

Comparison of sewage sludge and chemical fertilizer application on yield and concentration of some nutrients in spinach (*Spinosa olerace* L.) in three textural classes of a calcareous soil

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Abstract

Addition of sewage sludge (SS) in soil causes increasing soil organic matter, which in turn improves soil physical properties, and could supply part of the nutrients required by plants. For comparison of SS application and chemical fertilizer treatment (CFT) on yield and concentration of some macro and micro nutrients in spinach, a greenhouse factorial experiment, arranged in a completely randomized design (CRD), was conducted with three replications. The first factor included SS levels (0, 10, 20, 40 and 80 gr kg⁻¹) and the second factor was soil textural classes (clay loam, sandy loam and sandy). A CFT was also used to compare its affect with that of SS levels. Results showed that addition of all levels of SS caused significant increase in the weight of spinach shoots in three soil textures. Application of all SS levels caused significant increase of nitrogen (N), phosphorous (P), iron (Fe), zinc (Zn), copper (Cu) and manganese (Mn) concentration in spinach shoots. With SS application, none of the nutrients' concentration in spinach reached the toxic level. The amounts of cadmium (Cd) and lead (Pb) were not detectable in shoots. However, in frequent application of SS, especially at high levels, it is necessary to measure and detect these elements in plants. Effect of fertilizer in increasing yield and concentration of nutrients was less than the 40 and 80 gr kg⁻¹ SS treatments. Considering the Fe and Zn deficiency in calcareous soils, application of SS can be effective for combating this deficiency. Prior to any recommendation of SS application, the results of this research need to be verified under field conditions.

Keywords: Sewage sludge, Chemical fertilizer, Calcareous soil, Spinach, Macro and micro nutrients.

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