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GENETIC ANALYSIS OF PEARL MILLET CROSS

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ABSTRACT

An investigation was carried out to study the inheritance of seven metric traits in a pearlmillet cross. The study revealed the presence of additive, dominance and dominant x dominant interaction for the traits studied. Duplicate type of epistasis was observed. Recurrent selection followed by pedigree breeding is suggested for improvement of grain yield and component traits.

Key words: Gene effects, scaling test, metric traits.

Pearlmillet is important food and fodder crop of the semi-arid and tropical areas. Information on the genetic systems controlling metric traits is important for planning effective selection programmes. Such studies were reported in this crop with different sets of parents [1–3].

The material consisted of two inbreds, viz., Pt 3832 and ICMPES 11. Six generations (parents, F_1, F_2, BC_1 and BC_2) were grown in randomized block design with three replications. The parents, F_1, and backcrosses were sown in one row each and F_2 in 10 rows in each replication. The row length was 4 m and spacing between rows and plants 45 and 15 cm, respectively. The total number of plants raised in each replication was 26 in parents, F_1, and backcross generations, and 260 in F_2. Observations for seven metric traits were recorded on 10 random plants of each parent and F_1; 20 plants from each backcross; and 75 plants from the F_2 population.

Various gene effects, viz., additive (d), dominance (h), additive x additive (i), additive x dominance (j), and dominance x dominance (l), for different quantitative traits estimated as suggested by Mather and Jinks [4] are presented in Table 1.

The additive–dominance model was adequate for plant height since all the scales were nonsignificant. However, for all other traits digenic–epistatic model was applied as the scales are significant. The additive effect (d) was significant for plant height, earhead breadth, and grain yield. The dominance effect (h) was highly significant for grain yield. Therefore, both additive and dominance effects were important for governing the yield and its component traits. Similar findings were reported earlier [5, 6]. Among the interacting components, additive x additive (i) and additive x dominance (j) interactions were operating only for grain yield. Since (h) and (l) effects had opposite signs for most of the traits, duplicate type interaction was assumed for these traits. Additive, dominance and all the three epistatic interaction components seem to be governing grain yield and its component traits. Recurrent selection followed by pedigree breeding is suggested to fix superior genotypes. Biparental mating or selective diallel mating system should also be effective in improvement of these traits.

Table 1. Estimates of genetic components based on generation mean in pearl millet

Character	Scales			Genetic Parameters						Type of epistasis
	A	B	C	m	d	h	i	j	l	
Plant height	−7.2 ± 9.7	−7.5 ± 9.6	−21.3 ± 16.3	118.9 ± 15.2*	15.7 ± 3.4*	47.8 ± 38.6	—	—	—	—
No. of tillers	0.1 ± 0.5	−0.9 ± 0.4*	−0.6 ± 0.8	2.1 ± 0.8*	0.2 ± 0.1	−0.7 ± 1.9	0.3 ± 0.8	1.0 ± 0.6	1.1 ± 1.2	Duplicate
Leaf length	−8.8 ± 3.9*	−4.1 ± 4.1	−14.0 ± 7.5*	46.7 ± 7.3*	1.8 ± 1.3	−3.1 ± 17.7	1.1 ± 7.1	−4.8 ± 4.9	11.9 ± 11.2	Duplicate
Leaf breadth	−0.8 ± 0.3*	−0.6 ± 0.2*	−1.7 ± 0.5*	2.1 ± 1.5	0.0 ± 0.1	−0.5 ± 1.2	0.3 ± 0.5	−0.2 ± 0.4	1.1 ± 0.8	Duplicate
Earhead length	−5.5 ± 2.2*	−4.5 ± 1.9*	−12.9 ± 3.5*	17.1 ± 3.0*	1.0 ± 0.6	1.6 ± 7.7	3.0 ± 2.9	−1.0 ± 2.4	7.0 ± 5.3	Complementary
Earhead breadth	0.9 ± 0.2*	−0.5 ± 0.2*	−1.6 ± 0.3*	1.5 ± 0.3*	0.2 ± 0.1*	−0.8 ± 0.7	0.1 ± 0.3	−0.3 ± 0.2	1.3 ± 0.5*	Duplicate
Grain yield	1.4 ± 1.4	4.7 ± 1.3*	−21.3 ± 2.8*	3.1 ± 2.5	4.8 ± 0.3*	68.0 ± 6.0*	27.4 ± 2.5*	−3.3 ± 1.4*	−33.5 ± 3.9*	Duplicate

*Significant at 5% level.

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