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

DOCTORAL STUDY PROGRAM

PROPOSAL OF THEME

Study Program: **Special Agricultural Science**

Branch of Study: **Exploitation and Protection of Natural Resources**

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**

Theme: Factors Affecting the Earthworm Activity during the Vermicomposting of Sewage Sludge

Hypothesis:

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.
4. It is possible to use the vermicompost gained from the sludge or the vermicomposting system serving for the vermicomposting of sludge itself as a filtration medium for the removal of different pollutants from specific wastewaters.

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 of this dissertation 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.

Source of: NAZV QK1910095 Use of Vermicomposting to Eliminate Micropollutants for Safe Application of Sewage Sludge on Agricultural Land
The student could be financially supported from this project even simultaneously with the receiving of the scholarship.

Date: 30.1.2019 *Signature:*