtant Insect Pests*

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ABSTRACT

Field screening of twenty genotypes of *Cajanus cajan* (L.) Millsp. in North Gujarat conditions during 1991-92 revealed that six early maturing genotypes *viz.*, ICPL 85014, ICPL 9008, ICPL 87, ICPL 151, ICPL 88027 and ICPL 9007 were highly promising against *Empoasca kerri* Pruthi as they gained 5 or less resistance rank. Only Guj. Tur-1 from early maturity group and GAUT 85035 and BDN 2 from mid-late maturity group showed remarkable resistance against all the three pod borers *viz.*, *Heliothis armigera* (Hubner), *Exelastis atomosa* Walsingham and *Melanagromyza obtusa* Malloch. The Hy. 3C was the only genotype found to be resistant against jassid as well as pod borers and as such may be included in breeding programme to develop a cultivar with multiple resistance against these pests.

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INTRODUCTION

Pigeonpea, *Cajanus cajan* (L.) Millsp. is attacked by several insect pests right from seedling stage till pod formation stage (Ghosh, 1981). Chemical pesticides alone does not help to suppress pests below economic injury level and therefore, Integrated Pest Management approach should be adopted. Host plant resistance is one of its important tools. Therefore varietal reaction of promising genotypes of pigeonpea was studied against aphid, *Aphis craccivora* Koch; jassid, *E kerri; H. armigera;* tur plume moth, *E. atomosa* and tur pod fly, *M. obtusa.*

MATERIALS AND METHODS

Field screening of ten early maturing and ten mid-late maturing genotypes of pigeonpea was done in Randomised Block Design at Puleses Research Station, GAU, Sardar Krushinagar, Dist. Banaskantha, during 1991-92. Each genotype was sown at 0.6 x 0.3 m spacing in 5 x 12 m plot (Gross). Pest populations were counted from five randomly tagged plants from each plot. Number of aphid nymphs and adults were counted from the whole plant, whereas, jassid nymphs were counted and recorded from three trifoliate leaves, one each from top, middle and bottom

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portion at a week interval. Observations on pod borers were recorded on the basis of damage symptoms of each borer separately, from 250 pods collected randomly from each plot at maturity stage. Data were statistically analysed after necessary transformation.

Cut off values were worked out by using the formulae suggested by Rana *et al.* (1975) and Bapat and Mote (1982) and presented in Table 2. However, neither of these satisfactorily served the purpose. The mean value of incidence or damage of a pest which was intermediate to the cut off value derived by using formulae suggested by earlier workers and as such adopted as cut off value. The genotypes which registered less damage or incidence of a pest than its mean values were designated as resistant (R) and those showing higher damage or incidence were grouped as susceptible (S).

The resistant genotype (R) with least value of damage or incidence of a pest was assigned numerical rank 1 and the remaining genotypes were ranked in ascending order of damage or pest population. Mean rank of resistance was worked out for only those genotypes which proved resistant against all the pod borers by addition of the resistance ranks secured by a genotype against different pod borers and then dividing the total rank value by 3. Combined rank of resistance against jassid as well as all pod borers was computed for the genotype that proved resistant against all these pests by summing up the ranks of resistance gained by a genotype and dividing the value so arrived by 4. Smaller value of mean rank combined rank of resistance indicated greater degree of resistance against the pests.

RESULTS AND DISCUSSION

The results presented in Table 1 showed that the pigeonpea genotypes differed significantly with respect to their reaction to all the pests except aphid. The aphid population varied from 5.2 to 6.2 (Av. 5.62) per plant. The jassid population was minimum in ICPL 85014 and maximum in GAUT 82-90. Most of the early maturing genotypes *viz.,* ICPL 87, ICPL 151, ICPL 85014, ICPL 9007 and ICPL 9001 proved resistant against jassid, whereas only Hy 3C and ICPH 8 from mid-late maturity group exhibited resistrance against this pest.

The results also indicated that *Heliothis* damage varied from 2.5 to 14.3 per cent (Av. 7.5%). Only four early maturing genotypes *viz.,* ICPL 88027, Guj. Tur-1, ICPL 85014 and ICPL 85-4, all except GAUT 88-18 and ICPH 8 in the mid-late maturity group proved resistant to *H. armigera.* Earlier to this, Bhosale and Navale (1983) reported that gram pod borer damage was more in early maturing genotypes than mid-late genotypes supporting the present findings.

The damage of *E. atomosa* ranged between 3.6 and 15.4 (av. 7.5) per cent in the pods. Two early maturing genotypes such as GAUT 85-4 and Guj. Tur 1 proved highly promising, whereas all the mid-late maturing genotypes except GAUT-88-18 showed resistance against tur plume moth. Among these, GAUT 85-35, GAUT 82-90 and BDN 2 were highly promising against this pod borer since they registered less than five per cent damage. Contrasting to this, Khokhar and Singh (1984) reported higher incidence of *E. atomosa* in late maturing varieties of pigeonpea.

TABLE 1

Reaction of pigeonpea genotypes to important insect pests.

Genotype	No. of sucking pests		Mean pod damage (%)		
	Aphid/plant[1]	Jassid/Leaf[2]	H. armigera	E. atomosa	M. obtusa
Early maturity group					
ICPL 87	5.67	8.33	11.1 (19.4)*	10.5 (18.7)	19.4 (23.6)
ICPL 151	5.20	8.33	9.6 (17.9)	5.5 (13.5)	16.3 (23.6)
ICPL 9001	5.33	10.73	12.2 (20.5)	11.7 (19.8)	31.8 (33.9)
ICPL 9006	5.33	9.73	12.1 (20.3)	8.8 (17.2)	29.9 (33.1)
ICPL 9007	5.73	8.93	11.8 (20.1)	13.0 (20.9)	19.9 (26.5)
ICPL 9008	5.47	8.20	14.3 (22.2)	15.4 (22.9)	21.9 (27.3)
ICPL 85014	5.53	8.00	7.2 (15.5)	8.1 (16.4)	12.3 (20.5)
ICPL 88027	6.00	8.80	6.4 (14.7)	8.9 (17.3)	9.8 (18.3)
Guj. tur 1	6.00	13.40	6.5 (14.3)	3.8 (11.0)	6.2 (14.4)
GAUT 85-4	5.33	12.07	7.3 (15.6)	3.6 (11.0)	17.4 (24.6)
Mid-late maturity group					
GAUT 82-58	5.60	12.60	2.5 (9.0)	7.1 (15.4)	34.9 (36.2)
GAUT 82-90	5.33	14.53	2.9 (9.7)	4.3 (12.0)	15.5 (23.1)
GAUT 85-19	6.00	12.67	4.2 (11.8)	7.2 (15.5)	13.5 (21.1)
GAUT 85-35	5.73	14.07	3.4 (10.5)	4.2 (11.7)	11.2 (19.5)
GAUT 88--18	5.47	12.40	8.5 (16.9)	9.9 (18.0)	9.1 (17.5)
GAUT 88-19	5.73	12.27	6.4 (14.6)	5.7 (13.7)	9.2 (17.6)
Hy 3C	5.67	9.87	5.8 (14.0)	6.7 (14.9)	12.6 (20.8)
ICPH 8	5.53	10.53	7.7 (16.1)	7.0 (15.3)	11.3 (19.6)
BDN 2	6.20	11.93	6.9 (15.2)	4.6 (12.4)	4.3 (11.9)
T 15-15	5.40	12.07	3.1 (11.0)	5.1 (13.1)	23.1 (26.4)
Mean	5.62	10.96	7.5 –	7.5 –	16.5 –
C. D. at 5%	NS	2.15	2.53	3.74	6.74
C. V. %	15.11	11.00	9.91	14.55	17.67

1. Based on four observations 2. Based on ten observations.

* Figures in parenthesis are sin $\sqrt{\ }$ per cent transformed values.

The pod fly damage varied from 4.3 to 34.9 (Av. 16.5) per cent (Table 1). Four early maturing genotypes *viz.*, Guj. Tur 1, ICPL 88027, ICPL 88014 and ICPL 151 and all except GAUT 82-58 and T 15-15 from mid-late maturity group exhibited resistance against pod fly damage. Patel and Patel (1983) reported Baroda 12 as resistant against tur pod fly.

The varietal differences for aphid were non-significant and as such resisance rank was assigned only for jassid and pod borers. It was clearly evident that only Guj Tur 1 from the early maturity group and six genotypes from mid-late maturity group viz., GAUT 85-35, BDN 2, GAUT 82-90, GAUT 88-19, Hy 3C and GAUT 85-19 exhibited resistance against all the three pod borers (Table 2).

TABLE 2

Ranking of pigeonpea genotypes for resistance against jassid and pod borers.

Genotypes	*Jassid*	*H. armigera*	*F. atomosa*	*M. obtusa*	*Rank for pod borers*	*Combined rank for jassid and pod borers*
Early maturity group						
ICPL 87	8.33 R_3	11.1$_S$	100.5$_S$	19.4$_S$	–	–
ICPL 151	8.33 R_3	9.6$_S$	5.5 R_6	16.3 R_{12}	–	–
ICPL 9001	1073 R_9	12.2$_S$	11.7$_S$	31.8$_S$	–	–
ICPL 9006	9.73 R_6	12.1$_S$	8.8$_S$	29.9$_S$	–	–
ICPL 9007	8.93 R_5	11.8$_S$	13.0$_S$	19.9$_S$	–	–
ICPL 9008	8.20 R_2	14.3$_S$	15.4$_S$	21.9$_S$	–	–
ICPL 85014	8.00 R_1	7.2 R_{10}	8.1$_S$	12.3 R_8	–	–
ICPL 88027	8.80 R_4	6.4 R_7	8.9$_S$	8.9 R_5	–	–
Guj Tur 1	13.40$_S$	6.5 R_8	3.8 R_2	6.2 R_2	4.0	–
GAUT 85-4	12.07$_S$	7.3 R_{11}	3.6 R_1	17.4$_S$	–	–
Mid-late maturity group						
GAUT 82-58	12.60$_S$	2.5 R_1	7.1 R_{10}	34.9$_S$	–	–
GAUT 82-90	14.53$_S$	2.9 R_2	4.3 R_3	15.5 R_{11}	5.3	–
GAUT 85-19	12.67$_S$	4.2 R_5	7.2 R_{11}	13.5 R_{10}	8.6	–
GAUT 85-35	14.07$_S$	3.4 R_4	4.2 R_{11}	11.2 R_6	4.0	–

1.	2.	3.	4.	5.	6.	7.
GAUT 88-18	12.40_S	8.5_S	9.9_S	9.1 R_1	–	–
GAUT 88-19	12.27_S	6.4 R_7	5.7 R_7	9.2 R_4	6.0	–
Hy 3C	9.87 R_7	5.9 R_6	6.7 R_8	12.6 R_9	7.6	7.3
ICPH 8	10.53 R_8	7.7_S	7.0 R_9	11.3 R_7	–	–
BDN 2	11.93_S	6.9 R_{10}	4.6 R_4	4.3 R_1	5.0	–
T 15-15	12.07_S	3.1 R_3	5.1 R_S	23.1_S	–	–
C. D.	2.09	3.45	3.26	8.43	–	–
Criterion for computing cut off value for grouping genotypes in resistant (R) and susceptible (S) category :						
1. Mean incidence/ damage	10.96	7.5	7.5	16.5	–	–
2. Mote and Bapat (1982) formula : Max. demage / 2	11.26 Min. damage	8.4 Min. damage	9.5	19.6	–	–
3. Rana *et al.* (1975) formula : Mean-S.D.	8.87	4.05	4.24	8.07	–	–
4. R = Resistant, S = Susceptible.						

From the overall results, it can be inferred that out of 20 genotypes screened, six early maturing genotypes and one midlate maturing genotypes proved highly promising against jassid as they recorded less than 10 jassid per leaf and gained 1 to 7 rank of resistance. On the other hand, only one genotype from early maturity group and two genotypes from mid-late maturity group showed remarkable degree of resistance against all the three pod borers as these recorded less than 4 mean rank of resistance against all the pod borers. Thus, ICPL 85014, ICPL 9008, ICPL 84, ICPL 151, ICPL 88027 and Hy 3C may be used as source of resistance against *E. kerri*. Similaly, GAUT 85-35 and BDN 2 may be incorporated in resistance breeding for pod borers. A single genotype Hy 3C showed combined resistance against jassid as well as three pod bores and as such it can be utilized for developing cultivar having multiple resistance against all these pests.

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