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GENETIC ANALYSIS OF RESISTANCE TO LEAF HOPPER (*OROSIUS ALBICINCTUS* DIST.) IN SESAME

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ABSTRACT

Crosses were made in a 9x9 diallel set (excluding reciprocals) involving diverse parents to study the inheritance of resistance to leaf hopper (*Orosius albicinctus* Dist.) in sesame. Combining ability analysis as well as predictability ratio revealed the involvement of both additive and nonadditive gene effects. The parents B-14 and HT-1 had significantly negative gca effects, indicating the possibility of using them as donors of leaf hopper resistance. The crosses B-9 x S-14 and Anand-74 x Sekhar were good specific cross combinations which involved at least one high general combiner.

Key words: Sesame, leaf hopper, resistance, combining ability.

Among the insect pests of sesame, leaf hopper (*Orosius albicinctus* Dist.) is most serious when its numbers become large [1] as it causes significant damage to leaves and also acts as a vector of phyllody virus. Leaf hoppers are more active in summer crop (February–May) and start attacking the plants from seedling stage. The extent of damage varies to a great deal depending on weather conditions and population of alternate hosts. Effective prophylactic measures, although available, are too expensive and hazardous to human health. Thus, the host plant resistance against this pest would be useful for stabilizing yield. Preliminary studies revealed that resistance to leaf hopper did not follow simple Mendelian inheritance suggesting its polygenic nature. However, there is no report in literature on genetic analysis of resistance to leaf hopper in sesame. The present study, therefore aims at understanding the nature of gene action for leaf hopper resistance in sesame.

MATERIALS AND METHODS

Nine diverse genotypes including two highly resistant (B-14 and HT-1), two susceptible (B-67 and Russ-17-4) and five other genotypes (Anand-74, B-9, L-8-6, Sekhar and

S-14), were involved in a dialiel cross. Nine parents and their 36 F_1 hybrids without reciprocals were grown in single row plots each, 2 m long, in randomized block design with three replications. Row-to-row and plant-to-plant distances were 30 cm and 10 cm, respectively. The seeds were sown in the middle of March and leaf hopper started appearing in 20-day-old crop. The pest continued to multiply as no insecticide was applied. At the peak infestation stage (flowering time) intensity of infestation was scored on a 1–5 scale on the basis of damage symptoms on leaves. Leaf blotch and browning of leaves were inspected visually to score insect damage.

Score	Damage	Description
1	None	Plants having very little symptoms in 1-4 leaves
2	Low	Plants having yellowish spots on 5-8 leaves
3	Medium	Plants having damage on 9-12 leaves, browning of leaf margins
4	High	Plants having damage in 13-16 leaves, browning of leaf margin, and cupping of leaves
5	Severe	Plants having damage in almost all leaves, severe cupping of younger leaves, and dry up.

Five plants in each population were scored and were analysed for combining ability of resistance following Method 2, Model 1 of Griffing [2]. The analysis of variance was done on plot basis in a random model.

RESULTS AND DISCUSSION

The initial test of significance showed that the mean indices of resistance of 45 populations (9 parents + 36 F_1s) were significantly different. Mean scores of resistance (Table 1) showed that the parents B-14 and HT-1 and crosses B-9 x S-14, Anand-74 x Sekhar, Anand-74 x B-14, Anand-74 x HT-1, B-9 x B-14, B-9 x HT-1, L-8-6 x HT-1, Sekhar x B-14 and B-14 x HT-1 were highly resistant to leaf hopper than others.

The analysis of variance revealed that both gca and sca variances were highly significant, indicating the importance of both additive and nonadditive gene action in the resistance to leaf hopper. Further partitioning of genetic variance into additive and nonadditive components showed equal importance of both these components of genetic

Table 1. Mean insect scores of parents (in bold) and their hybrids (upper diagonal), sca effects (lower diagonal) and gca effects for leaf hopper resistance in sesame

Parent	Anand-74	B-9	B-67	S-14	L-8-6	Sekhar	B-14	Russ-17-4	HT-1	Gca
Anand-74	**2.17**	2.50	3.50	4.67	2.50	1.67	1.67	4.00	1.83	–0.23**
B-9	0.16	**2.83**	4.00	1.83	2.00	2.17	1.67	3.67	1.83	–0.35**
B-67	0.04	0.66**	**3.83**	4.00	4.33	4.00	3.83	3.83	2.50	0.77**
S-14	1.72	–0.99**	0.05	**1.83**	3.30	3.83	3.67	3.17	3.83	0.26**
L-8-6	0.22	–0.35	0.86**	0.37	**2.50**	2.33	2.00	3.67	1.67	–0.21**
Sekhar	0.93**	–0.31	0.40	0.75**	–0.28	**3.17**	1.83	3.67	2.33	–0.09
B-14	–0.54*	–0.42	0.63**	0.98**	–0.22	–0.51*	**1.83**	4.00	1.50	–0.49**
Russ-17-4	0.55*	0.34	–0.61**	–0.76**	0.21	0.08	0.81**	**3.83**	3.83	0.76**
HT-1	–0.45	–0.32	–0.78**	1.07**	–0.63**	–0.08	0.52*	0.57*	**2.67**	–0.41**

*, **Significant at 5% and 1% levels, respectively.

variance. The predictability ratio (0.49) of Baker [3] also confirmed this suggestion. The gca effects revealed that the parents B-14, HT-1 and B-9 had very high resistance reaction and the parents B-67 and Russ-17-4 had very high and significant susceptible reaction against leaf hopper.

Among the crosses, B-9 x S-14, Anand-74 x Sekhar, B-67 x Russ-17-4, S-14 x Russ-17- 4, L-8-6 x HT-1 exhibited significant sca effect for resistance while the crosses Anand-74 x S-14, B-67 x L-8-6, S-14 x Sekhar, S-14 x B-14 and S-14 x HT-1 exhibited significant sca effect for susceptibility to leaf hopper. However, there was a good association between the mean performance and gca effects of parents and between the mean performance of the crosses and sca effects excepting few cases.

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