World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:9, No:09, 2015

Potential of ᵞ-Polyglutamic Acid for Cadmium Toxicity Alleviation in Rice

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Abstract : Cadmium (II) (Cd) is one of the major toxic elemental pollutants which is hazardous for humans, animals and plants. γ-Polyglutamic acid (γ-PGA) is an extracellular biopolymer produced by several species of Bacillus which has been reported to be an effective biosorbent for metal ions. The effect of γ-PGA on growth of rice grown under laboratory conditions was investigated. Rice seeds were germinated and then grown at 30±1°C on filter paper soaked with Cd solution and γ-PGA for 7 days. The result showed that Cd significantly inhibited the growth of roots and shoots by reducing root and shoot lengths. Fresh and dry weights also decreased compared with control; however, the addition of 500 mg•L-1 γ-PGA alleviated rice seedlings from the adverse effects of Cd. The analysis of physiological traits revealed that Cd caused a decrease in the total chlorophyll and soluble protein contents and amylase activities in all treatments. The Cd content in seedling tissues increased for the Cd 250 µM treatment ($P < 0.05$) but the addition of 500 mg•L-1 γ-PGA resulted in a noticeable decrease in Cd ($P < 0.05$).

Keywords : polyglutamic acid, cadmium, rice, bacillus subtilis
Conference Title : ICEST 2015 : International Conference on Environmental Science and Technology
Conference Location : Singapore, Singapore
Conference Dates : September 10-11, 2015