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Identification of Rice Mutants Tolerant to Cold Stress at the Germination Stage By Tilling

The occurrence of low temperatures is a common stress in rice cultivation in temperate regions, making tolerance to low temperatures a desirable trait in rice genotypes grown in Southern Brazil. These low temperatures hinder germination, crop establishment and grain yield. This study aimed to characterize and identify through the TILLING technique, rice families tolerant to low temperature stresses in the germination stage. In germination analysis, seeds of 400 mutant families rice (M3 generation), and BRS Querência, BR IRGA 409 and Nourim Mochi cultivars were subjected to treatments with different temperatures (13 ° C and 25 ° C) and compared as to their relative performance, as measured by the length of coleoptile, root length and shoot length. For the analysis of mutant families by the TILLING technique, 4,000 M3 plants subdivided in 500 pools of eight plants were analyzed. Mutants were obtained by mutagenesis with ethylmethanesulfonate (EMS), for the presence of mutations in Os03g0103300 (qLTG3-1), a gene connected to germination response to low temperature stress in rice. The results indicate that mutation induction was effective in generating genetic variability for tolerance to low temperatures during germination stage. The TILLING technique allowed the identification of a genotype (516 A3) carrying several SNP mutations in the Os03g0103300 gene (qLTG3-1). SNPs were detected in coding sequences and in the 3'-UTR region, and one mutation was found to be associated to a AP2/ERF domain located downstream the gene and is suggested to be the mutation responsible for the character stress tolerance to low temperatures.

Country or International Organization

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