

B411

사격장 토양과 식물의 중금속 분포
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phytoremediation 기술은 식물을 이용하여 오염된 토양을 정화하는 기술을 말한다. 특히 중금속 농도가 높은 지역에서 서식하며, 중금속을 많이 축적하는 자생식물을 이용할 경우, 중금속의 식물 유효도가 토양의 pH, 유기물 함량, 토성 등에 의해 영향을 받기 때문에 복원 효율이 높을 것이라 예상된다. 본 조사는 약 50년간 사격장으로 사용되어졌던 국내 D사격장 토양의 중금속 및 식생분포를 조사하여 현장의 내성종을 파악하고 효율적인 phytoremediation을 위한 현장 자료를 얻고자 하였다. 조사지역 토양의 총 카드뮴은 2.37~5.04 ppm, 총 납은 46.59~90.32 ppm, 총 구리는 52.51~74.14 ppm, 총 아연은 111.45~124.42ppm이었다. 치환성 구리(2-6%), 납(0-4%), 아연(1-3%)은 총 중금속 중 미량만 검출되어 이들 중금속의 토양 metal bioavailability는 비교적 낮은 것으로 나타났으나 카드뮴의 경우, 치환성 metal이 총 metal의 21-49% 가량 검출되어 높은 토양 metal bioavailability를 나타내, 특히 카드뮴 오염에 따른 생태계의 영향이 우려되는 지역이었다. 사격장의 식생은 쑥, 돼지풀, 들꿩, 억새, 고마리, 미나리 등이 우점종으로 나타났으며 생체량도 비교적 컸다. 식물의 중금속 분석 결과 쑥, 고마리, 바랭이 등이 Cd를 많이 축적하는 것으로 나타났으며 특히 고마리의 경우 총 축적량의 60% 이상이 지상부에 분포하고 있어 Cd 오염 토양의 phyto-extraction에 효율적인 종이라 사료된다.

B412

Effect of Heavy Metal Pollution on the Genetic Diversity of Natural Populations of *Littorina brevicula*
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Changes in genetic variability and allele frequency can be response from natural populations by effect of heavy metal pollution. The genetic diversity and population structuring of natural populations of *L. brevicula* from heavy metal polluted and unpolluted environments along the southeast coast of Korea were examined using *COII* and combined (*COII* + cyt *b* + ND6) mtDNA markers. This study applied AMOVA to test existence of structuring association of haplotype distribution with environments (polluted and unpolluted). No genetic differences within combined (*COII* + cyt *b* + ND6) mtDNA were detected between environments. On the other hand, differences in population haplotype diversity and structuring were found within *COII* mtDNA between polluted and unpolluted environments ($p < 0.05$). The *COII* mtDNA haplotype (=genetic) diversity was significantly higher in polluted environments ($p < 0.05$). This increased genetic diversity within heavy-metal polluted environments compared to unpolluted ones stands out as emergent effects from pollution at a population level. By the results, the genetic diversity of populations within *COII* mtDNA can be ecological indicator.

B413

Roost Site Selection by Shorebirds
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Shorebirds typically roosted in shallow non-tidal wetlands or exposed mud near water's edge of tidal mudflats. Roost sites are often adjacent to coastal feeding sites. Habitat types of roosts used by shorebirds on Ganghwa and Yeongjong Island included upper tidal zone, salt pans, salt marshes and fishponds. Roost sites selection of shorebirds was determined by tide level and varied with the seasons. Shorebirds roosted above the high tide line on upper tidal zone at neap tide and used inland wetlands at spring tide. Tide level and numbers of visiting shorebirds at Yeocha fishpond correlated significantly ($r_s = 0.55$, $p < 0.001$). Ricefields were available only in spring for roosting shorebirds. The difference of species composition was related to water level of roost availability. They preferred to use the fishpond in shallow water level. Shorebirds have visited their traditional roost site, but the roosting habitat preference depend upon habitat availability and its quality. Therefore, available roost sites with shallow water were required for shorebirds during spring tide period.

B414

Brood Parasite of Korean Shiner, *Pseudopuntungia nigra* in Keum River, Korea
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A field study of the brood parasitism by Korean shiner, *Pseudopuntungia nigra*, on nests of the Korean aucha perch, *Coreoperca herzi* was carried out from May 2003 to July 2003 at the mountain stream of the Unilam-Banilam, Jinan-gun, Jeonlabuk-do, Korea. Observation in wild showed that the Korean shiner was concentrated on Korean aucha perch nests in which nest owners had just spawned. The Korean shiner always spawned in nests of Korean aucha perch. When spawned in perch nest parasite eggs almost all hatched earlier than host eggs. Host and parasite eggs rapidly disappeared without guarding by a host male. This disappearance was caused by predation by fishes. Therefore, the benefits and costs of this nesting relationship are discussed in relation to the high predation effort observed.