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CHANGES OF DEHYDROGENASE ACTIVITY IN GASOLINE CONTAMINATED SOIL STIMULATED WITH SELENIUM AND AMMONIUM SULPHATE (VI) IN DIFFERENT PROPORTIONS

Key words: ammonium sulfate, biostimulation, dehydrogenase, gasoline, selenium, soil

Summary

The aim of the study was to determine changes in enzyme activity in soil contaminated with gasoline (1% by weight of soil) subjected to biostimulation by two factors. The first factor was ammonium sulfate in doses of 0.15 mmol·kg⁻¹, 1.50 mmol·kg⁻¹ and 15.00 mmol·kg⁻¹. Mineral fertilizer was the main source of sulfur in soil, furthermore it enriched soil with nitrogen. The second factor was selenium IV and VI (0.05 mmol·kg⁻¹) as a sulfur analog and element, which can stimulate the activity of some oxidoreductases. The proportions were chosen to provide the ratio of S to Se equal 3:1, 30:1 and 300:1 (regardless of selenium oxidation state IV and VI). During the experiment, soil dehydrogenase activity and changes in soil pH in 1 M KCl were analyzed. Measurements were made independently on day 1, 7, 14, 28 and 56. Analyses showed stimulating effect of gasoline on the dehydrogenase activity on day 1. The observed effect increased with increasing amounts of introduced ammonium sulfate (VI). Subsequent measurements revealed that the introduction of high doses of ammonium sulfate (VI) (15 mmol·kg⁻¹) and selenium negatively affected the dehydrogenase activity in soil contaminated with gasoline. In contrast, lower doses of (NH₄)₂SO₄ had mainly a stimulating effect on the dehydrogenase activity in soil with gasoline. Furthermore, it was observed that the soil dehydrogenase activity on most days of experiment increased in the presence of (NH₄)₂SO₄ and selenium at the oxidation state IV. Therefore, the use of biostimulation with ammonium sulphate (VI) together with selenium (IV) in appropriate proportions can be used for the remediation of soils contaminated with petroleum hydrocarbons.

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