Abstracts of Ph.D. Thesis

Physiological Basis of Heterosis in Sorghum (*Sorghum bicolor* (L.) Moench)

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The present investigations on physiological basis of heterosis in sorghum were carried out during kharif and summer 1985 at College Farm, N.M. College of Agriculture, Gujarat Agricultural University, Navsari.

The results suggested that more emphasis should be given to the pattern of translocation of photosynthates and nutrients. The data on dry matter accumulation and its partitioning into different plant parts indicated that the hybrids produced more dry matter during their life period indicating their higher translocation ability. These seem to be due to efficient mobilization of photosynthates and major nutrients as indicated from partitioning of total photosynthates in different plant parts and nutrient uptake studies. Data of growth and developmental traits also depicted that the hybrids adjusted their growth and formed an efficient photosynthetic size and plant skeleton as a whole that produced higher amount of dry matter and also efficiently mobilize to the fruiting parts. This was evidence from the values of leaf area, leaf area duration. leaf area index, relative growth rate and net assimilation rate. Significant positive heterotic effects for all these traits revealed that the hybrids utilized their vigour to increase the yield potentiality which was proved by significantly higher harvest index.

Multiple regression results suggested that relative growth rate (RGR) and leaf area index (LAI) contributed significantly more to grain yield, while the contribution of other characters was less.

All the yield contributing characters viz., panicle length, panicle width, panicle weight, primaries per panicle, grains per panicle and 1000 grain weight also contributed significantly to build up higher yield of the hybrids.

The results on nutrient uptake also revealed that hybrids uptook maximum amount of N, P and K. The data on protein content in grain indicated that the seeds of the hybrids contained higher percentage of nitrogen and proved their better mobilization efficiency than their parents.

As regards to seasonal effects, the heterotic effects for most of the characters in all the three hybrids were more pronounced in kharif as compared to summer. Among hybrids, 2077A x M.74 exhibited maximum heterotic effects for most of the characters in both the seasons.

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