Regulation of sucrose synthase and its association with grain filling in spermine treated rice plant under water deficit

ABSTRACT

Spermine (SPM) was utilized to investigate its impact on the accumulation of sucrose synthase (SUS) and the role of SUS as a predictor of sink strength of rice under cyclic water stress. Treatments which consisted of control and SPM were arranged in a randomized complete block design. Biochemical analyses showed significantly higher contents of sucrose, starch and carbohydrate in SPM-treated panicles which pointed to increased loading of sucrose into the grains or conversion of sucrose into starch. Besides, the expression of SUS gene was up-regulated in both inferior and superior spikelets at twenty and three fold, respectively. Correspondingly, SUS enzyme showed an increase in its activity. The high expression of SUS3 during grain filling is linked to the increased capacity for starch synthesis. Grain weight and grain filling rate of SPM-treated spikelets improved due to their large sink capacity and increased number of spikelets per panicle.

Keyword: Grain filling; Rice; Sink strength; Spermine (SPM); Sucrose synthase (SUS); Water stress