

New index for trace element concentration in soil by cicada shell

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Introduction

Cicada shell is studied as an index of available trace element concentration for terrestrial organisms. Cicada larva live in soil over several years and get nutrition from tree roots. Trace elements also accumulate in cicada larva through a bioconcentration process.

Method

Trace element concentration of cicada shell was measured under different geological and artificial soil conditions which were serpentinite, mesozoic sandstone and mudstone, basic schist, pelitic schist, alluvial sediment, mine tailings (Ikuno (Ag, Cu, Pb, As, and Zn mines) and Tada mine (Ag and Cu)) and backfill soil after factory. Black cicada shell was sampled at city parks, large brown cicada shell at forest and city parks, higurashi cicada and small cicada shells at forest locations.

Results and discussion

Ni concentrations of small cicada shell sampled at serpentinite area were high, over 100 ppm. Similarly those of higurashi cicada shell at the serpentinite were over 10 ppm as well as tree leaves. Ni concentration of black cicada sampled at backfill soil after factory also varied from several to several 10ppm. Other samples were low, 0.1 to several ppm. As concentrations of small cicada and higurashi cicada shells sampled at the Ikuno mine varied from several to 100 ppm, although other samples were less than several ppm. Pb concentration of small cicada and higurashi cicada shells sampled at the Ikuno mine and large cicada at the Tada mine and black cicada sampled at the backfill soil after factory and at Sumiyoshi Taisya Shirine on the alluvial sediment were over 10 ppm and reached several 100 ppm at the Ikuno mine and the backfill soil after factory, although other Pb concentrations were less than 10 ppm. Cu concentration of small cicada and higurashi cicada shells at the Ikuno mine and large brown cicada shell at the Tada mine reached several 100 ppm although other concentrations were about 10 ppm. Mn concentration of cicada shell were almost uniform, several 100 to 1000ppm, although Mn of black cicada shell at sampled mesozoic sandstone and mudstone were a little high, about 1000 ppm. Therefore trace element concentration depends on each particular place and species therefore cicada shell is useful for soil trace element contamination.

[1] Ueda & Ii (2017) GEOMATE2017, 7 890-895.