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Restoration of soil quality after oil pollution

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Abstract

© 2014, SGEM. All Rights Reserved. In this study, the self-restoration and remediation of oily polluted soil was investigated, Microbial parameters were used as indicators of the processes. The amount of oil that was used for artificial contamination of soil was 20 g kg-1. We analyzed total petroleum hydrocarbon (TPH) content and dynamics of microbial activities in polluted soil, polluted dugged-up soil, control soil in the layers 0-20, 20-40, 40-60 cm after 3 and 36 months after pollution. It was shown that oil mainly remains in the upper layer and does not migrate significantly along soil profile. The digging-up permitted the intensify the natural process of oil destruction (up to 42%). Changes in TPH content influenced the concentrations of organic carbon in the soil - they increased in 3.3-3.9 times in the upper layer of soil after 3 months since contamination in comparison to control. The level of microbial biomass in the control samples ranged from 172 to 201 mg Cmic g-1in the upper soil layers, and decreased with depth. The maximum level of this parameter (807 mg Cmic g-1) was observed in the upper layer of non-digged polluted soil after 3 months of contamination. Soil respiration activity values ranged from 94 to 100 mg CO2-C g-124h-1. The positive correlation (R=0.86) between basal respiration and microbial biomass was found in control samples but not in polluted samples. Oil pollution did not influence significantly the cellulase activity of the soil which was more determined by depth but not TPH concentration or presence/absence of pollution. In opposite, urease activity was highly dependent on oil pollution - in all polluted samples it was 3-383 times lower than in the corresponding control.

Keywords

Microbial biomass, Microbial enzyme activity, Microbial respiration, Oil pollution, Soil restoration