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About Journal@rchive

Journal List

Journal/
Society Search

GO

News



Science Links Japan

JST Japan Science and Technology Agency

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The Crop Science Society of Japan [Info](#) [Link](#)[TOP](#) > [Journal List](#) > [Available Issues](#) > [Table of Contents](#) > [Abstract](#)

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Effects of Potassium Deficiency on Leaf Growth, Related Water Relations and Accumulation of Solutes in Leaves of Soybean Plants

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Abstract:

The influence of potassium (K) deficiency on leaf water and osmotic potentials, and concentrations of major solutes was determined to assess their contributions to the leaf growth of soybean plants grown in solution cultures containing 5.0 and 0.2 mM KCl. A deficient supply of K restricted leaf growth due to decreased mesophyll cell numbers and cell enlargement, though water content, water and osmotic potentials of the expanding leaves were not affected by the treatment. The osmolarity of the expanding leaves showed very similar values in both treatments, though the K⁺ concentration in the K-deficient plants was remarkably lower than that of the control. In response to the K-deficiency, some cations, anions, sugars and amino acids accumulated in the expanding leaf, compensating the decrease in K concentration approximately 92%. These findings suggest that the leaf growth depression observed in the K-deficient plant occurred when the water relations of the K-deficient leaves are maintained close to that of the control.

Keywords:

Leaf growth, Leaf osmolarity, Leaf water potential, Potassium deficiency, Soybean

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