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"Gheorghe Asachi" Technical University of Iasi, Romania

REVITALIZATION OF PESTICIDE-POLLUTED AGRICULTURAL SOIL FUNCTIONS BY MICROBIOME TRANSPLANTATION

Emoke Dalma Kovacs[1,2*], Teodor Rusu[2], Lech Szajdak[3], Di Tian[4], Cecilia Roman[1], Lacrimioara Senila[1], Melinda Haydee Kovacs[1]

[1]Research Institute for Analytical Instrumentation, INCDO-INOE 2000, 67 Donath Street, Cluj-Napoca, 400293, Romania
[2]Faculty of Agronomy, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, 400372, Romania
[3]Institute for Agricultural and Forest Environment, Polish Academy of Science, Poznan, 60-809, Poland
[4]College of Forestry, Beijing Forestry University, Beijing 100083, China

Abstract

The continuous application and often the overuse of pesticides in agricultural soils influence in time soil microbiota abundance and metabolic activities, with final potential negative effects on soil functioning. Recently, bioaugmentation has emerged as an advantageous method for revitalizing agricultural soils affected by chemicals use. In this study, the hypothesis that transplantation of soil cores with optimal microbiota community structure could serve in affected soil microbiota restoration and pesticides degradation enhancement was evaluated. To assess soil core transplantation efficiency, in this study were investigated implication of soil microbiota structure and abundance in pyrethroids degradation in soil, as well pyrethroids impact on soil microbiota metabolic activity. The presence of pyrethroid pesticides as cypermethrin, deltamethrin and fenvalerate in agricultural soils from Turda was evidenced within range of 119 – 845 $\mu g \cdot kg^{-1}$. They negatively impacted both soil bacterial and fungal community abundance, decreasing them with approximately 50%. The impact of transplanted soil cores on both soil microbiota abundance as well on cypermethrin, deltamethrin and fenvalerate concentration was also evidenced. A revitalization of microbiota abundance in contaminated soil was observed after transplant (increase with 1.5-fold generally). These data positively sustain that affected soil microbiota due to use of pyrethroid pesticide could be revitalized through transplant of soil cores with no contamination.

Keywords: biodegradation, catabolic activity, microbiota, pyrethroid pesticide, soil transplant

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[*]Author to whom all correspondence should be addressed: e-mail: dalmaemokekovacs@gmail.com; Phone: +40 741 049178; Fax: +40 364 401433