

Research
Paper

Combining ability analysis for green fodder yield and quality attributes in sorghum [*Sorghum bicolor* (L.) Moench] over environments

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ABSTRACT

Sorghum is one of the most important food and fodder crop of dry land agriculture. In order to make forage sorghum as an enterprising and remunerative crop, there is urgent need to develop varieties and hybrids having early maturity, fast growth habit and higher yield coupled with high protein content and safe limit of toxic constituents like HCN for animal. Combining ability analysis is a powerful tool to discriminate good as well as poor combiners and choose appropriate parental material in breeding programme. Combining ability for green fodder yield and quality attributes was studied using three male sterile lines, sixteen male parents and 48 hybrids in RBD with three replications in three environments created by different dates of sowing. Highly significant mean squares for males and females indicated the presence of sufficient variability in the parental material. The ratio of general combining ability to specific combining ability variance indicated the non additive gene action. Parent showed difference in their combining ability effects for same traits under different environments. Indore 9A from female and PB 22, ASF 7, PB 181 and PB 45 from male parents were identified as good combiner for green fodder yield per plant, dry matter yield per plant and majority of yield components. Estimates of specific combining ability effects did not reveal any specific pattern but varied from cross to cross in individual environment. The pooled data showed that Indore 9A x PB 22, 3660 A x Sholapari, 3660 A x PB 45 exhibited positive and significant *sca* effect for green fodder yield per plant and majority of its components in overall environmental conditions. On the basis of *gca* : *sca* ratio preponderance of non-additive gene action for green fodder per plant suggested heterosis breeding programme could be useful for developing superior genotype/hybrids.

Patel, K.V. and Patel, A.D. (2010). Combining ability analysis for green fodder yield and quality attributes in sorghum [*Sorghum bicolor* (L.) Moench] over environments, *Adv. Res. J. Crop Improv.*, **1** (2) : 187-193.

Key words : Sorghum, Combining ability, Environment, Hybrid

INTRODUCTION

Sorghum [*Sorghum bicolor* (L.) Moench] is a major fodder crop among cereal fodder. Green fodder is the cheapest source of feed for milky, meat and draft animals. Therefore, development of fodder resources of the country becomes a high priority national programme. This could be achieved through covering more area under cultivation of high productivity coupled with quality of fodder crop. There is need to improve the crop by identifying good combiner for development of high yielding hybrid. Combining ability analysis is being used in crop plants for identifying the superior parents for obtaining superior hybrid combinations. On the basis *gca/sca* ratio, also help in characterization of nature and magnitude of gene action for various characters of economic

importance.

The concept of general and specific combining ability is an especially useful in testing procedure that involves the study and comparison of the performance of homozygous inbred lines in cross combinations. The knowledge of gene action for characters helps in employing suitable breeding methodology for their improvement. Forage yield is basically a function of many morphological and physiological characters; therefore, breeding for high fodder yield depends on one or more other characters. For improvement of yield basically involved the exploitation of genetic diversity present in population. Development of hybrids provides a good avenue for quicker exploitation of both additive and non-additive genetic variances through such alterations.