Goldschmidt 2024 Abstract
https://doi.org/10.46247/gold2024.21281

PROSPECTS OF REMEDIATION OF SOILS CONTAMINATED WITH HEAVY METAL CATIONS (Ni AND Cd) BY PLANT+MICROORGANISM SYSTEM

AZIZA USMONKULOVA[1], DR. NOSIR SHUKUROV, PHD[2] AND GULCHEKHRA KADIROVA[1]

[1]Institute of Microbiology ofAcademy Sciences of Uzbekistan
[2]Institute of Geology & Geophysics, University of Geological Sciences

Presenting Author: usmonkulova.aziza@mail.ru

Pollution with heavy metals (HM) is a result of anthropogenic, technological and geological activities, and the increase in their concentration causes serious ecological problems for environment. Scientists consider that using physical and chemical remediation methods to reduce pollution with HM leads to some inconveniences, in particular, decrease in soil fertility and secondary pollution. Therefore, in this study, we aimed to apply microorganisms and plants, which are highly effective, ecologically safe and inexpensive remediation objects.

In our preliminary studies, nitrogen fixation, phosphorus mobilization, content of exopolysaccharides, phytohormones and ACC deaminase, SOD enzymes, which ensure adaptation of plants under stress conditions and increase soil fertility, were determined in *Pseudomonas aeruginosa18, Enterobacter ludwigii11Uz, Enterobacter cloacaeUz_5* strains isolated from soils contaminated with HM. In particular, exopolysaccharide synthesizing activity of *Enterobacter ludwigii11Uz* strain at nickel concentration of 191.4 mg/l is 81 mg/l; auxin and gibberellic acid - 7.16 µg/ml and 113 µg/ml, 574.2 mg/l concentration of ACC deaminase and SOD enzyme activity - 4.15 µM/mg/protein/h and 5.7 µM/ml/min established. In addition, the fact that the selected strains have S=O, NH2, COOH functional groups binding to heavy metals, the possibilities of bioaccumulation and biosorption of HM were investigated.

In next stage studies, wheat plants which planted in soils contaminated with HM were treated with a suspension of selected bacterial consorsium and and grown for 30 days. After 30 days, plant height, shoot and root biomass, chlorophyll content, bioaccumulation (BAF), translocation factors (TF) were measured. The results showed the synergistic potential of the bacterial consortium for plant growth parametrs in heavy metal-contaminated soils. The BAF and TF values of Ni and Cd in plants treated with bacteria are higher than control plants (without bacteria), indicating that microorganisms affect the transformation of metals, their biomobility and remediation. At the end of the research, it was found that Cd and Ni content in the soil was reduced by 20-23% totally for 30 days applying the plant+microorganism system.

In the future, applying the plant+microorganism system recommended by us for the implementation of bioremediation of heavy metals-contaminated soils and the restoration of soil fertility will be great practical importance