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GWAS analysis and selection of useful resources for direct-seeding related mesocotyl elongation in rice

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Abstract

In Asia, rice production has some difficulties with reduction of farm household population and increase of elderly population. As a result, it has resulted in inefficiency and we need to reduce labor force and improve labor productivity. Direct-seeding in rice could reduce labor and production costs, the area of direct seeding is increasing in japonica rice production in Asia. In direct seedling cultivation competition against weeds is one of most important concern. So, low temperature germinability and mesocotyl elongation should be considered. In this study, we evaluated the mesocotyl length and low temperature germination conducted association analysis using 137 Korea core collections. An average length of mesocotyl among 137 core collections was skewed range from 0mm to 43mm. we searched candidate gene around target SNP. Such related traits, genome-wide association study (GWAS) analysis was carried out using GAPIT. Also, average mesocotyl length of 394 Korea landrace cultivars was measured ranging from minimum 0 mm to maximum 34mm. 30 out of 394 Korea landrace cultivar conducted re-sequencing, and haplotype analysis of candidate gene. we searched these related resources, which including germination of low temperature and mesocotyl elongation. This could be used for the development of direct-seeding cultivars. The validated accession of core collection and landrace cultivars will be used development of direct-seedling cultivar in the future.

Keywords : Rice, Mesocotyl elongation, Low temperature, Genome-wide association study (GWAS).

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