Česká zemědělská univerzita v Praze
Fakulta agrobiologie, potravinových a přírodních zdrojů

DOKTORSKÝ STUDIJNÍ PROGRAM/ DOCTORAL STUDY PROGRAM

NÁVRH TÉMATU/PROPOSAL OF THEME

Studijní program/*Study Program*: **Special Agricultural Science**

Studijní obor/*Branch of Study*: **Exploitation and Protection of Natural Resources**

Katedra/*Department of*: **Agroenvironmental Chemistry and Plant Nutrition**

Školitel (včetně titulů), email/*Supervisor*, email: **Prof. Dr. Pavel Tlustos, tlustos@af.czu.cz**

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Forma studia/*Form of Study*: **Full_time**

Téma/Theme: **Bioremediation of pharmaceutical compounds accumulated in wastewater sewage sludge**

Hypotéza/ Hypothesis: A sewage sludge is produced during the wastewater treatment process in a wastewater plant. Sewage sludge is known to be rich in nutrients, which could be reused. However, the sewage sludge accumulates a large scale of pollutants including a wide range of pharmaceutical compounds residues. A high content of pharmaceuticals in wastewater sewage sludge could limit their possible reuse e.g. in agriculture. It is assumed, that the pharmaceutical compounds could be significantly decreased or mineralized from a sewage sludge or soil amended with a sewage sludge-organic substrate mixture using the environment friendly bioremediation and phytoremediation approaches. Sewage sludge after the bioremediation could be safely used in agriculture.

Anotace/Annotation: Sewage sludge disposal costs are continuously rising with increasing sewage sludge production from a wastewater plants. A sewage sludge contains a large amount of organic matter and nutrients. Due to this, could be suitable for the replacement of mineral fertilizers. Wastewater sludge can also accumulate wide spectra of inorganic and organic pollutants especially persistent organic pollutants, personal care products and pharmaceutical compounds residues. Pharmaceutical compounds persist in the environment, may enter to plants, animals and further can get into the food chain of biota. A whole range of non-steroidal anti-inflammatory drugs, beta-blockers, antidepresives and many others are included into the pharmaceuticals which chemical structure can change after they enter the biota. Thus, many side effects may occur in biota. Therefore, the application of sewage sludge into agriculture soil can lead to a serious environment threat. It is necessary to find suitable bioremediation approaches for the decrease of pharmaceuticals derived from raw sewage sludge before their reuse as a mineral fertilizer.

Main aim of PhD study is to find suitable bioremediation methods for the removal of selected pharmaceutical compounds present in sewage sludge. An experiment with plants will be established for the evaluation of plants and autochthonous microorganisms ability to decrease the content of sewage sludge pharmaceuticals amended soil in relation with selected microbial enzyme activities. Influence of pharmaceuticals on biomass dry weight and plant uptake of pharmaceuticals from soil will be also evaluated. Removal of pharmaceutical compounds from sewage sludge amended soil will be compared to the removal of pharmaceutical spiked soil.

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