

Alleviation of Adverse Effects of Salt Stress on Soybean (*Glycine max. L.*) by Using Osmoprotectants and Compost Application

Authors : Ayman El Sabagh, SobhySorour, AbdElhamid Omar, Adel Ragab, Mohammad Sohidul Islam, Celaleddin Barutçular, Akihiro Ueda, Hirofumi Saneoka

Abstract : Salinity is one of the major factors limiting crop production in an arid environment. What adds to the concern is that all the legume crops are sensitive to increasing soil salinity. So it is implacable to either search for salinity enhancement of legume plants. The exogenous of osmoprotectants has been found effective in reducing the adverse effects of salinity stress on plant growth. Despite its global importance soybean production suffer the problems of salinity stress causing damages at plant development. Therefore, in the current study we try to clarify the mechanism that might be involved in the ameliorating effects of osmo-protectants such as proline and glycine betaine and compost application on soybean plants grown under salinity stress. Experiments were carried out in the greenhouse of the experimental station, plant nutritional physiology, Hiroshima University, Japan in 2011- 2012. The experiment was arranged in a factorial design with 4 replications at NaCl concentrations (0 and 15 mM). The exogenous, proline and glycine betaine concentrations (0 mM and 25 mM) for each. Compost treatments (0 and 24 t ha⁻¹). Results indicated that salinity stress induced reduction in all growth and physiological parameters (dry weights plant-1, chlorophyll content, N and K⁺ content) likewise, seed and quality traits of soybean plant compared with those of the unstressed plants. In contrast, salinity stress led to increases in the electrolyte leakage ratio, Na and proline contents. Thus tolerance against salt stress was observed, the improvement of salt tolerance resulted from proline, glycine betaine and compost were accompanied with improved membrane stability, K⁺, and proline accumulation on contrary, decreased Na⁺ content. These results clearly demonstrate that could be used to reduce the harmful effect of salinity on both physiological aspects and growth parameters of soybean. They are capable of restoring yield potential and quality of seed and may be useful in agronomic situations where saline conditions are diagnosed as a problem. Consequently, exogenous osmo-protectants combine with compost will effectively solve seasonal salinity stress problem and are a good strategy to increase salinity resistance in the drylands.

Keywords : compost, glycine betaine, proline, salinity tolerance, soybean

Conference Title : ICAHS 2015 : International Conference on Agricultural and Horticultural Sciences

Conference Location : Istanbul, Türkiye

Conference Dates : September 28-29, 2015