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Immobilization of Lead in Contaminated Soil Using Enzyme Induced Calcite Precipitation (EİCP) Along with Coconut Fiber Biochar (CFB)

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Abstract : Lead is environmentally hazardous because it may persist for a long time in soil, water, and air, and it can travel large distances when carried by wind or water. Lead is toxic to many different species of organisms and has the potential to disrupt ecosystem stability. Moreover, lead can contaminate crops and livestock, which can then have an adverse effect on human health. This study was conducted to use the enzyme-induced calcium carbonate precipitation (EICP) technique from soybean crude extract urease along coconut fiber derived biochar's (CFB) to bioremediate lead. To study the desorption rates of heavy metals from the soil, lead (Pb) was added to the soil at load ratios of 50 and 100 mg/kg. There were five separate treatment soil columns created: control sample, only CFB, only EICP, EICP with 2% (w/w) CFB, and EICP with 4% (w/w) CFB. Laboratory scale experiment demonstrates significant lead removal from soil. The amount of $CaCO_3$ precipitated in the soil was measured using a gravimetric acid digestion test, which related heavy metal desorption to the amount of precipitated calcium carbonate. These findings were validated using a scanning electron microscope (SEM), which revealed calcium carbonate and lead coprecipitation. As a result, the study reveals that the EICP technique, in conjunction with coconut fiber biochar, could be an efficient alternative in the remediation of heavy metal ion-contaminated soils.

Keywords : enzyme induced calcium carbonate precipitation (EICP), coconut fiber derived biochar's (CFB), bioremediation, heavy metal
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