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STUDIES ON THE VARIETAL RESISTANCE OF CHICKPEA AGAINST *HELICOVERPA ARMIGERA* (HB.)

Amjed Parvez, Muhammad Aleem Alam & Muhammad Bashir Ilyas'
Departments of Agricultural Entomology and Plant Pathology, University of Agriculture, Faisalabad

Studies on the varietal resistance of 20 test lines of chickpea against gram pod borer, *Helicoverpa armigera* (Hb.) showed that only one cultivar i.e. 1230 was resistant to *H. armigera* (Hb.). Three cultivars viz. 932, 1084 and 4001 were moderately resistant to the pest attack. while rest of the cultivars were moderately susceptible. Though a cultivar , C-44. was found to be moderately susceptible but it gave the maximum mean yield despite considerable pod damage. This was probably due to its high potential for yield.

Key words: *chickpea.Helicoverpa armigera,* varietal resistance

INTRODUCTION

Gram *iCicer arietinum* L.) is Pakistan's foremost pulse crop but its yield (538 kg/ha) is extremely low (Anonymous. 1994-95). The gram pod borer *Helicoverpa* (= *Heliothis) armigera* (Hb.) and gram semi-looper *Autographa nigrisigna* (Wlk.) are the most serious pest-insects of chickpea (Ahmad *et al .. 1989).* Total dependence on chemicals for insect control. has given rise to insect resistance problems. This situation prompts the workers to divert their efforts to Integrated Pest Management (lPM) which includes the use of resistant varieties. means of biological. cultural and chemical control of *H. armigera* (Lal *et al., 1986).*

In the present studies efforts were directed to screen chickpea germplasm for the identification of resistance sources against *Heticoverpa armigera* (Hb.) under natural pest infestation in an insecticide free field.

MATERIALS AND METHODS

Twenty chickpea germplasm lines including a susceptible check line i.e. 1114 were screened against *Helicoverpa armigera* (Hb.) for varietal resistance at the Experimental Farm. University of Agriculture Faisalabad. The germplasm lines were obtained from the Department of Plant Breeding and Genetics. University of Agriculture, Faisalabad and were sown following randomized complete block design with three replications. The net plot size was 6.6 x 4.02 m with plant to plant and row to row distances of I0 cm and 30 cm, respectively. The level of resistance/susceptibility on each of the test entries was assessed by recording larval number and percent pod damage on 5 plants selected randomly from each test line. Grain yield (g) per plot was also recorded. The data recorded were subjected to statistical analysis. The level of resistance/susceptibility of each test entry was determined by using the following pest resistance/susceptibility rating scale designed by Lateef and Sachan (1990).

Pest resistance percentage	Relative resistance/ susceptibility rating	
100%	I	
76 to 99	2)	Increasing resistance
51 to 75	31	
26 to 50	4)	
II to 25	51	
-9 to 10	6	Equal to check
-24to-IO	7	Increasing
-49 to -25	8	susceptibility
-50 to less	9	

RESUL TS AND DISCUSSION

Depending on the palatability and genotypes of the test lines. the larval population of *H. armigera* (Hb.) and pod damage varied from 11.27 to 24.43 larvae and 19.53 to 40.83% pod damage per 5 plants. respectively (Table I). The most susceptible/palatable cultivars were found to be 1114 (Check), 992. 1034. 1128. 1130. 1265. 4008 and 4012 because there were 24.40. 24.20. 22.67. 23.87. 23.70. 24.03. 22.70 and 24.43 larvae and 40.09.40.67,33.50.40.40.39.96.40.83. 37.83 and 40.11 % pod damage per 5 plants, respectively. These cultivars were statistically at par with each other and rated for grade 6 (Tables I & 2). The least susceptible/palatable cultivar was only one i.e. the cultivar 1230 which supported 11.27 larvae and 19.53 % pod damage per 5 plants and rated as 3 (resistant). Cultivars 932, 1064 and 400 I were rated as moderately resistant and the remaining eight cultivars viz. 925. 930. C-44. 1049. 1117, 1126, 1129 and 4005 behaved as moderately susceptible. The results were highly significant and were in agreement with those of early workers but the range of damage recorded by them varied greatly i.e. 12-34% (Ahmad and Hashmi, 1976).5 to 32% (Chaudhry *et al ..* 1982) and 19.53 to 40.67% (Parvez *et al ..* 1996).

Table I. Studies on the varietal resistance of chickpea against *Helicoverpa armigera* (Hb.)

Name of varieties/genotypes	Mean values per 5 plants		Pest resistance (%)	Mean grain yield per plot (g) (6.6x4.02 m)
	Number of larva	Pod damage(%)		
1114 Check	24.40A*	40.09A*	0.00	126.66 EF*
925	19.33 HI	32.91 D	17.89	123.33 EF
930	19.97 GHI	31.13 E	22.35	145.00 CDEF
932	16.60 NOP	25.56 G	36.22	191.67 BC
992	24.20 A	40.67 A	-1.462	135.00 DEF
C-44	16.200P	27.91 F	16.41	256.66 A
1034	22.67 D	33.50 D	8.713	110.00 EF
1049	20.70 EFG	33.56 CD	16.24	131.66 DEF
1084	17.00MNO	25.53G	36.31	180.00 BCD
1117	21.40 E	31.45 E	21.53	125.00 EF
1126	20.036 HI	34.72 C	13.36	135.00 DEF
1128	23.87 AB	40.40 A	-0.81	125.00 EF
1129	20.97 EFG	32.26 DE	19.16	160.00 BCDE
1130	23.70 ABC	39.96 A	0.313	145.00 CDEF
1230	11.27 W	19.53 NO	51.28	206.67 B
1265	24.03 AB	40.83 A	-1.874	106.67 F
4001	16.27 OP	24.36 GH	39.21	206.67 B
4005	20.27 FGH	32.99 D	17.67	116.67 EF
4008	22.70 D	37.83 B	5.59	116.67 EF
4012	24.43 A	40.11 A	-3.855	126.66 EF

*Any two means not sharing a common letter differ significantly at 5% level of significance.

Table 2. Response of chickpea germplasm against *Helicoverpa armigera* (Hb.)

Relative pest resistance/ susceptibility rating scale	Name of chickpea varieites/genotypes	Response of genotypes to pest attack
1		Immune
2		Highly resistant
3	1230	Resistant
4	932. 1084,4001	Moderately resistant
5	925, 930, C-44, 1049,1117,1126,1129,4005	Moderately susceptible
6	1114 (check), 992 1034, 1128, 1130, 1265,4008,4012	Susceptible

Kotikal and Panchabhavi (1992) studied the response of 8 genotypes of chickpea to *Helicoverpa armigera* (Hb.) without any plant protection schedule and reported that the least attacked varieties (pod damage 12.9% and pest resistance rating 2) gave the highest yield (80 kg/ha). Similar results were also obtained in the present studies and the varieties/lines responded as resistant/moderately resistant gave the highest yields (Table 1) except the cultivar C-44 which gave a good mean yield of 256.66 g per plot (6.6 x 4.02 m) despite exhibiting a considerable damage and its response was rated as moderately susceptible. This high yielding response was probably due to its ability to withstand damage and exhibit high yielding potential. Bhalani *et al.* (1987) also reported that in the screening of 16 chickpea genotypes for resistance to *H. armigera* (Hb.) in pesticide free field, three genotypes (P65, B6242 and Dohad yellow) gave good mean yield, despite considerable damage.

The value of correlation coefficient (0.642) worked out between pest resistance percentage and grain yield of the data in Table 1 indicated significant positive correlation between these two variables. These findings are in line with those of Sehgal (1990) who reported significant positive correlations between yield reduction and percent pod damage.

REFERENCES

Ahmad, K., F. Khalique and M. Afzal. 1989. Effect of agronomic factors on the incidence of *Helicoverpa armigera* (Hb.) and its parasite *Compoietis chloridae* (U.) in chickpea field. Pak. 1, Sci. lnd. Res. 32(10):694-697.

Ahmad, M. and A.A. Hashmi. 1976. Assessment of pod borer *IHeliothis armigera* (Hb.] damage to different varieties of chickpea in the Punjab. J. Agri.. Res. 14(2):82-86.

Anonymous. 1994-95. Agricultural Statistics of Pakistan. Govt. of Pak. Ministry of Food, Agri. and Livestock, Islamabad.

Bhalani. P.A .. G.J. Parsana and J.P. Yadavendera 1987. Susceptibility of chickpea genotypes to *Helicoverpa armigera* (Hb.) under tield conditions. Int. Chickpea Newsletter, 16: 7 (Rev. Appl. Entomol.. A, 76(6): 3423, 1988).

Chaudhry, J.P., L.S. Yadav and K.B. Rustogi. 1982. Imensity of attack of *Helicoverpa armigera* (Hb.) on gram in Haryana. Ind. J. Entomol.. 44(2): 191-192 (Rev. Appl. Entornol. A, 71(8): 5683. 1983).

Kotikal, Y.K. and K.S. Panchabhavi.. 1992. Reaction of selected genotypes of chickpea *[Cicer arietinum* (L.») to gram pod borer *Helicoverpa armigera* (Hb.), Ind. J. Agri. Sci .. 62 (9):623-624 (Rev. Agri. Entomol.. 81(10): 9983, 1993).

Lal, 5.S .. C.P. Yadava and J.N. Sachan. 1986. Strategies for the development of an integrated approach to control gram pod borer, *Helicoverpa armigera* (Hb.) infesting chickpea. Pesticides, 20(5): 39-51 (Rev. Appl.. Entomol.. A, 75(7): 3475, 1987).

Lateef, S.S. and J.N. Sachan. 1990. Pest resistance percemage and relative resistance/susceptibility rating scale. Pesticides, 31(4):21-24 (Rev. Agri.. Entomol.. 81(IQ): 4740. 1991).

Parvez, A .. M.A. Alam and M.B. Ilyas. 1996. Screening of chickpea germplasm against *Helicoverpa armigera* (Hb.) for the sources ofresistance. Pak. Entomol. 180-2):70-72.

Sehgal, V.K. 1990. Damage/yield relationships due to *Helicoverpa armigera* (Hb.) larvae in chickpea. Proc. Second Int. Workshop on Chickpea Improvement. Patancheru, India. ICRI5AT: 177-179.