

Identification of Restoring Fertility and Maintainer Rice Varieties Using SSR Marker

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Abstract

Background and Objectives

In classical plant breeding, restorers are identified by the cross test, of existing varieties with cytoplasmic male sterility (CMS) lines and evaluating F_1 progenies in terms of fertility of pollen and spikelete. Lines showing more than 80 percent fertility of pollen and spikelete are considered as restorer lines. This study aimed at applying marker assisted selection (MAS) using linked SSR markers to restoring fertility (Rf) genes for identification of restorer and maintainer lines in hybrid seed production in rice.

Materials and Methods

In this study, 15 rice varieties were planted at the research farm of Sari University of Agricultural Sciences and Natural Resources and marker assisted selection (MAS) was used for identification of two Rf genes located on chromosomes 1 and 10 of rice using SSR markers RM171, RM258 and RM3148. The PCR reaction was performed at 94 °C for 5 min; then for 35 cycles of 94 °C for 1 min; 55°C for 1 min; 72 °C for 2 min followed by 72 °C for 5 min. PCR products were resolved by electrophoresis in agarose gel stained with ethidium bromide and then photographed.

Results

Results of molecular analyses using microsatellite markers RM171, RM258 and RM3148 linked with Rf genes showed that rice varieties namely Hashemi and Deylamani had both Rf genes in their genomes and were considered as putative restorers and were suggested to be test crossed with male sterile lines to assess their F_1 generations. Rice varieties namely Shiroudi, Tabesh, Fajr and Shafagh were identified as maintainers. Thus backcross breeding method is suitable for transferring sterile cytoplasm to them for development of new CMS lines.

Discussions

Identifying restorer lines by means of molecular marker technology is more cost effective and reliable than phenotypic assays especially in hybrid rice production. Restorer and maintainer lines identified in this study could be used for promotion of hybrid rice technology in the country.

Keywords: Rice, Restorer varieties, Maintainer varieties, SSR marker.