PO-13

A Biofilm-Based Bioremediation Method to Reduce Cadmium Levels in Agricultural Soils

Gamini Seneviratne, **H.M.L.I. Herath**

Microbial Biotechnology Unit, Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka
E-mail: gaminis@ifs.ac.lk

Agricultural soils are contaminated withcadmium via various sources of synthetic inputs like fertilizers used in modern agriculture. Therefore, introduction of efficient bioremediation methods are essential to remove such toxic heavy metals. Developed microbial biofilms as biofilmed biofertilizers (BFBFs) have been shown to be effective in bioremediation of toxic heavy metals. In the present study, semi-hydroponic systems were established using tomato (*Solanum lycopersicum* L.) as the test plant. The experiment was arranged in a Completely Randomized Design (CRD) with triplicates. Then, the semi-hydroponic systems were treated with cadmium nitrate or cadmium nitrate with BFBFs, and untreated systems served as the control. After one month, plants were harvested and cadmium levels were measured in the plant, soil, hydroponic solution and microbial sediment using atomic absorption spectrophotometer (AAS). Simultaneously, plant magnesium and iron levels were also measured. Microbial sediment was subjected to Fourier transform infrared spectrophotometric (FTIR) analysis. Cadmium levels in the plant, soil and corresponding hydroponic solution in the cadmium alone treatment were significantly higher than that of the BFBFs amended treatment. Thus, it was evident that BFBFs significantly reduced the cadmium levels in plant, soil, and the hydroponic solution. A high cadmium concentration was detected in the microbial sediment. Further, cadmium carboxylate stretch at 1558 cm^{-1} of the FTIR spectrum indicated surface adsorption and immobilization of cadmium via the biofilm action. Iron and magnesium that are essential to plant function did not show any significant difference between the BFBFs amended and unamended plants. Thus, it can be concluded that the BFBFs can be used to effective bioremediation of cadmium in cadmium-contaminated agricultural soils.