

Nitrogen Fixation of Soybean Approaches for Enhancing under Saline and Water Stress Conditions

Authors : Ayman El Sabagh, AbdElhamid Omar, Dekoum Assaha, Khair Mohammad Youldash, Akihiro Ueda, Celaledin Barutçular, Hirofumi Saneoka

Abstract : Drought and salinity stress are a worldwide problem, constraining global crop production seriously. Hence, soybean is susceptible to yield loss from water deficit and salinity stress. Therefore, different approaches have been suggested to solve these issues. Osmoprotectants play an important role in protection the plants from various environmental stresses. Moreover, organic fertilization has several beneficial effects on agricultural fields. Presently, efforts to maximize nitrogen fixation in soybean are critical because of widespread increase in soil degradation in Egypt. Therefore, a greenhouse research was conducted at plant nutritional physiology laboratory, Hiroshima University, Japan for assessing the impact of exogenous osmoregulators and compost application in alleviating the adverse effects of salinity and water stress on soybean. Treatments was included (i) water stress treatments (different soil moisture levels consisting of (100%, 75%, and 50% of field water holding capacity), (ii) salinity concentrations (0 and 15 mM) were applied in fully developed trifoliolate leaf node (V1), (iii) compost treatments (0 and 24 t ha⁻¹) and (iv) the exogenous, proline and glycine betaine concentrations (0 mM and 25 mM) for each, was applied at two growth stages (V1 and R1). The seeds of soybean cultivar Giza 111, was sown into basin from wood (length 10 meter, width 50cm, height 50cm and depth 350cm) containing a soil mixture of granite regosol soil and perlite (2:1 v/v). The nitrogen-fixing activity was estimated by using gas chromatography and all measurements were made in three replicates. The results showed that water deficit and salinity stress reduced biological nitrogen fixation and specific nodule activity than normal irrigation conditions. Exogenous osmoprotectants were improved biological nitrogen fixation and specific nodule activity as well as, applying of compost led to improving many of biological nitrogen fixation and specific nodule activity with superiority than stress conditions. The combined application compost fertilizer and exogenous osmoprotectants were more effective in alleviating the adverse effect of stress to improve biological nitrogen fixation and specific nodule activity of Soybean.

Keywords : a biotic stress, biological nitrogen fixation, compost, osmoprotectants, specific nodule activity, soybean

Conference Title : ICCPP 2016 : International Conference on Crop Production and Phytohormones

Conference Location : Istanbul, Türkiye

Conference Dates : July 21-22, 2016