

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**

Konzultant (včetně titulů)/*Co-supervisor*:

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

Téma/Theme: Improvement of Sewage Sludge Properties Derived from Sewage Water Plants by Thermal Treatment

Hypotéza/ Hypothesis: Sewage sludge contains wide spectra of compounds eliminated during cleaning process of wastewater and stabilized in solid phase of waste. We suppose that sewage sludge contains a large number of contaminants, and their composition and content strongly depend on the area of interest and activities provided there. Thermal treatment can transform or degrade a large number of contaminants. Contemporary sewage sludge organic matter quality is transformed and the nutrient availability is changed.

Anotace/Annotation: Sewage sludge production is growing all around the world and another increase of sludge production is expected by the growing pressure on the quality of treated sewage water from the majority of inhabitants on the planet. Sewage sludge can accumulate a large amount of organic matter and nutrients suitable for the replacement of mineral fertilizers. Sewage sludge can also accumulate wide spectra of contaminants with different chemical properties. Apart from intensively studied toxic elements, a great attention is made on persistent organic pollutants, pharmaceuticals, and personal care products. Many organic compounds are difficult to identify, therefore specific extraction procedures have to be required. Mentioned compounds are sensitive to growing temperature of pyrolyses and can be transformed or decomposed. Higher temperature of pyrolyses can also stabilize organic matter of sewage sludge and probably improve physical properties of original materials.

PhD study will be focused on the determination of organic matter quality and on the development of protocol for the determination of wide spectra of toxic organic compounds, mainly pharmaceuticals and personal care products in a large set of sewage sludges sampled at different sewage plants with described technology of cleaning. The effect of thermal treatment on the changes of toxic compounds content and the quality of organic matter in the treated sludge will be subsequently evaluated. Further objective will focus on the evaluation of treated materials after the application into the soil and the possibility to use them as fertilizers.

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