

Identification and Characterization of a Mutation in the SLR1 and GA3ox2 Genes in Two Mutant Dwarf Rice Varieties Obtained from an Improved Local Variety

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Abstract

Dwarfism is considered a valuable trait in crop breeding. Owing to short stature, dwarf plants have a greater resistance to rain and wind damage leading to tolerance to lodging, and thus associate with increased and stable yield. Though dwarfism can be caused by different factors, defects in the perception and biosynthesis of gibberellic acids (GA₃) have been identified as the most prominent factors. In Sri Lanka, where rice is the staple food, rice supply does not consistently meet the existing demand. Therefore, the current study was conducted to characterize two dwarf mutants originating from a locally available rice variety and to determine whether the dwarf phenotype has the potential to be introduced to the breeding programs. The DNA from the dwarf mutants and the mother plant was extracted using CTAB method and was amplified using two selected primers, *OsSLR1* and *OsGA3ox2* which were designed for the *SLR1* and *GA3ox2* genes of the rice genome. *SLR1* codes for the repressor protein DELLA, which is involved in gibberellin signalling pathway, and *GA3ox2* encodes GIBBERELLIN-3-BETA-HYDROXYLASE 2 enzyme which is involved in the process of gibberellin biosynthesis. Then the amplified regions were subjected to DNA sequencing and the sequences were aligned using multiple sequence alignment and subjected to comparison in order to identify polymorphisms and indels. Several indels were identified in both dwarf phenotypes compared to the parent plant. Although some changes among the compared sequences were observed, GA₃ response assays, protein clustering and the sequencing of more gene regions associated with GA₃ signalling and biosynthesis should be carried out to verify the presence of mutations in the dwarf phenotypes.

Keywords: *Decreased lodging, DNA sequencing, dwarf phenotype, gibberellin biosynthesis, gibberellin signalling*

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