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Arnon Setsungnern, Chairat Treesubsuntorn, Paitip Thiravetyan

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Chlorophytum comosum–bacteria interactions for airborne benzene remediation: effect of native endophytic *Enterobacter* sp. EN2 inoculation and blue-red LED light

Arnon Setsungnern[a], Chairat Treesubsuntorn[b], and Paitip Thiravetyan[a]*

[a] School of Bioresources and Technology, King Mongkut's University of Technology Thonburi, Bangkok 10150, Thailand

[b] Pilot Plant Development and Training Institute, King Mongkut's University of Technology Thonburi, Bangkok 10150, Thailand

* Corresponding author. Tel.: +66 2 470 7535; fax: +66 2 452 3455; email address: paitip.thi@kmutt.ac.th (P. Thiravetyan).

Abstract

This study was performed to determine the effect of plant–endophytic *Enterobacter* sp. EN2 interactions and blue-red LED light conditions on gaseous benzene removal by plants. It was found that under consecutive benzene fumigation for three cycles (18 days), inoculation of the strain EN2 into sterilized and non-sterilized native *C. comosum* resulted in significantly increased gaseous benzene removal compared to that in non-inoculated groups under the same light conditions ($P < 0.05$). Remarkably, EN2 colonization in inoculated plants under LED conditions was higher than under fluorescence conditions as the EN2 could grow better under LED conditions. Strain EN2 possesses NADPH that is used to facilitate benzene degradation and modulate plant growth under benzene stress by bacterial IAA production and ACC deaminase activity; higher IAA and lower ethylene levels were found in inoculated plants compared to non-inoculated ones. These contributed to better benzene removal efficiency. Interestingly, under fumigation for 16 cycles (67 days), there was no difference in gaseous benzene removal between inoculated plants and non-inoculated plants under the same light conditions at initial benzene concentrations of 5 ppm. This is probably due to EN2 reaching maximum growth under all treatments. However, *C. comosum* exhibited better benzene removal under LED conditions than under fluorescence conditions during 16 cycles, possibly due to better photosynthetic performance and plant growth, leading to more NADPH, and eventually enhanced benzene