

Tolerance of Rose Balsam (*Impatiens balsamina* L.), to grow on soil contaminated by used automobile lubricating oil

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Soil contamination with used lubricant oil (ULO) has become an emerging global environmental issue due to its negative impacts on soil and biota. Phytoremediation is a novel, environmental friendly technique that has potential to be utilized in remediation of ULO contaminated soil. Screening of plant species expressing tolerance to growth on contaminated soil is the most critical step in the planning of a phytoremediation program. The aim of the present study is to investigate the tolerance of Rose Balsam (*Impatiens balsamina* L.) to grow in ULO-contaminated soil. Results of the preliminary experiment showed 100% seed germination after 96 hours of incubation in soils treated with 1-5% w/w ULO levels similar to that of uncontaminated control. This result indicates high tolerance of *I. balsamina* L. to germinate on ULO contaminated soil. The continuation of preliminary experiment for 120 hours showed the significant ($p < 0.05$) reduction of root length and root biomass of seedlings in all treatments above 3% w/w ULO. A pot experiment was conducted using fully randomized block design (RBD) with contamination levels of 0% (control), 0.5%, 1%, 1.5%, 2%, 2.5% and 3% w/w ULO with four replicates. The percentage biodegradation of ULO in different treatments indicated time dependent increase. The percentage biodegradation at three months was 46.3%, 38.5%, 31.4%, 26%, 20.22%, and 18.5% for 0.5%, 1%, 1.5%, 2%, 2.5% and 3% w/w ULO treatments, respectively. The measured growth parameters of *I. balsamina* grown in soils contaminated with >1% w/w ULO indicated significant negative effects. There were no significant differences in chlorophyll contents of plants grown in different treatments. Therefore, the present study concludes the tolerance of *I. balsamina* L. to grow in soil up to 1% of w/w ULO contamination levels without showing any negative effect. The results further highlighted that *I. balsamina* L. could be used in phytoremediation of soil contaminated with even higher levels of ULO (3% of w/w) if grown for long term such as 12 months.

Keywords: *Impatiens balsamina* L. phytoremediation, tolerance, used lubricating oil

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