Genetic Architecture for Sex Expression and Qualitative and Quantitative Characters in Castor *(Ricinus communis* L.) Under Different Environments

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Investigation were carried out on sex expression and maintenance studies of five castor females viz., VP1, Geeta, SKP 35, SKP 52 and SKP 93 under high and low temperature conditions and on heterosis and combining ability and nature and gene action analysis for qualitative and quantitative traits involving nine castor genotypes, 36 F_1's and 36 F_1's under irrigated and rainfed conditions at Main Castor Research Station, Gujarat Agricultural University, Sardar Krushinagar during *kharif*, 1995-'96.

The result indicated that to obtain maximum female plants, female lines should be maintained through environmental sensitive staminate (ESSF) pollinators and by selfing of late reverted plants. This will be helpful for increasing hybrid seeds with high genetic purity. The reversion in females upto 4th order (32.5°C temperature) was under limit. Therefore to get high genetic purity of hybrid seed, spikes upto 4th order should be harvested. The maintenance of S-type female is accomplished in male promoting environment *(summer)* whereas, hybrid programme in female promoting environment *(winter)*. The maximum heterosis was accomplished in cross TMV 5 x SKI 119 (44.59) under irrigated and heterobeltiosis in cross TMV 5 x SKI 119 (44.59) over both the environments. Parents SPS 43-3, SKI 22 and 48-1 under irrigated and VI 9, SKI 119 and 48-1 under rainfed conditions showed good GCA effect and *per se* performance for yield and its components. The crosses SKI 22 x TMV 5, 48-1 x SKI 119 and SKI 107 x SPS 43-3 under irrigated and SKI 22 x SPS 43-3, SKI $F_2$22 x TMV 5 and SKI 22 x SKI 119 under rainfed conditions exhibited high heterosis and SCA effect. Crosses with high heterotic effect for yield and its components showed high inbreeding depression under both the conditions and thus heterosis was mainly due to non-additive gene action.

Estimate of KD/KR ratios along with D and H components revealed that additive as well as non-additive gene action was involved in the inheritance of most of the traits with predominant role of non-additive gene action under both the conditions. Under these conditions, biparental meeting and reciprocal recurrent selection offer promise. Alternate intermating and selfing showing transgressive segregation would be helpful in isolating superior genotypes. The graphical analysis revealed that both partial and overdominance were important for yield and its components. Estimates of heritability were high to moderate for most of the traits which were moderately influenced by environmental factors.

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