The pooled mean squares for combining ability indicated that both GCA and SCA variances were highly significant for all of the traits, with GCA being greater than SCA. Both GCA and SCA were influenced by environment in the case of all traits, with the exception of SCA for grain yield, plant height and ear placement. Parents P1, P2, P3 and P9 were identified as good sources for *turcicum* resistance based on GCA effect. P10 proved an ideal general combiner for all traits followed by P1 and P9. Cross combinations P7 x P9 and P3 x P9 showed resistance to the disease and good performance for other traits, based on the SCA. In general, crosses having at least one parent with negative GCA effect and a resistant reaction showed resistance; however, crosses of most resistant parents gave intermediate to susceptible reactions.

Studies on genetic variability, genotypic correlation and path coefficient analysis in maize under the high altitude temperate conditions of Kashmir

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A number of studies in maize have been conducted to elucidate the nature of association between yield and its components which identify traits like ear length, ear diameter, kernels/row, ears/plant, 100-seed weight and rows/ear as potential selection criteria in breeding programs aimed at increasing yield (Mohan et al., Natl. J. Plant Improve. 4(1):75-76, 2002; Tollenaar et al., Crop Sci. 44:2086-2094, 2004). Hence, an attempt was made to ascertain the influence of different characters on the improvement of grain yield in 3 local and 7 CIMMYT inbred line crosses of maize under the high altitude temperate conditions of Kashmir (7500 ft asl).

The present half diallel material was generated in Kharif 2006 by crossing the inbred lines in all possible combinations, except reciprocals, at the High Altitude Maize Research Station, Larnoo of Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir, J&K (India). The parental lines and all forty-five crosses were evaluated at two diverse locations with temperate conditions, namely Larnoo and Khudwani, representing distinct climatic zones during Kharif 2007. All 55 genotypes were replicated twice at each location in CRBD. Each entry was given a plot size of three rows of 3 m length, with row and plant spacing of 60 and 25 cm, respectively. Recommended practices were followed to ensure a good crop. Maturity parameters (days to 50% pollen shed and silking, 75% husk browning), grain weight and straw weight were recorded on a plot basis. For the other 12 traits under study, data were recorded on five randomly selected competitive plants from each replication. The data were statistically analysed for correlation coefficients and path analysis as per the methods of Al-Jibouri et al. (Agron. J. 50:633-637, 1958) and Dewey and Lu (Agron. J. 51:515-518, 1959), respectively.

The analysis of variability parameters revealed the presence of substantial variability for all traits. Relatively higher estimates of GCV for straw weight, grain weight, plant height, ear placement, kernel rows/ear and number of kernels/row along with high heritability (broad sense) suggest that selection can be effective for these traits. Genetic advance was relatively higher for plant height, ear placement and number of kernels/row. The genotypic correlation coefficients revealed positive and significant association with ear length, ear girth, kernel rows/ear, kernels/row, straw weight, plant height and ear placement. The maturity traits recorded significant negative correlation with yield. The path analysis revealed that the traits with the highest direct effect on grain yield are number of kernels/row, ear length, ear girth and kernel rows/ear. Thus, these traits should be used as target traits for tailoring an ideal plant type for higher yield. Other traits exerted positive indirect effects on yield by affecting ear length, ear girth and ear placement (Table 1).

Table 1. Genotypic path coefficients for grain yield and component traits in maize.

Trait	Days to 50% pollen shed	Days to 50% silking	Husk browning	Plant height (cm)	Ear placement (cm)	Moisture content (%)	Ear length (cm)	Ear girth (cm)	Kernal rows/ear	Kernels/row	Straw weight	Correlation with grain yield/plot
Days to 50% pollen shed	**0.348**	0.163	-0.053	-0.036	-0.22	0.009	0.214	0.126	0.013	-0.212	0.002	-0.342
Days to 50% silking	0.157	**-0.361**	0.052	-0.041	0.280	0.011	-0.072	0.166	0.014	-0.262	0.002	-0.445*
Plant height (cm)	0.196	-0.157	**-0.219**	-0.111	-0.432*	0.013	0.258	0.180	0.025	-0.276	0.035	-0.520*
Ear placement (cm)	0.068	-0.174	-0.074	**-0.086**	0.004	0.002	0.515*	0.338	0.029	-0.555*	0.954	0.886**
Moisture content (%)	0.285	-0.213	-0.076	-0.083	**0.287**	-0.001	0.483	0.314	0.095	-0.520*	0.304	0.875**
Straw weight/plot (kg)	0.042	-0.110	-0.040	-0.004	-0.060	**0.038**	0.195	0.027	0.001	-0.145	0.001	0.008
Days to 75% husk browning	0.056	-0.170	-0.049	-0.070	0.756**	0.011	**0.630****	0.300	0.024	-0.630**	0.004	0.730**
Ear length (cm)	0.052	-0.153	-0.055	-0.074	0.790**	0.002	0.483	**0.392**	0.026	-0.519*	0.003	0.809**
Ear girth (cm)	0.035	-0.079	-0.045	-0.038	0.065	0.000	0.235	0.157	**0.387**	-0.264	0.001	0.384
Kernal rows/ear	0.052	-0.141	-0.049	-0.071	0.767**	0.008	-0.670**	0.304	0.026	**0.593***	0.004	0.69**
Kernels/row	0.056	-0.128	-0.068	-0.058	0.766**	0.010	0.407	0.243	0.107	0.447	**0.006**	0.714**

*, ** Significant at 5% and 1% levels, respectively; R^2 value: 0.841; residual effect: 0.397; diagonal values = direct effect.