Title: Screening of heat stress-tolerant weedy rice and SNP identification of heat-tolerance-related genes.

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Abstract: Rice, a staple crop that feeds more than one-third of the world's population, encounters a wide range of biotic and abiotic stresses due to climate change. Rising temperature is one of the significant abiotic stresses affecting rice productivity worldwide. The development of heat-tolerant rice cultivars is critical in this regard. Weedy rice could potentially serve as a natural resource for genes conferring agronomically important traits beneficial to cultivated rice. However, heat tolerance in both cultivated and weedy rice is still understudied. This study screened a set of 180 weedy rice accessions for heat stress tolerance and further characterised them using genome-wide single-nucleotide polymorphisms (SNPs) analysis. Five heat-tolerant (HT) accessions (MU244, MU235, MU249, MU260 and MU237), along with five heat-susceptible (HS) accessions (MU100, MU114, MU264, MU251 and MU005), were subjected to relative electrical conductivity (REC) test and reactive oxidative species assay (ROS). These tests verified that the five HT accessions performed better under heat stress than their HS counterparts. In addition, whole-genome sequences of three HT (MU235, MU237 and MU066) and four HS (MU100, MU114, MU022 and MU005) accessions were selected for the genome-wide SNPs comparison, revealing substantial amino acid variation in the heat-tolerance-related genes between the HT and HS rice groups. The proposed genes and genome-wide SNP markers may help rice breeders better understand how different rice cultivars respond to heat stress.

Keyword: Genome-wide SNPs, Heat Shock Protein, Heat Stress, Weedy Rice.

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