

Combining ability studies for yield and yield associated traits in rice (*Oryza sativa* L.) involving Assam rice cultures

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ABSTRACT

The nature of combining ability in rice was studied at Killikulam with 42 rice hybrids derived from seven diverse genotypes including three Assam rice cultures with full diallel mating design. Preponderance of additive gene action was observed for all the eleven characters studied. Based on the *per se* performance and *gca* effects. ARC 15759 and ARC18214 were the best parents for the improvement of yield associated traits besides grain yield. ARC 18023 X ADT 36 and ASD 16 X ARC 15759 may be exploited for heterosis breeding, while ASD 16 X ARC 18214 and ARC 18214 X ADT 43 are suitable for recombination breeding.

Key words : Rice, Combining ability, GCA, Grain yield.

INTRODUCTION

Selection of parents for hybridization assumes greater importance in heterosis breeding programme. The superiority of parents has to be assessed based on GCA of parents and its ability to produce specific combining hybrids. Knowledge on the combining ability of parents and hybrids will facilitate appropriate choice of parents in breeding programme. Additive and non-additive gene action in the parent, estimated through combining ability analysis is useful in determining the possibility for commercial exploitation of heterosis. Thus, the present investigation was aimed to analyze the combining ability of seven locally adopted, diverse genotypes including three Assam rice cultures.

MATERIALS AND METHODS

The experimental material comprised of 42 hybrid progenies derived from seven diverse, rice genotypes *viz.*, IR 64, ASD 16, ARC 18214, ARC 15759, ARC 18023, ADT 43 and ADT 36 through a full-diallel mating system. The hybrids of first filial generation and their respective parents were raised in Randomized Block Design with three replications. Twenty three days old seedlings were transplanted with 20cm inter and 10 cm intra-row spacings. Observations were recorded on five plants selected at random in each entry in each replication (in parents and hybrids) for days to 50 per cent flowering, plant height, panicle length, panicles per plant, grains per panicle, grain yield per plant, spikelet fertility, 1000 grain weight, harvest index, protein content and amylose content. For finding out the crude protein content, the total nitrogen content was estimated by following Micro kjeldhal method (A.O.A.C., 1965) and from which the

crude protein content is calculated. Amylose content was estimated by the method prescribed by Juliano (1971). Analysis for combining ability was done as per Griffings (1956) for method I and model I of diallel mating design.

RESULTS AND DISCUSSION

The analysis of variance for combining ability revealed highly significant differences among the genotypes for all the characters and the variances due to GCA were greater in magnitude than SCA indicating additive gene action for these characters (Table 1).

Preponderance of additive gene action for days to 50 per cent flowering (Bidhan Roy and Mandal, 2001), plant height (Lavanya, 2000), panicle length (Kalita and Upadhaya, 2000), panicles per plant (Padmavathi *et al.*, 1997), grains per panicle (Sharma and Koranne, 1995), grain yield per plant (Meenakshi and Amirthadevarathinam, 1999), spikelet fertility (Munhot *et al.*, 2000), 1000 grain weight (Lavanya, 2000), harvest index (Verma *et al.*, 1995), protein content (Yolanda, 1993), and Amylose content (Kuo and Liu, 1986) has been reported earlier in rice.

High mean value was the main criterion among the breeders for a long time. Gilbert (1958) suggested that parents with good *per se* performance would result in better genotypes. Further, the parents having high *gca* effects could be useful since the *gca* effect is due to additive gene action and is fixable. Hence the parents were evaluated based on *per se* performance and *gca* effects (Table 2).

ADT 43 and IR 64 were the best genotypes for dwarfness where as ARC 15759, ARC 18023 and ADT 36 for earliness. For grain yield, ADT 43 and ASD 16 recorded

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