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ANALYSIS OF VARIETY DIALLEL CROSS FOR YIELD AND ITS COMPONENTS IN WINTER MAIZE (*ZEA MAYS* L.)

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ABSTRACT

A 6 × 6 variety diallel cross without reciprocals in rabi maize revealed variances due to varieties (Vi), heterosis (hij) and its components were significant for all the characters studied. Parents CM-501, Harsha and Navjot had good varietal effect for earliness while parent Navjot and Laposta were good for grain yield, 100 grain weight, cob girth and cob length. Good varietal effect was also revealed by parent pool 16 for all the characters except days to silk and grain yield. Crosses Pool 16 × CM-501, Pool 16 × Laposta, Pool 16 × Harsha and Laposta × Tuxpeno squia C_8 were identified as promising for possible use in developing broad base genetic population.

Key Words : Variety cross diallel, yield components, winter maize

In maize studies through variety diallel cross model [1] provide useful information for the selection of parents based on hybrid performance and elucidate the nature and magnitude of various type of gene action involved in the expression of quantitative trait. The objectives of the present study were to workout estimates of genetic parameters from a 6 × 6 variety diallel cross for yield and its attributes so as to use this information in developing high yielding maize populations. Such information is available in *kharif* maize, but it is scanty in *rabi* maize.

MATERIALS AND METHODS

A half diallel set (excluding reciprocals) along with six parents viz. Pool 16, Laposta, Tuxpeno squia C_8, CM-501, Harsha, and Navjot was planted in randomized block design with three replications in rabi, 1990-91 under normal irrigation. The row and plant spacing were maintained at 60 and 25 cm respectively, with a plot size of 12 m^2 per entry. Observations on ten randomly selected plants were recorded for cob length, cob girth, number of rows/ear, number of grains/row and 100 grain weight, where as observations on grain yield and days to 50 per cent silk were recorded as plot basis. The data were analysed following analysis II of Gardner and Eberhart [1] as given by Singh [2].

RESULTS AND DISCUSSION

Analysis of variance as per analysis II of Gardner and Eberhart [1] (Table 1) revealed that the variance due to varieties (Vi) and heterosis (hij) were significant for all the characters studied.

Table 1. Analysis of variance for variety diallel cross analysis II (Gardner and Eberhart, 1966) in winter maize

Source	d.f.	Mean squares						
		Days to 50% silk	Cob length	Cob girth	No. of grain/row	100 grain wt.	Grain yield	No. of row/ear
Replication	2	8.78**	0.609**	0.446**	1.159**	0.113**	2.674**	12.291**
Varieties (vi)	5	7.88**	2.568**	1.020**	35.461**	13.763**	1.400**	5.615**
heterosis (hij)	15	2.73**	1.958**	2.227**	19.945**	13.172**	2.0022	2.491**
Average ($\bar{h}$)	1	2.26**	1.020**	2.630**	48.576**	0.004	6.344**	3.913**
Variety (hi)	5	2.86**	1.710**	4.475**	27.483**	12.072**	1.599**	2.859**
Specific (Sij) heterosis	9	2.71**	2.190**	0.933**	12.575**	15.245**	1.776**	2.128**
Error	40	0.73	0.202	0.66	0.942	0.371	0.443	0.402

**Significant at 1% level of significance

A persual of estimates of genetic constants (Table 2) indicated that varietal effects (Vi) were desirable and significant in pool 16 for number of rows per ear,

Table 2. Estimates of genetic constants from a variety diallel cross in winter maize

Character variety	Days to silk		Cob length		Cob girth		No. of grains/row		100 grain weight		Grain yield		No. of rows ear	
	Vi	hi	Vi	hi	Vi	hi	Vi	hi	Vi	hi	Vi	hi	Vi	hi
Pool 16	1.38	-0.23	-1.37**	1.80**	-1.22**	2.16**	-0.50	4.00**	-5.82**	2.90**	1.27	-0.49	1.67**	-1.44**
Laposta	1.38	0.37	0.46	-8.81**	-2.45**	1.25**	0.83	0.42	-1.38**	0.03	-1.33	1.27**	-0.33	-0.94
Tuxpeno squia C_8	0.72	0.56	-0.81	0.28	0.62**	0.65**	1.17**	-6.67**	0.82	-2.98**	-0.66	0.09	1.67**	1.39**
CM-501	2.05**	-0.70	1.99**	0.05	0.62**	-0.39**	3.83**	-0.00	6.65**	-2.80**	-0.83	0.48	-2.33**	-1.06**
Harsha	-1.62**	0.86	0.03	0.09	0.62**	-0.29*	-0.17	2.83**	-1.45**	2.09**	0.11	0.77	-0.33	0.78
Navjot	-1.62**	-0.13	-0.31	-0.83**	1.82**	-2.07**	-5.17**	0.25	1.18**	0.81	1.44**	-1.15**	-0.33	0.72

**Significant at 1% level of significance

Tuxpeno squia C_8 for cob girth, number of grains per row and number of rows per ear, CM-501 for cob length, cob girth, number of grains per row and 100-grain weight, Harsha for days to 50 percent silk, cob girth and Navjot for days to 50 percent silk, cob girth, 100 grain weight and grain yield.

The heterotic effect was positive and significant in pool 16 for cob length, cob girth, number of grains per row and 100 grain weight, Laposta for cob girth and grain yield, Tuxpeno squia C_8 and CM-501 only for number of rows per ear and Harsha for number of grains per row.

The significant specific heterotic effects were revealed by the crosses Tuxpeno squia C_8 × Navjot (1.98) followed by Pool 16 × Harsha (1.80) for grain yield. For yield components, significant specific heterotic effect was maximum in the crosses Tuxpeno squia C_8 × Harsha (6.49) for 100 grain weight, followed by Laposta × CM-501 (5.55) and Harsha × Navjot (3.50), for number of grains per row, Laposta × CM-501 (2.85) and pool 16 × taxpena sequia C_8 (0.98), for cob length, Pool 16 × CM-501 (1.43) and Tuxpeno squia C_8 × Harsha (1.43). The promising cross combinations with high *per se* performance and involving one parent having desirable varietal effect for grain yield and most of yield component characters were Pool 16 × CM-501, Pool 16 × Tuxpeno squia C_8 and Laposta × CM-501, these varietal crosses may be used to develop broad genetic base populations.

REFERENCES

1. C. O. Gardner and S. A. Eberhart. 1966. Analysis and interpretation of the variety cross diallel and related populations. Biometrics., **22**: 439-52.
2. D. Singh. 1978. On the variety cross diallel analysis of Gardner and Eberhart. Indian J. Genet., **38**: 115-118.