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INHERITANCE OF YIELD AND IT'S COMPONENTS IN SPRING WHEAT

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Parental, F1 and F2 genera tion of three crosses involving Isogenic lines of spring wheat were studied for number of tillers per plant, spike length, number of spikelets per spike, number of grains per spike, lOOO-grain weight and grain yield per plant. Additive as well as non-additive gene effects prevailed for inheritance of the characters studied .

INTRODUCTION

The genetic study of various physical components of yield such as number of tillers per plant, spike length, number of spikelets per spike, number of grains per spike, lOOO-grain weight and grain yield per plant has been the focus of most wheat breeders in orders to select desirable cross combinations. The effective selection depends upon the information on the genetic basis of these characters. Although studies have been reported (Chaprnan and McNeal 1971, Khan and Chowdhry 1979, Srivastava et al. 1981, Nanda et al. 1982, Pinthus and Levy 1984, etc.), in which the parental materials involved were different varieties, no attempts have been made to use Isogenic lines to study the inheritance of these characters. Genetic information concerning the nature of gene action for the above mentioned characters will be a valuable tool for breeding better cult ivars of wheat.

MATERIALS AND METHODS

The experimental material comprised three crosses of Isogenic lines (Isogenic line I i,e. tall, Isogenic line 11 i.e. semi-

dwarf and Isogenic line II (i.e. dwarf) with a dwarf variety, olsen dwarf. The experiment was conducted at the experimental area of the Department of Plant Breeding and Genetics, University of Agriculture, Faisalabad during the year 1985-86. Parental, F1 and F2 generations of the crosses were space planted using randomized complete block design of layout with three replications. At maturity 240 plants from each F2 population and 24 plants from each of F1 and the parents were selected at random. Data were recorded about number of tillers per plant, spike length, number of spikelets per spike, number of grains per spike, 1000-grain weight and grain yield per plant for the selected plants.

The analysis of variance was run as given by Steel and Torrie (1980). Means and standard deviations of parents, F1 and F2 were computed for the traits under study to investigate the gene action.

RESULTS AND DISCUSSION

The analysis of variance (Table 1) indicated highly significant differences among generations for various characters except for the number of grains per spike.

The data given in Table 2 about number of tillers per plant indicate that in the cross Isogenic line II x Olsen dwarf the mean of F1 hybrid was less than the mid parent showing thereby partial dominance for low tillering capacity. While in the other two crosses F1 hybrid means were greater than the respective mid parents indicating partial dominance for greater number of tillers per plant. In all the crosses the mean of F2 population was nearly intermediate between the parental extremes showing additive gene action for this trait as reported by Srivastava *et al.* (1981).

The data about spike length in Table 2 show that in the cross Isogenic line I x Olsen dwarf the value of F1 hybrid was less than the mid parent showing partial dominance of smaller spike while in other two crosses F1 hybrids were greater than their respective mid parents showing partial dominance of longer spike. In all the crosses the mean of F2 population was nearly

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Table [illegible] and [illegible]

Cross	Population	Number of tillers per plant		Spike length		Number of spikelets per spike		100-grain weight		Yield per plant	
		$\bar{x}$	S.E.	$\bar{x}$	S.E.	$\bar{x}$	S.E.	$\bar{x}$	S.E.	$\bar{x}$	S.E.
[illegible] line I × [illegible]	P_1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	P_2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	F_1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	F_2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] line II × [illegible]	P_1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	P_2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	F_1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	F_2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] line III × [illegible]	P_1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	P_2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	F_1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	F_2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

intermediate between the parental extremes indicating additive gene effects. Similar results have been reported by Nanda et al. (1982).

The data about number of spikelets per spike in Table 2 indicate that all the F 1 hybrids exceed the mid parents exhibiting partial dominance for higher number of spikelets per spike. Mean values of F2 population in the crosses Isogenic line I x Olsen dwarf and Isogenic line III x Olsen dwarf were intermediate between the parental extremes showing additive type of gene action. Chapman and McNeal (1971) also recorded similar findings. While in the cross Isogenic line 11 x Olsen dwarf the F2 population mean was greater than the better parent showing tile presence of overdominance for higher number of spikelets per spike.

The data reported in Table 2 about lOOO-grain weight shows that in the cross Isogenic line I x Olsen dwarf and Isogenic line III x Olsen dwarf the F hybrid mean was nearly equal to the better parent indicating the complete dominance of heavier grain while in the cross Isogenic line 11 x Olsen dwarf the hybrid mean was equal to mid parent showing additive gene action . Moreover, F2 population mean was between the parental extremes in all the crosses showing additive gene action as observed by Chapman and McNeal (1971).

Table 2 shows about grain yield per plant that in two crosses Isogenic line I x Olsen dwarf and Isogenic line III x Olsen dwarf the F 1 hybrid exceed the better parent showing complete dominance for high grain yield per plant. While in the other cross Isogenic line 11 x Olsen dwarf F 1 hybrid exceed the mid parent expressing partial dominance for enhanced grain yield per plant. In the cross Isogenic line I x Olsen dwarf the F2 poplation was nearly intermediate between the parental extremes revealing additive gene action as reported earlier by Nanda et al. (1982). In the crosses Isogenic line 11 x Olsen dwarf and Isogenic line 11 x Olsen dwarf the mean value of F2 population was greater than the better parent indicating overdominance pattern of inheritance for high grain yield per plant.

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