

Impact of sewage sludge disposal on bacterial activity, nutrient and heavy metal content of Chernozem soils, Southeastern Hungary

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Sludge, as a product of the wastewater treatment, contains organic matter, micro and macronutrients which are potentially useful for agriculture usage. However, it can be harmful when containing undesirable amount of organic pollutants, heavy metals or pathogens. Our research addressed to investigate the impact of systematic sewage sludge disposal on Chernozem soils in Southeastern Hungary. Nutrient and toxic element content, furthermore bacterial activity of treated and control soils were compared to identify the potential changes. The soil sampling was carried out in March 2018 near Újkígyós settlement. Average samples were collected from the upper soil (0-30 cm) and subsoil (30-60 cm) from six sites of 2500 m² within the study area (4 sites were affected by sewage disposal and 2 control sites). Furthermore, soil samples were collected from boreholes at 4 depths (0-30 cm, 30-70 cm, 70-110 cm, 110-150 cm) repeating a previous soil survey in 2013. In the laboratory, the samples were analysed to determine the basic soil properties (pH, salt content, organic matter and carbonate content, Arany yarn number), the concentration of heavy metals using ICP-OES spectrophotometer and the nutrient content by FIA spectrometer. To determine the bacterial composition, the number of living cells, the catalase enzyme activity and the dehydrogenase activity were determined. The analysis of the heavy metals made us clear that zinc, copper and cadmium showed higher values compared to the control area, however, the values were lower compared to the previous survey in 2013. Based on these, it can be concluded that the toxic element content did not increase significantly due to the sludge disposal. Bacteriological studies showed that bacterial numbers and enzyme activity have also increased slightly as a result of sewage sludge disposal. The research was funded by the 'Thematic Network for the Sustainable Use of Resources – RING2017' project (program code: EFOP-3.6.2-16-2017-00010).