

Preliminary evaluation of diesel removal by *Chrysopogon zizanioides* (Vetiver grass): Impacts on plant physiology and phytoremediation performance

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Abstract

Locally-available specimens of *Chrysopogon zizanioides* (Vetiver grass) were assessed in order to evaluate the potential of low-cost plants for use in remediation of hydrocarbon-polluted environments. Experiments were carried out over 15 days (24 ± 2 °C with dark/light cycles of 12 h) in glass flasks containing 300 ± 15 g soil sample contaminated with 10% (w/w) commercial diesel oil. Maximum removal efficiency of C11-C20 alkanes present in the diesel sample was $33 \pm 2\%$. Diesel was highly deleterious for *C. zizanioides*, which was evidenced by a marked chlorosis of the plant leaves. The content of chlorophyll a, b, and total carotenoids decreased 93%, 82%, and 76%, respectively, with respect to the control plants ($p < 0.05$). Accordingly, a decrease in biomass growth was also observed in all treated-specimens. Conversely, the content of soluble carbohydrates in the plant leaves showed a 3.3-fold increase ($p < 0.05$) compared to the control group. These results suggest that the environmental stressful conditions caused by diesel exposure could induce the mobilization of soluble sugars (e.g., increase glycogen catabolism) in order to preserve leaf survival, since these biomolecules play an active role as intracellular signaling molecules involved in the regulation of metabolic processes associated with ATP production. In general,

C. zizanioides showed a low potential to remove high diesel oil concentration (i.e., 10% w/w) in the tested conditions. However, more evidence is still needed in order to consider Vetiver grass as a low-cost flora useful in phytoremediation

strategies towards management of hydrocarbon-polluted environments.

Keywords: Hydrocarbon-polluted soils, diesel oil, Vetiver grass, phytoremediation, toxicological impacts.