Identification of Sugar Signals Controlling the Nitrate Uptake by Rice Roots Using a Noninvasive Technique

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In order to evaluate the hypothesis that nitrate uptake is under positive control by sugars, a simple noninvasive model was used to measure the effects of nine modulating sugars on the net nitrate uptake in rice under constant low nitrate concentration. The results showed that the fastest and greatest acceleration in nitrate uptake were observed after sucrose was added, and this change reached a peak 1.5 h after treatment. In addition, we found that 1 mM sucrose could affect the nitrate uptake in rice roots for 8.5 h. The three most positive effective sugars and one negative effective sugar were selected for further analyzing their effect on the expression of nitrate transporter gene *OsNrt2.1*. The result of RT-PCR showed that the expression of *OsNrt2.1* was upregulated by sucrose, glucose and galactose. Among the three positive effective sugars tested, sucrose was found to have significant and continuous enhanced stimulation on *OsNrt2.1* gene expression within 4 h, which indicated that sucrose could be as a specific signal to regulate the net nitrate uptake.

Key words: Noninvasive Technique, Sugars, *OsNrt2.1* Gene