

## The Effects of Microbial Agent and Fertilizer on Phytoremediation of Diesel-Contaminated Soils

(디젤오염토양에서 미생물제제와 비료가 식물재배정확에 미치는 효과)

Seongmin Woo<sup>1</sup> · Gwanghyun Han<sup>2</sup> · Seokho Jung<sup>2</sup> · Hyunjae Kwon<sup>2</sup> · Linwoo Kang<sup>3</sup> ·

Pham Tan Viet<sup>3</sup> · Jaehong Yim<sup>1</sup> · Dongwook Kim<sup>1\*</sup>

우성민<sup>1</sup> · 한광현<sup>2</sup> · 정석호<sup>2</sup> · 권현재<sup>2</sup> · 강린우<sup>3</sup> · 밤탄비엣<sup>3</sup> · 임재홍<sup>1</sup> · 김동욱<sup>1\*</sup>

<sup>1</sup>Research Institute, Phygen Inc. Deajeon 305-301, Korea

<sup>2</sup>Chungbuk National University, Cheongju 361-763, Korea

<sup>3</sup>Konkuk University, Seoul 143-701, Korea

<sup>1</sup>화이젠주식회사, <sup>2</sup>충북대학교, <sup>3</sup>건국대학교

This study was conducted to investigate the effects of microbial agents and fertilizer to enhance the efficiency of phytoremediation. *Populus alba* x *P. glandulosa*, *Thuja orientalis* L., *Pinus densiflora*, and *Lolium perenne* L. were selected as candidates for remediation of a diesel-contaminated soil from the previous study. The microbial agent used in this study is microbial consortium composed of *Stenotrophomonas acidaminiphila* and *Pseudomonas putida* (Trevisan) Migula. These microbes are bacterium degrading petroleum compound and living in symbiosis with plants. 'Oreaga (18-8-8+4+0.2)' produced by Namhae Chemical was used as fertilizer. Pot growth experiment was performed for 150 days. The initial concentration of total petroleum hydrocarbon (TPH) was 6,000 mg kg<sup>-1</sup>. The biomass of *P. alba* x *P. glandulosa* was increased at the highest rate when both microbial agent and fertilizer were applied; however, it didn't reach at the level of control cultivated in non-contaminated soil. The decrease rate of TPH with conditions; poplar only, poplar with microbial agent, poplar with fertilizer, and poplar with both of them, were 40%, 55%, 69%, and 81% respectively. The biomass of *T. orientalis* was not increased by application of microbial agent or fertilizer. The decrease rate of TPH with conditions were 62%, 63%, 75% and 83% respectively. The biomass of *P. densiflora* was not increased by application of microbial agent or fertilizer like *T. orientalis*, but the root growth was improved significantly. The decrease rate of TPH with conditions were 60%, 45%, 83% and 77% respectively. The biomass of *L. perenne* L. was increased into the level of control by application of both microbial agent and fertilizer. The decrease rate of TPH with conditions were 62%, 35%, 77% and 76% respectively. These results showed that fertilizer could be most crucial factor to enhance the efficiency of phytoremediation, while microbial agent could not function sufficiently by itself. The combination of microbial agent and fertilizer might be the available solution to clean any diesel-contaminated soil by using plants.

**Key words :** Phytoremediation, Diesel-contamination, Soil, Microbial agent, Fertilizer

**Corresponding author :** E-mail. dwsoil@paran.com; Tel. 82-42-822-4864

This work was supported by a grant (Code 173-091-001) from GAIA project, Ministry of Environment, Republic of Korea.