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COMBINING ABILITY FOR SEED YIELD AND ITS COMPONENTS IN PEARL MILLET

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ABSTRACT

Combining ability analysis of a nine-parent diallel in pearl millet for yield and its components showed that they were governed by nonadditive gene action. Parents 78/621, R-75-208-2 and 77/165-6 were good general combiners for seed yield. The crosses, PYS-7 × 77/40-5, 78/621 × 77/40-5, and PYS-7 × R-75-208-2 were productive.

Key words: Pearl millet, general combining ability, specific combining ability, heterosis.

High per se performance of parents is not necessarily an indication of their general combining ability. After selecting parents on the basis of their genetic diversity, it is necessary to test their F_1 for components of combining ability for various traits needing improvement. This study reports results of diallel F_1 using nine elite and diverse inbred lines in pearl millet (*Pennisetum typhoides* (B) S & H).

MATERIALS AND METHODS

Nine inbreds, PYS-7, 78/850, 964/2-1, 75-682-1-3, R-75-208-2, 78/621, R-75-915-3, 77/165-6, and 77/40-5, were diallel mated; the 36 F_1 and 9 inbreds were sown in single-row plots of 3 m length with 45 × 15 cm spacing. Number of tillers and ears/plant, ear girth, ear length, seed yield/plant, and 1000-seed weight were recorded on 5-plant samples. Combining ability analysis was done following Method 2, Model I of Griffing [1]. Heterosis over better parent was calculated.

RESULTS AND DISCUSSION

The mean squares due to gca and sca were highly significant (Table 1), indicating the importance of both additive and nonadditive gene action (see also [2]).

Only two parents, 78/621 and 77/165-6, were good general combiners for seed yield; however, the inbred R-75-208-2 was a good general combiner for tillers and ears/plant. The other parents had good gca mostly for one character.

Only five crosses had positive and significant sca for seed yield. Out of these, crosses PYS-7 × R-75-915-3, PYS-7 × 77/40-5 and 78/621 × 77/40-5 had positive and significant heterosis (Table 2).

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Table 1. Combining ability analysis for yield and its components in pearl millet

Source of variation	d.f.	F test					
		tillers per plant	ears per plant	ear girth	ear length	seed yield per plant	1000-seed weight
gca	8	*	*	NS	*	*	*
sca	36	*	*	*	*	*	*
Error	88	0.43	0.19	0.19	2.90	83.94	0.31
$1/8\Sigma_i g_i^2$		0.06	0.03	0.01	0.30	15.19	0.08
$1/36\sum_i\sum_j s_{ij}^2$		0.61	0.37	0.23	1.77	151.22	0.88

*Significant at 5% level, NS—nonsignificant.

Very few parents had significant gca effects; none had them for more than two characters. In general, high per se performance did not always have desirable and significant gca. However, most crosses with high per se performance also had high sca effects [3]. In most crosses, one or both parents had good or average gca with high sca. Supporting evidence could be found for this observation in the literature [2, 4].

Thus, specific crosses like 78/621 × 77/165-6, PYS-7 × 77/40-5, and PYS-7 × R-75-208-2 can be pooled into a composite population and random mating allowed for a few generations to develop a high yielding composite for commercial cultivation.

Table 2. Heterosis values of hybrids showing heterosis for yield

Cross	Heterosis (%)			
	ear girth	ear length	seed yield	1000-seed weight
PYS-7 × R-75-208-2	6*	@	27*	@
PYS-7 × R-75-915-3	0	4	32*	@
PYS-7 × 77/40-5	3*	13*	53*	7*
78/850 × 78/621	@	@	27*	8*
R-75-208-2 × 77/40-5	@	@	28*	@
78/621 × 77/40-5	2*	16*	28*	14*

Only negative heterosis was recorded for number of tillers and ears/plant; @ negative value.
*Significant at 5% level.

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