P131

Analysis of metabolites in wheat roots in response to salinity stress

Da-Eun Kim[1)], Swapan Kumar Roy[1)], Ki-Hyun Kim[1)], Seong-Woo Cho[2)], Chul-Soo Park[3)], Moon-Soon Lee[4)] and Sun-Hee Woo[1*)]

[1)] Department of Crop Science, Chungbuk National University, Cheong-ju 361-763, Korea
[2)] Rice Research Division, National Institute of Crop Science RDA, Suwon 441-857, Korea
[3)] Department of Crop, Agriculture and Life Science, Chonbuk National University, Jeonju, 561-756, Korea
[4)] Dept. of Industrial Plant Science & Technology, Chungbuk National University, Cheongju 361-763, Korea

Abstract

Salinity stress is one of the most important abiotic stresses and severely impairs plant growth and production. Root is the first site for nutrient accumulation like as Na^+ in the plant. To investigate the response of wheat root under salinity stress, we executed the characterization of morphology and analysis of metabolites. Wheat seeds cv. Keumgang (Korean cultivar) were grown on the moist filter paper in Petri dish. After 5 days, seedlings were transferred to hydroponic apparatus at 1500 LUX light intensity, at 20ºC with 70% relative humidity in a growth chamber. Seedlings (5-day-old) were exposed to 50mM, 75mM, 100mM NaCl for 5 days. Ten-day-old seedlings were used for morphological characterization and metabolite analysis. Root and leaf length became shorter in high NaCl concentration compared to following NaCl treatment. For confirmation of salt accumulation, wheat roots were stained with CoroNa$^+$ Green AM, and fluoresce, and the image was taken by confocal microscopy. Na^+ ion accumulation rate was higher at 100mM compared to the untreated sample. Furthermore, to analyze metabolites in the wheat root, samples were extracted by D_2O solvent, and extracted sample was analyzed by 1H NMR spectroscopy. Fourteen metabolites were identified in wheat roots using NMR spectroscopy. Methanol and ethanol were up-regulated, whereas formate, aspartate, aminobutyrate, acetate and valine were down-regulated under salinity stress on roots of wheat. Fumarate had no change, while glucose, betaine, choline, glutamate and lactate were unevenly affected during salinity stress.

Keywords: wheat, root, metabolites, salinity stress

Corresponding author*
Sun-Hee Woo
Address: Chungbuk National University, 1, Chungdae-ro, Seowon-gu, Cheongju-si, Chungbuk 28644 Korea (Republic of)
Fax: +82-43-273-2242
Tel: +82-43-261-2515
E-mail: shwoo@chungbuk.ac.kr