

GENETIC DIVERGENCE ANALYSIS IN SORGHUM [SORGHUM BICOLOR (L.) MOENCH]

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ABSTRACT

Genetic divergence among twenty four sorghum genotypes was assessed using Mahalanobis D^2 statistic. The genotypes were grouped in to eight clusters, which revealed wide diversity in the experimental material. Harvest index contributed maximum towards genetic divergence. The maximum inter cluster distance was observed between clusters VII and VIII followed by clusters II and VIII, clusters II and VI. The high diverse clusters could serve as potential sources of the accessions for their use in hybridization programme.

Key words: Genetic divergence, Cluster analysis, Diversity, Sorghum.

INTRODUCTION

Sorghum [*Sorghum bicolor* (L.) Moench] is the 5th most important cereal crop grown in the world. In India, it occupies 3rd place among the food grains after rice and wheat. Rainy season sorghum grain is used primarily for human consumption. Sorghum has great potential to supplement fodder resources in India because of its wide adoption, rapid growth, and high green fodder yield with high drought tolerance. Since green revolution, over decades, hybridization has boosted the yield levels of sorghum, besides improving other characters like resistance to biotic and abiotic stresses that poses serious problem for its successful cultivation. Assessment of genetic diversity therefore becomes a prerequisite for identifying potential parents for hybridization. Diverse parents are expected to yield higher heterotic effects. Therefore, Mahalanobis D^2 statistic has been used as an effective tool in quantifying the degree of genetic divergence, determining variability and deciding breeding strategy for the crop in various studies. In this contest, an attempt was made to study genetic diversity in sorghum.

MATERIALS AND METHODS

The experimental material comprised of 20 F_5 families obtained from Sorghum Research

Station, Marathwada Krishi Vidyapeeth, Parbhani along with commercial varieties PVK 809, 296 B, GMRP 9 and commercial hybrid CSH 16 as checks and were grown in a randomized block design with three replications during *kharif* 2008 at the Experimental Farm, Department of Agril.Botany, College of Agriculture, Latur. Each genotype was raised in 6 m row spaced at 45 cm between rows and 15 cm within row. Observations were recorded on randomly selected five plants for ten characters *viz.*, days to 50% flowering, days to maturity, panicle length (cm), panicle width (cm), plant height (cm), number of primary branches/ panicle, number of grains/ panicle, test weight (g), harvest index (%) and grain yield/ panicle (g). The analysis of variance was carried out for all the characters individually. The data were subjected to statistical analysis as per D^2 statistic proposed by Mahalanobis (1936) and as described by Rao (1952). Genotypes were grouped in to different clusters suggested by Tocher (Rao, 1952) and intra and inter cluster distances were calculated as per Singh and Chaudhary (1977).

RESULTS AND DISCUSSION

Analysis of variance revealed significant differences among the genotypes for all the ten characters studied indicating sufficient scope for

TABLE 3: Per cent contribution of the characters towards divergence in Sorghum.

Characters	Contribution (%)
Days to 50% flowering	1.449
Days to maturity	0.000
Panicle length (cm)	3.261
Panicle width (cm)	6.884
Plant height (cm)	12.681
Number of primary branches/ panicle	10.507
Number of grains/ panicle	5.797
Test weight (g)	5.435
Harvest index (%)	42.391
Grain yield/ panicle (g)	11.594
Total	100.000

maximum cluster mean values for panicle length, panicle width, number of primary branches/ panicle, number of grains/ panicle, test weight, harvest index and grain yield / panicle and cluster VIII for days to 50% flowering and days to maturity.

The results indicate that the inclusion of genotypes grouped in cluster VII (CSH 16), VIII (296 B), II (PVK 1107, PVK 1109) and VI (PVK 1106, PVK 1108) with high inter cluster distances in the *kharif* sorghum hybridization programme are expected to give promising recombinants.

TABLE 4: Cluster mean values for ten characters in Sorghum.

Cluster	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	X ₁₀
I	78.50	120.67	28.02	7.21	252.50	67.12	2626.00	23.70	43.28	69.35
II	82.83	124.67	29.08	7.88	233.17	76.61	3237.83	28.38	49.18	82.68
III	73.33	114.14	23.08	5.36	219.19	56.34	2235.52	22.63	31.04	53.78
IV	81.00	120.33	19.50	4.79	183.17	46.15	1858.50	24.00	22.67	42.62
V	75.50	117.17	28.12	8.02	235.83	72.91	3256.33	26.61	46.71	81.82
VI	68.33	109.17	19.00	3.87	152.00	55.05	1848.67	20.32	19.46	42.02
VII	65.33	105.00	32.47	8.04	175.00	83.60	3625.33	31.30	55.13	89.93
VIII	86.00	126.00	18.10	3.46	147.33	53.73	1446.33	14.80	16.06	20.50

Where,

X₁ = Days to 50% flowering, X₂ = Days to maturity, X₃ = Panicle length (cm),

X₄ = Panicle width (cm), X₅ = Plant height (cm), X₆ = Number of primary branches/ panicle,

X₇ = Number of grains/ panicle, X₈ = Test weight (g), X₉ = Harvest index (%)

X₁₀ = Grain yield/ panicle (g).

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