عنوان مقاله:

Physiological responses and phytoremediation ability of Eastern Coneflower (Echinacea purpurea) for crude oil contaminated soil

محل انتشار:

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خلاصه مقاله:

One of the most important anthropogenic pollution types in countries with oil production is soil and water contamination by petroleum. Phytoremediation is an emerging green technology for cleaning up polluted soil. A greenhouse experiment was conducted to study the effect of oil-contaminated soil on Echinacea purpurea with four concentrations of crude oil – contaminated soil: control = ۰, ۰.۵% = ۵۰۰۰, ۱% = ۱۰۰۰۰, and ۲% = ۲۰۰۰۰ mg kg-۱. Morphological and physiological traits were evaluated after ۹۰ days. Gas chromatography determined the removal rate percentage of total petroleum hydrocarbons (TPHs) in the soil. The results show that this plant has potential for removing TPHs, up to ۴۵.۵% at ۱% crude oil contamination, while the removal rate by natural attenuation is only ۳۲%. Data from morphological and flowering indices including shoot and root fresh weights, shoot and root dry weights, flower stem length, flower longevity, flower anthocyanin, and visual stress symptoms show significant differences within treatments. Based on the results, E. purpurea can tolerate crude oil concentrations in soil equal to or greater than ۵۰۰۰ and ۱۰۰۰۰ mg kg-۱ (۰.۵% and ۱% w/w). However, flowering was not observed at treatments of ۱% and ۲% crude oil contamination. As crude oil concentration increased, physiological parameters such as total chlorophyll, protein, and antioxidant capacity significantly decreased, while other parameters including leaf anthocyanin, electrolyte leakage, malondialdehyde, proline, and total carbohydrate all increased. Overall, E. purpurea is a widely – spread species that can be effectively used for phytoremediation of ≤۱۰۰۰۰ mg kg-۱ crude oil contaminated soil.

کلمات کلیدی:

TPHs, Echinacea purpurea, Environmental pollution, Growth, Flowering

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