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Influence of Sewage Sludge on Agricultural Land Quality and Crop

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Abstract : Since the accumulation of large quantities of sewage sludge is producing serious environmental problems, numerous environmental specialists are looking for solutions to solve this problem. The sewage sludge obtained by treatment of municipal wastewater may be used as fertiliser on agricultural soils because such sludge contains large amounts of nitrogen, phosphorus and organic matter. In many countries, sewage sludge is used instead of chemical fertilizers in agriculture, this being the most feasible method to reduce the increasingly larger quantities of sludge. The use of sewage sludge on agricultural soils is allowed only with a strict monitoring of their physical and chemical parameters, because heavy metals exist in varying amounts in sewage sludge. Exceeding maximum permitted quantities of harmful substances may lead to pollution of agricultural soil and may cause their removal aside because the plants may take up the heavy metals existing in soil and these metals will most probably be found in humans and animals through food. The sewage sludge analyzed for the present paper was extracted from the Wastewater Treatment Station (WWTP) Galati, Romania. The physico-chemical parameters determined were: pH (upH), total organic carbon (TOC) (mg L^{-1}), N-total (mg L^{-1}), P-total (mg L^{-1}), N-NH_4 (mg L^{-1}), N-NO_2 (mg L^{-1}), N-NO_3 (mg L^{-1}), Fe-total (mg L^{-1}), Cr-total (mg L^{-1}), Cu (mg L^{-1}), Zn (mg L^{-1}), Cd (mg L^{-1}), Pb (mg L^{-1}), Ni (mg L^{-1}). The determination methods were electrometrical (pH, C, TSD) - with a portable HI 9828 HANNA electrodes committed multiparameter and spectrophotometric - with a Spectroquant NOVA 60 - Merck spectrophotometer and with specific Merck parameter kits. The tests made pointed out the fact that the sludge analysed is low heavy metal falling within the legal limits, the quantities of metals measured being much lower than the maximum allowed. The results of the tests made to determine the content of nutrients in the sewage sludge have shown that the existing nutrients may be used to increase the fertility of agricultural soils. Other tests were carried out on lands where sewage sludge was applied in order to establish the maximum quantity of sludge that may be used so as not to constitute a source of pollution. The tests were made on three plots: a first batch with no mud and no chemical fertilizers applied, a second batch on which only sewage sludge was applied, and a third batch on which small amounts of chemical fertilizers were applied in addition to sewage sludge. The results showed that the production increases when the soil is treated with sludge and small amounts of chemical fertilizers. Based on the results of the present research, a fertilization plan has been suggested. This plan should be reconsidered each year based on the crops planned, the yields proposed, the agrochemical indications, the sludge analysis, etc.

Keywords : agricultural use, crops, physico–chemical parameters, sewage sludge
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