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Genetic diversity in direct seeded aerobic rice

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ABSTRACT

The nature and magnitude of genetic divergence was estimated in 22 aerobic rice varieties using Mahalanobis's D^2-stastics.The cultivars were grouped into six clusters showing considerable amount of genetic diversity among the varieties. The clustering pattern showed no correspondence between clustering pattern and geographical origin of the varieties .Cluster IV and VI showed maximum inter-cluster distance while cluster II exhibited maximum intra-cluster cluster divergence. Cross combinations showing high D2 matrix value like Bala x Sattari, Bala x Heera, Sattari x Vandana and Kalinga-II x Bala may produce high magnitude of heterosis or desirable segregants. All minimum and maximum cluster mean values were distributed in relatively distant clusters. Traits like days to 50% flowering,1000-grain weight, plant height, grain length and grain breadth were the major contributors to the genetic divergence.

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Key words : Aerobic rice, Genetic divergence, Cluster, Yield components

INTRODUCTION

Water is becoming a looming crisis in agriculture, more particularly in rice cultivation. By 2025, per capita water availability in many Asian countries is likely to decline by 15-54% as compared with 1990. On the other way, to meet the global demand of rice, 800 million tons of rice needs to be produced by 2025. 'Aerobic rice' cultivation is one of the promising water saving rice production technologies where the amount of irrigation water meets the demand for evaporation from soil and transpiration by the crops. However, to sustain high yields under this condition requires varieties ideal for limited water stress condition along with improved crop management. To save irrigation water, researchers are developing some alternative cultivation methods, which can help to save water and enhance water productivity in rice cultivation. Therefore, considerable efforts are being focused at CRRI Cuttack, India to develop aerobic rice genotypes. The study of diversity of rice genotypes for aerobic condition may lead towards enhancing grain and water productivity.

The estimation of genetic divergence in the available germplasm is important for successful selection of parents for hybridization purpose. The divergent lines belonging to different and distantly located clusters have a higher probability of giving heterotic hybrids or superior progenies than those parental lines belonging to the same cluster or group possessing low genetic distance. Several workers have emphasized the importance of genetic divergence for selection of desirable parents (Murthy and Arunachalam, 1966; Sinha *et al.*, 1991; Pradhan and Mani, 2005 and Bose and Pradhan, 2005).Looking into the importance of varietal development in aeobic rice, the present investigation was undertaken to assess the magnitude of genetic divergence among the collected varieties.

MATERIALS AND METHODS

The experimental materials comprised of 22 aerobic rice genotypes collected from different breeding centres of the country were direct seeded at aerobic experimental plot developed at CRRI Cuttack, India in alpha lattice design with three replications in wet season, 2006 and 2007. The plot size comprised of 5 rows, each of 3 meter length and 15cm apart. Plant to plant spacing was maintained at 15cm. Recommended agronomic practices and need based plant protection measures were followed in order to raise good crop. Observations on days to heading, plant height, total tillers/plant, ear bearing tillers/plant, panicle length, panicle weight, grains/panicle, seed test weight, plot yield (t/ha), grain length and grain breadth. Mean data were subjected for Mahalanobis's D2 statistics as suggested by Rao(1952).

RESULTS AND DISCUSSION

The analysis of variance revealed significant differences among the genotypes for all the eleven studied characters (Table 1). The results indicated high magnitude of variances for majority of the characters might favour selection and further utilization in future recombination

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