RESEARCH PAPER

Studies on gene action and combining ability for yield and its component traits in rice (*Oryza sativa* L.)

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ABSTRACT

Combining ability in rice was studied in a set of 4 lines and 10 testers with their 40 hybrids. The analysis of variance indicated magnitude of gca variances was higher than sca variances for day to 50 per cent flowering, amylose content, protein content and L/B ratio for which predominance of additive gene action and magnitude of sca variance was higher than gca variance for remaining all other characters indicating predominance of non-additive gene action. Componantwise findings indicated that male parents like IET-20528, NVSR-20, GR-103 and GR-12 were good general combiner for yield and yield contributing traits, while female parents like GR-10 and IR-28 have good general combining ability for earliness and yield contributing traits. All the crosses having best specific combination for grain yield per plant were obtained either through average x poor and average x average parental combination.

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Key words : Combining ability, Gene action, Line x tester, Rice, Yield, Yield components

INTRODUCTION

The concept of combining ability plays a significant role in crop improvement, since it helps the breeder to determine the nature of gene action involved in the expression of quantitative characters of economic importance such as plant height, productive tillers per plant, length of the panicle, number of grains per panicle and grain yield per plant and to formulate the breeding procedure. It helps in the identification of best general combiners and specific combiners. Hence, present investigation was undertaken using line x tester analysis to estimate the combining ability for grain yield and yield contributing traits.

MATERIALS AND METHODS

The experimental plant material consisted of four females *viz.*, GR-10, IR-28, Lal kada and safed kada and ten testers *viz.*, GR-12, NVSR-20, IET-20152, IET-20528, IET-20533, IET-20538, IET-20560, IET-20567, GR-103 and IET-19419. They were crossed in line x tester fashion during summer 2007 to obtained 40 F_1 s. All these hybrids along with their parents were evaluated in a Randomized Block Design with three replications during *Kharif*–2008 at National Agricultural Research Project Farm, NAU, Navsari. Each entry was planted in a single row consist of 15 plant in each row with a spacing 20 x 15 cm. The standard agronomical practices were followed to raise

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the experimental crop. Biometrical observations were recorded for ten yield and yield attributing traits *viz.*, days to 50 % flowering, panicles per plant, panicle length, plant height, grains per panicle, grain yield per plant, 1000 grain weight, amylose content, protein content and L/B ratio. Observations were made on five randomly selected competitive plants per replication for 54 genotypes, comprising 40 hybrids and their 14 parents. The estimates of combining ability and variances were worked out according to the method outlined by Kempthorne (1957).

RESULTS AND DISCUSSION

The results obtained from the present investigation alongwith relevant discussion have been presented as under:

Analysis of variance:

The analysis of variance for combining ability (Table 1) revealed that general combining ability (gca) variances for females (s^2f) were significant for days to 50 per cent flowering, panicle length, amylose content and protein content, whereas general combining ability (gca) variances for males (s^2m) were significant for all the characters. On the other hand, specific combining ability (sca) variances for f x m interaction were also significant for all characters. The variance estimates for gca and sca suggested that both additive as well as non-additive gene