OA-04

Comparison of Morpho-Physiological Changes of Common Buckwheat (*Fagopyrum esculentum Moench.*) and Rice (*Oryza sativa* L.) to Waterlogging Stress

Ju-Young Choi[1], Seong-Woo Cho[3], Swapan Kumar Roy[1], Jae-Buhm Chun[4], Soo-Jeong Kwon[1], Jwa-Kyung Sung[1], Jun-Ichi Sakagami[2]*, Sun-Hee Woo[1]*

[1]Department of Crop Science, Chungbuk National University, Cheong-ju 28644, Korea
[2]Department of Biological production, Faculty of Agriculture, Kagoshima Uniuversity, Kagoshima 890-0065, Japan
[3]Department of Agronomy and Medicinal Plant Resources, Gyeongnam National University of Science and Technology, Jinju, Korea
[4]Crop Foundation Division, National Institute of Crop Science, RDA, Wan-ju,RepublicofKorea

[Introduction]

Waterlogging is one of the major obstacles for sustainable agriculture. Plants subjected to waterlogging stress suffer from substantial yield losses. Under natural environmental conditions, plants often get exposed to transient or permanent waterlogging. Under waterlogged conditions, plants exhibit several responses, including hampered stomata conductance, net CO2-assimilation rate and root hydraulic conductivity. Furthermore, plants grown under waterlogged conditions often face the oxidative damage induced by the generation of reactive oxygen species. This study aimed to investigate the morpho-physiological changes of buckwheat and rice under waterlogging stress.

[Materials and Methods]

The common buckwheat (*Fagopyrum esculentum* cv. Harunoibuki) and rice (*Oryza sativa* L.) used in this study were collected from the Laboratory of Tropical Science at Kagoshima University in Japan. The seeds were germinated in controlled conditions (25 ºC, 12 h day/12 h night, and 150 $\mu mol \cdot m^{-2} \cdot s^{-1}$ light intensity). The seedlings were exposed to waterlogging stress with 0 ~ 1 cm of water depth for 3-days at early growth stage. The samples were collected after 1-day, 2-days, 3-days and 4-days of recovery under waterlogging stress. The plant height, SPAD, chlorophyll fluorescence, root traits (length, surface area and volume), aerenchyma, Radial oxygen loss (ROL) barrier and dry weight were measured.

[Results and Discussion]

In the present study, waterlogging caused dramatic changes in the plant height, chlorophyll content and root morphology. SPAD value and chlorophyll fluorescence of buckwheat was significantly ($p<0.01$) affected under waterlogging stress. However, the rice had no effect under waterlogging stress. In case of buckwheat chlorophyll fluorescence showed the significant changes with 0.54 Fv/Fm in early growth stage under waterlogging stress. Also, the root morphology was significantly ($p<0.01$) affected under waterlogging stress. In particular, waterlogging affected root length, surface area and volume in buckwheat. Root (length, surface area, volume) caused serious damage under waterlogging stress. No aerenchyma and ROL barrier were found in Buckwheat, however, flooding stress enhanced adventitious roots substantially. The findings concluded that buchweheat was more sensitive regarding physiological characteristics under waterlogging stress in Harunoibuki of Buckwheat.

*Corresponding author: E-mail. shwoo@chungbuk.ac.kr