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Inheritance Studies of Some Biochemical and Anatomical Traits in *Brassica juncea* (L) Czern & Coss for Aphid Resistance

Ram Dhari and T P Yadava
Department of Plant Breeding, Haryana Agricultural University, Hisar – 125 004 India

One of the main reasons of low production and productivity of mustard (*Brassica Juncea*) in India is non-availability of aphid resistant varieties. Information on the genetics of biochemical and anatomical traits associated with aphid resistance would prove useful in breeding aphid tolerant cultivars. Accordingly, the present study was undertaken to understand the inheritance of such traits.

Two crosses viz. RH 30 xRWH 1 and RH 7859 X RC 1425 were attempted involving two resistance parents (RWH 1 and RC 1425) and two highly susceptible parents (RH 30 and RH 7859). The six generations (P_1, P_2, F_1, F_2, B_1 and B_2) of these crosses were grown in a randomized block design with three replications in two environments viz, normal sown (E_1) and late sown (E_2) during *rabi* 1988-89 at Hisar. In each replication, 2 rows of each P_1, P_2 and F_1, 3 rows of each B_1 and B_2, and 4 rows of F_2 generations were sown. The infector rows of highly susceptible variety BSE 1 (*Brown sarson*) were also grown around the experimental plot to ensure uniform building up of aphid population. Proteins, total and reducing sugar, and total phenols were estimated as per standard methods. The thickness of epidermis and depth of vascular bundles were measured with the help of occular and stage micrometers. The estimation of gene effects were obtained from the generation mean analysis of joint scaling test of Cavalli(1952) and perfect fit solution of Mather and Jinks (1971).

It was noticed that total phenol, depth of vascular bundles and thickness of epidermis has negative correlation, i.e. -0.624, - 0.172, 0.240 respectively, with aphid increase . This is in confirmity with the findings of Malik (1981) and Malik and Annad (1983). The non- significant values for joint scaling test indicated the adequacy of three parameter model for total phenol, and total sugar in the cross RH 7859 x RC 1425 in both the environments for protein content and depth of vascular bundles in the cross RH 30 x RWH 1, for reducing sugar in both the crosses and for thickness of epidermis in RH 30 x RWH 1 in both the environments and in RH 7859xRC 1425 in E_1. The magnitude of additive gene effects were higher in cross RH 7859xRC 1425 in E_1 for total phenol and total sugar while for reducing sugar and thickness of epidermis in both the crosses in both the environments. The same trend was also observed for depth of vascular bundles in cross RH 30xRWH 1 in both the environments. Therefore, it could be concluded that improvement in these crosses for above mentioned characters is easy and could be done by simple selection.

For the crosses where three parameter model was found inadequate, the data were subjected for six parameter model or digenic model. The results revealed that in the cross RH 7859xRC 1425 in E_1 dominance, additive x additive and dominance x dominance types of gene effects controlled the inheritance of protein content (Table 1). Additive x dominance type of interaction was responsible for the inheritance of total phenol in RH 30xRWH 1 in both the environments. The dominance, additive x additive and dominance x dominance gene effects were responsible for the inheritance of total sugars in RH 30xRC 1425, additive, additive x dominance gene effects in E_2 were responsible for the inheritance of thickness of epidermis. Dominance and additive x dominance type of gene effects were controlling the inheritance of depth of vascular bundles in cross RH 7859 x RC 1425 in both the environments.

The present study indicated that the characters in question were under the control of both additive and non-additive genetic components, the former being more improtant. Under such a situation maximum improvement may be expected through conventional breeding procedures which could exploit both additive and non-additive type of genetic com-

Table 1 *Estimates of components of generation means on six parameter model in two crosses of Indian mustard.*

Cross	Env.	(m)	(d)	(h)	(i)	(j)	(l)
Protein (%)							
RH 7859xRC 1425	E_1	45.15± 7.69	0.68±0.82	-54.57** ±18.81	-18.52** ± 7.64	-1.75± 5.02	36.07** ±11.61
Total phenol (%)							
RH 30xRWH1	E_1	3.26± 0.62	0.39±0.39	12.03± 7.76	4.24± 3.16	5.34** ± 2.10	-8.74± 4.70
	E_2	4.98± 0.83	0.35±0.21	0.46± 7.13	-1.24± 2.82	3.90* ± 1.96	-2.48± 4.46
Total sugar (%)							
RH 30xRWH1	E_2	16.06± 0.80	0.39±0.26	-28.96** ±10.71	-10.32* ± 4.79	-1.91± 2.17	18.59** ± 6.07
Thickness of epidermis (μ)							
RH 7859xRC 1425	E_2	126.63±22.89	10.65** ±2.81	38.91±54.39	-2.38±22.71	52.08** ±13.86	44.74±33.28
Depth of vascular bundles (μ)							
RH 7859xRC 1425	E_1	275.76±23.25	0.00±3.13	-74.56** ±17.31	-41.46±23.04	13.14** ± 5.81	26.00±35.78
	E_2	248.01± 3.06	1.78±3.06	8.66* ± 3.42	-19.04±22.81	8.31* ± 3.43	-22.37±34.92

*, ** Significant at 5 and 1 v. respectively Env = Environment

ponents. Breeding procedures involving multiple crosses followed by simple selections hold promise as they utilise simultaneously both types of genetic components.

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