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The combined usage of magnesium potassium phosphate cement and calcite for Ni stabilization in soil polluted with surgical industry wastewater

DR. MUHAMMAD IQBAL[1] AND **HAFIZ MUHAMMAD TAUQEER**[2]

[1]Government College University Faisalabad, Pakistan
[2]University of Gujrat
Presenting Author: enviro1537@gmail.com

Due to irrigation with surgical industrial effluents, soil pollution with nickel (Ni) has worsened the safer vegetables production from the arable lands. Hence, the remediation of such soils is necessary to avoid Ni bioaccumulation and its transfer into the food chain. The current research was conducted to test the efficacy of magnesium potassium phosphate cement (MKPC) and calcite (CLT) as a sole or concoction for Ni stabilization in soil. The Ni-contaminated soil (Ni = 112 mg kg^{-1}) was amended with MKPC (5%) and CLT (5%) as sole and concoction (MKPC2.5%+CLT2.5%) to test Ni phytoavailability to *Solanum melongena* L. The outcomes revealed that the MKPC2.5%+CLT2.5% incorporation in the soil promisingly improved the *S. melongena* growth, biomass, photosynthesis, and antioxidant enzymes in *S. melongena* leaves while reducing the electrolyte leakage (EL), and hydrogen peroxide (H_2O_2) in all treatments. Over control, the plant height and chlorophyll contents increased to 3% and 2%, respectively. Additionally, the reduction in Ni bioavailability (24%) and its accumulation in *S. melongena* roots (19%) and shoots (29%) were observed in the combined treatment of MKPC and CLT (MKPC2.5%+CLT2.5%), respectively, compared to control. Similarly, the MKPC2.5%+CLT2.5% treatment also reduced EL by 24% and H_2O_2 by 48% over control. The reduction in Ni bioavailability and Ni distribution in *S. melongena* is possibly due to the rise in soil pH, which restricts Ni uptake. Thus, the combined usage of MKPC and CLT is considered the efficient and cost-effective dose at a 50:50 proportion for the management of Ni-contaminated soils.