Compost from plant and animal residues of a zoo park improves the fertility of soils and increases the growth and production of lettuce

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INTRODUCTION

Composting is a biological decomposition and stabilization of organic substrates that can be applied to the soil for fertilization (Figure 1) [1]. The São Paulo Zoo Park (SPZP) produces compost using all organic waste from the park and applies it on their own farm crops to be used for the animals feeding [2]. The aim of this study was to evaluate the potential of this composting in providing nutrients to the foods (Figure 2). This recycling process applied in the dependences of the Zoo, knowing as CIRCULAR ECONOMY, serves as a tool for sustainable development.

RESULTS AND DISCUSSION

In order to evaluate the nutritional quality of the soil, and to observe the dynamics of the nutrients, from soil preparation to harvesting, the soil was subjected to treatments L, C5, C7, and C10, pH and matter, pH 3.0, and 40°C (C10), and after harvesting the plants (all six treatments), Figure 3 (A,B and C). The soil before planting (Blank) contained 22 g dm⁻³ of organic matter, pH 3.0, and 40 mmol, dm⁻³ CEC; when organic material was added to the soil producing the treatments L, C5, C7, and C10, pH and CEC increased significantly improving the soil nutritional quality, (Figure 4A and 4B).

In the loadings graph (Figure 5A), lettuce seedlings treated with leachate (L replicates) produced leaves that are mostly found in the upper half of the PCA score graph (Figure 5B), which were characterized by the levels of Mn, Na, and Fe. In the leaves of lettuce cultivated with leachate, the average level of Fe was 422 mg kg⁻¹. Lettuce plants grown in soil treated with compost and MF presented similar Fe levels, which varied from 322 to 422 mg kg⁻¹. On the other hand, plants grown without any fertilization showed low levels of this nutrient. The fertility analysis showed an improvement in the quality of the composted soil due to the presence of nutrients such as Mg and Fe, and the increase of pH. The elevation of pH was responsible for providing other nutrients to the plants, that although present in the soil, they were not bioavailable.

CONCLUSIONS

- The production of compost at the SPZP saves over US$ 50,000/year on the costs of residues disposal in landfills as well as in expenses in tons of fertilizers/year used in the zoo garden and at the farm, where most of the animals feed is produced.
- Besides this economic value, it was possible to demonstrate that a poor soil can be corrected to produce high-quality crops by adding small amounts of compost (5-10%) in the soil to produce high-quality lettuces, which was not possible to achieve even when using mineral fertilization over the soil.
- This management practice has been contributing to the CIRCULAR ECONOMY and consequently to the development of sustainability in the Zoo, besides providing to the society sustainable forms of economy development without degrading the environment and generating resources.

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References