Immobilization of Ni and Cd in soil by biochar derived from unfertilized dates.


Abstract:

Effect of biochar, derived from unfertilized dates, on the immobilization of Cd and Ni, in a sandy loam alkaline soil, was investigated. The biochar was applied to the soil columns at the rate of 0.5, 1, and 2 % (w/w) artificially polluted with 10 mg kg⁻¹ Cd and 100 mg kg⁻¹ Ni. After 1 month incubation of soil-biochar mixture under ambient conditions, the soil bulk density was reduced by 0.19 g cm⁻³ as compared with no biochar addition with increase in soil pH. A reduction of 53% in the NH₄NO₃-extractable soil Ni was recorded as compared with the corresponding control without biochar addition. After incubation, the water-soluble Ni and NH₄NO₃-extractable soil Cd and Ni contents were significantly lower in all the biochar treatments than the control. A reduction of 53 % in the NH₄NO₃-extractable soil Ni was recorded as compared with the corresponding control. The biochar content separated from the incubated soil showed low concentrations of NH₄NO₃-extractable Cd and Ni. The total Ni and Cd contents recovered from biochar samples after incubation were 35.2 and 3.7 mg kg⁻¹, respectively. Their contents in soil were substantially reduced by the incorporation of biochar amendment (114 to 57.2 mg kg⁻¹ Ni, 9 to 5.6 kg⁻¹ Cd) as compared with the no-biochar control. Therefore, addition of the biochar improved the soil physical properties and succeeded in immobilizing the studied metals.

Published In:

Water, Air & Soil Pollution, 225: (11) , PP 1-10.