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Phytoremediation of VOCs from indoor air by ornamental potted plants: A pilot study using *a palm species* under the controlled environment

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Abstract

Volatile organic compounds (VOCs) in indoor air have recently raised public concern due to their adverse health effects. One of hazardous VOC is Formaldehyde which can cause sensory irritation and induce nasopharyngeal cancer. The aim of this study was to investigate potted plant-soil system ability in formaldehyde removal from indoor air. We applied one of common interior plant from the palm species, *Chamaedorea elegans*, inside a chamber under the controlled environment. Entire plant, growing media and roots contribution in formaldehyde were evaluated by continuously introduction of different concentrations of formaldehyde into the chamber ($0.66\text{--}16.4\text{ mg m}^{-3}$) each over a 48-h period. Our findings showed that the plant efficiently removed formaldehyde from polluted air by 65-100%, depending on the inlet concentrations, for a long time exposure. A maximum elimination capacity of $1.47\text{ mg/m}^2\cdot\text{h}$ was achieved with an inlet formaldehyde concentration of 14.6 mg m^{-3} . The removal ratio of areal part to pot soil and roots was 2.45:1 (71%: 29%). The plants could remove more formaldehyde in light rather than dark environment. Concentrations up to 16.4 mg m^{-3} were not high enough to affect the plants growth. However, a trivial decrease in chlorophyll content, carotenoid and water content of the treated plants was observed compared to the control plants. Thus, the palm species tested here showed high tolerance and good potential of formaldehyde removal from interior environments. Therefore, phytoremediation of VOCs from indoor air by the ornamental potted plants is an effective method which can be economically applicable in homes and offices.

Keywords: Phytoremediation; Formaldehyde; potted plant; Indoor air pollution

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