



Česká zemědělská univerzita v Praze

Fakulta agrobiologie,  
potravinových a přírodních zdrojů

DOCTORAL STUDY PROGRAM

## PROPOSAL OF THEME

*Study Program:* **Plant Sciences**

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

*Supervisor, email:* **doc. Ing. Aleš Hanč, Ph.D.; hanc@af.czu.cz**

*Co-supervisor:* **Ing. Pavel Švehla, Ph.D.**

*Form of Study:* **Full\_time**

*Type of Theme:* **Framework**

**Theme:** **Issue of Sewage Sludge Vermicomposting**

### **Hypotheses:**

1. It is assumed that the vermicomposting represents one of the possible methods of sewage sludge treatment, which will lead to the improvement of the applicability of the sludge on agricultural soil.
2. The conditions prevailing naturally in the environment of the sludge will not be suitable for long-term maintenance of the activity of the earthworms. In this respect, especially high concentration of total ammonia at relatively high pH value and from it derived toxic effect of free ammonia seems to be problematic.
3. The improvement of pH, thermal pre-treatment or the treatment of the sludge in the mixture with other substrate(s) will lead to the achievement of suitable conditions for the vermicomposting of sludge.

### **Annotation:**

Sewage sludge represents suitable source of inorganic nutrients as well as organic matter. From this point of view, it seems to be suitable source of these compounds for plant nutrition. However, during wastewater treatment process, many pollutants such as endocrine disruptors, pharmaceutical residues, PCB, PAH or heavy metals are transferred into the matter of the sludge. This phenomenon is caused mainly by the sorption of these compounds onto particles of primary or secondary sludge during mechanical as well as during biological treatment of wastewater. In addition, at present time, the conditions for the application of sludge to soil are significantly tightened. Therefore, real risk of the impossibility of the use of the nutrients present in the sludge become very actual.

The aim is to identify the factors inhibiting the activity of earthworms in the environment of the sewage sludge. Subsequently, optimal conditions for specific micro-pollutants removal from sludge will be suggested where suitable technology of sludge treatment will be developed. The possibility of the removal of monitored micro-pollutants during the transfer of treated water through the layer of vermicompost produced from the sludge or through the vermicomposting system itself will be also evaluated. Due to the complexity of the work, vermicompost will be tested as a fertilizer in precise pot experiments and field vegetation experiments.

**Source of:** NAZV QK1910095 Use of Vermicomposting to Eliminate Micropollutants for Safe Application of Sewage Sludge on Agricultural Land

*Date:* 24.1.2020

*Signature:*