Increased gaseous benzene remediation by inoculated *Chlorophytum comosum* with endophytic *Enterobacter sp.* EN2

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1. Introduction

Benzene is a volatile organic compound that causes an airborne pollution and human cancer. Contamination of benzene in indoor air is a major issue, which needed to be controlled [1]. The inoculation of endophytic bacteria to their native plants has more efficient than using plants alone in organic pollutant remediation [2]. This study aims to apply native endophytic bacteria to *Chlorophytum comosum*, high benzene removing plant, for enhancing benzene removal efficiency and propose the possible mechanism of bacteria to protect plant under benzene stress.

2. Experimental

Benzene removal efficiency was analysed by GC-FID. The photosynthetic pigments, Indole-3-acetic acid (IAA) and pyridine nucleotides (NADH and NADPH) were determined by spectrometric assays.

3. Results and Discussion

Inoculation of *Enterobacter sp.* EN2 to *Chlorophytum comosum* had higher benzene removal efficiency than non-inoculated plants. In addition, benzene could inhibit PSII photochemistry efficiency (*F*v/*F*m ratio) and total chlorophyll (a+b) content and reduce plant biomass in plant without inoculation. While, chlorophyll a/b ratio was increased. These appearances might be due to the fact that benzene mediated oxidative stress inside plants. Subsequently, plants modulated higher IAA content under benzene stress. The strain EN2 inoculation provided higher IAA contents in plants than non-inoculated plants resulted from ability of bacterial IAA production. These contributed to maintain plant growth under benzene stress. Moreover, NADH and NADPH accumulation in plants were increased towards benzene stress. High NADH and NADPH were also found in inoculated plant compared to non-inoculated ones. In benzene degradation pathways, NADH and NADPH served as electron donors for the enzymes involving in oxidation of benzene [3]. High pyridine nucleotides accumulation in inoculated plants seems to improve benzene removal efficiency.

4. Conclusions

Inoculation of endophytic *Enterobacter sp.* EN2 to their native *C. comosum* increased plant tolerance to benzene stress by keeping higher photosynthetic pigments and performances than non-inoculated plants. The inoculation of strain EN2 stimulated high IAA and maintain plant growth under benzene stress. Increased pyridine nucleotides contributed to greater benzene removal. Thus, the acceleration of airborne benzene remediation can be provided by inoculation of plants with native endophytic bacteria.

5. References

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