



Comparison of germination and seed vigor of sunflower in two contaminated soils of different texture

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Phytoremediation as an emerging low-cost and ecologically friendly alternative to the conventional soil remediation technologies has gained a great deal of attention and into lots of research. As a kind of the methods that use of green plants to remediate heavy metals contaminated soils, the early growth status of plant seeds in the contaminated environmental directly affects the effect of phytoremediation. Germination test in the water (aqueous solution of heavy metal) is generally used for assessing heavy metal phytotoxicity and possibility of plant growth, but there is a limit. Because soil is commonly main target of phytoremediation, not the water. The bioavailability of heavy metals in the soil also depends on the texture. So soil texture is an important factor of phytoremediation effect. Sunflower is the representative species which have good tolerance to various heavy metals; furthermore, the seeds of sunflower can be used as the raw-material for producing bio-diesel. The objectives of this research were to investigate germination rate of sunflowers in various heavy metal contaminated soils and to compare the seedling vigor index (SVI) of sunflower in two contaminated soils of different texture.

Sunflower (*Helianthus annuus L.*) seeds were obtained from a commercial market. In order to prove the soil texture effect on heavy metal contaminated soil, germination tests in soil were conducted with two different types of soil texture (i.e., loam soil and sandy loam soil) classified by soil textural triangle (defined by USDA) including representative soil texture of Korea. Germination tests in soil were conducted using KS I ISO 11260-1 (2005) for reference that sunflower seeds were incubated for 7 days in dark at 25 ± 1 Celsius degree. The target heavy metals are Nickel (Ni) and Zinc (Zn). The Ni and Zn concentrations were 0, 10, 50, 100, 200, 300, 500 mg-Ni/kg-dry soil, and 0, 10, 50, 100, 300, 500, 900 mg-Zn/kg-dry soil, respectively. After germination test for 7 days, germination rate of sunflower was calculated, and shoot and root lengths were also measured.

According to the results of germination tests, the seeds germination rates were reduced with increasing heavy metal concentrations in both loam soil and sandy loam soil. The SVI values in loam soil in more than in sandy loam soil.

Keywords: phytoremediation, sunflower, soil texture, germination test

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