

## Combining ability for yield and its components in hybrid rice (*Oryza sativa* L.) utilizing CMS system

RATNAKER PANDAY<sup>1</sup>, S.S. LAL<sup>2</sup> AND D.K. UPADHYAY<sup>1\*</sup>

<sup>1</sup>Department of Genetics and Plant Breeding, N.D. University of Agriculture and Technology, Kumarganj, FAIZABAD (U.P.) INDIA

<sup>2</sup>Department of Genetic and Plant Breeding, Shri Durgaji, P.G. Collage Chandeshwar, AZAMGARH (U.P.) INDIA  
(Accepted : March, 2008)

### SUMMARY

Three lines were crossed with ten testers in a L x T mating design to estimate the combining ability for yield and its component traits in hybrid rice (*Oryza sativa* L.) utilizing CMS system. The high magnitude of sca than gca variances for all the character except number of total tillers per plant and number of panicle bearing tillers per plant, high values of average degree of dominance and lower values of predictability ratio were observed for seven characters out of ten characters indicating significant role of non-addition gene action for these characters. Among testers, NDRK 5026 followed by NDRK 5028 were found good general combiner for most of the characters. Among the 30 hybrids studied PMS 10 A x NDRK 5028, IR 58025 A x Ananda and IR 58025 x Sarjoo 52 exhibited high sca effects for grain yield and biological yield, and PMS 10 A x Jaya, PMS 10 A x NDRK 5028 and PMS 8A x Vikash high sca effects for earliness and dwarfness.

**Key words :** Rice, Combining ability, Gene action, Yield, Yield components.

Many traits of economic importance in rice are quantitatively inherited. The exploitation of genetic variability (additive gene effect) of these traits through hybridization and selection is the primary focus of most Rice improvement programmes. Number of fertile spikelets per panicle, panicle weight, test weight, grain yield and harvest index are important yield components, in view of their positive correlation with pod yield. Hence, there is an urgent need to collect basic information about these traits in order to conceptualize breeding strategies suited to specific conditions. The objective of this study is to determine the combining ability of 13 parents for yield and yield components. The studies envisage to assess general combining ability of parents and specific combining ability of crosses through appropriate biometrical methods.

### MATERIALS AND METHODS

Parents were selected to include varieties and cultures that represent different botanical farms originated from divers geographical locations. Three cytoplasmic male steriles viz. IR 58025 A, PMS 8A and PMS 10A possessing wild abortive (WA) type of cytoplasm were used as female (lines) were crossed with 10 testers viz. Sarjoo 52, NDRK 5026, Narendra 359, Jaya, IR 30, Indrasan, Vikas, NDRK 5028, Ratna and Ananda in a line x tester model during *kharif* 2000. Thirty F<sub>1</sub> hybrids along with their parents were grown in a Randomized Block Design with three replications during *kharif* 2001

at the Student Instructional Farm of Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad (U.P.) At maturity, observations were recorded on five randomly selected plant from each entry in all replications for ten quantitative characters viz, days to 50% flowering, plant height (cm), number of total tillers per plant, number of panicle bearing tillers per plant, number of fertile spikelets per panicle, panicle weight (g), test weight, biological yield (g), grain yield per plant (g) and harvest index (%). The mean values of five observations were subjected to Line x Tester analysis (Kempthorne, 1957) to estimate combining ability effects. Analysis of variance (ANOVA) was performed to test the significance of difference among the genotypes including crosses and parents. If the differences are found significant, line x tester analysis is done. Considering the mean performance and gea effect, the parents were ranked as good or high/poor low combiners.

### RESULTS AND DISCUSSION

The analysis of variance showed significant differences among hybrids for all the characters, while parents exhibited significant mean squares also for all the characters. The interaction effects of hybrids vs parents showed significant difference for all the characters (Table 1).

Analysis of variance for combining ability revealed that variance due to lines was significant for most of the traits except plant height, number of fertile spikelets per

\* Author for correspondence.