

Characterization of genetic variability in different rice lines using DNA markers

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Rice is one of the important staple food crop in the world. Which has been extensively studied both the genetic and molecular level. New technique based on DNA profiling provides novel approaches to varietal characterization which offer advantage over traditional morphological comparisons. Identification of plant varieties/ cultivars and determination of their genetic variability through direct DNA analysis not only help to identify molecular marker across the chromosome for mapping purpose, it also help in gene tagging as well as molecular marker aided selection (MAS), because of several advantages of the molecular method over the biochemical or morphological methods to identify, characterize and determine genetic variability among rice lines, an attempt has been made to characterize different rice lines containing known genes of blast resistance and some of local cultivar with an objective to study the level of DNA polymorphism among different rice lines using PCR based DNA marker and to estimate the genetic variability among 23 rice lines during the year 2003 at NRCPB, New Delhi. PCR based Random Amplified Polymorphic DNA (RAPD), UPR, ISSR and STMS markers were used for characterization of genetic variability among 23 rice lines. Total 83 primers were used, out of which 30 primers gave polymorphism. A total 1276 number products amplified. Dendrogram was constructed on the basis of the result obtained through PCR. It showed that 23 lines were clustered in to 7 groups. The first group contains 2 isogenic blast resistant lines, second group contains four isolines having different genes of P14. The third cluster contains three rice lines which all contains different genes of PiK, HPU-741 which is local variety, distinguished from the other three variety they having 55 similarity in cluster 4. Three japonica type lines were grouped in cluster five. Cluster 6 having two rice lines which are japonica type having dark nature. Cluster 7 having two varieties which are susceptible for blast.

Key words : Rice, DNA, RAPD, ISSR, UPR, STMS, Polymorphism, Dendrogram

INTRODUCTION

Identification of plant varieties/cultivars and determination of their genetic variability through direct DNA analysis not only helps to identify marker variation across the chromosomes, which is useful for mapping and tagging agronomical useful genes as well as marker aided selection (MAS) programmes.

There are diversified molecular approaches adapted to generate DNA fingerprinting and thus identifying crop varieties. These techniques include polymerase chain reaction (PCR) based random amplified polymorphic DNAs (RAPDs), AFLPs and ISSR etc. RAPDs are primarily used for their simplicity. Although reproducibility of RAPD is less with changing parameters, these can be stabilized by maintaining constant experimental procedures or by maintaining greater stringency of experiment. Because of several advantages of these molecular

methods over the biochemical or morphological methods to identify, characterize and determine genetic variability among rice lines, an attempt has been made to characterize different rice lines which harbor known genes for blast resistance and some of local cultivars with an objective to study the level of DNA polymorphism among different rice lines using PCR based DNA markers and to estimate the genetic variability among the different rice lines.

MATERIALS AND METHODS

Plant material and DNA extraction

A total of 23 rice (*Oryza sativa* L) lines were selected for this study. The list of materials is indicated below:

Young leaves of these plants were collected from glass house of National Research, Centre on Plant

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