

Overexpression of type-A rice response regulators, OsRR3 and OsRR5, results in lower sensitivity to cytokinins

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Genet. Mol. Res. 9 (1): 348-359 (2010)

Received November 13, 2009

Accepted December 8, 2009

Published March 2, 2010

ABSTRACT. Response regulators are part of a two-component regulatory system. The type-A *Arabidopsis* response regulators act as negative regulators. To understand the function of type-A response regulators in the model monocot plant, rice (Japonica cultivar-group: Zhonghua11), we overexpressed two type-A OsRR genes, OsRR3 and OsRR5 (pACT1:OsRR3 and pACT1:OsRR5). We hoped to gain insight into their molecular function in cytokinin-signaling pathways. Both OsRR3 and OsRR5 overexpressors had longer roots and more lateral roots compared with Zhonghua11, when treated with exogenous cytokinin. Using callus formation and chlorophyll content assays, we found that Zhonghua11 was more sensitive to cytokinin compared with other cultivars of rice, expressing high transcript levels of OsRR3 and OsRR5. The expression of most type-A OsRR genes was repressed by OsRR3 and OsRR5 overexpression. However, semi-quantitative RT-PCR showed that three type-A OsRR genes showed increased expression. Our results suggest that both OsRR3 and OsRR5 mainly act as negative regulators of cytokinin signaling, as indicated by the reduced sensitivity of OsRR3 and OsRR5 overexpressors to exogenous cytokinins.

Key words: Cytokinin; Response regulator; Rice; RT-PCR