Stabilization effect of heavy metals in mine soils amended with oyster shell powder

군사기 철기에 따른 폐광산 토양 내 중금속 안정화

Young Rok Kim* and Seunghun Hyun.
김영록* 현승훈.
Division of Environmental science and Ecological Engineering, Korea university. 136–713, Korea
고려대학교 환경생태공학부

In these days, a large amount of oyster shell waste has been disposed at seashore along the southern coast of Korea. Another big environmental concern is heavy metal contamination caused by inappropriate management of abandoned mine. With the rainfall, heavy metals may move into the natural ecosystem, including groundwater, surface water, and soil.

Twelve soil samples were collected from three abandoned mine site (kukchang, daeyang, and boksu) in Jecheon city. Initial concentration of heavy metals (Cu, Cd, Cr, Ni, Zn, Pb, and As) is ranged 0.01~57 (mg/kg) analyzed by ICP-OES. Air-dried soil samples were mixed with oyster shell powder classified by particle size (A(5/10 mesh), B(10/100 mesh), C(100 mesh)) at the ratio (m/m) of 300:1 (soil : oyster shell powder). The oyster shell powder amended soil samples were incubated under 25°C and moisture content of 10%. After the incubation period of 1, 2, 3, 4, 5, 6, and 7 week, soil samples were collected for chemical analysis such as pH, available phosphorous, and the concentrations of heavy metal extracted by TCLP and SPLP methods.

In the results of this study, soil pH increased as decreasing particle size of oyster shell powder. The oyster shell has high alkalinity as calcium oxide, and phosphorous element presented as Ca-P complex. Heavy metals extracted from treated soils decreased gradually with the incubation period, most likely due to increased soil pH and absorption of heavy metals by oyster shell powder. As time goes by, leaching concentration of heavy metals was nearly not significant.

It was expected that oyster shell could be a good absorbent to reduce mobility of heavy metals in mine soils. Conclusively, application of oyster shell powder creates two effects, one thing is the recovery of vegetation in soil around the mining area and the other thing is useful application of seashore waste materials.

Key word : Oyster shell powder. Mine soil. Heavy metals.
Correspondence: 02–3290–3515 (evergreenkim@korea.ac.kr)