Effect of mineral enrichment on the humic fraction composition during the composting process

C.C. Lima (1,2), E.S. Mendonça (2), I.R. Silva (2), A. Roig (3), M.A. Sáchez-Monedero (3) , M.L. Cauyela (3) y B.H. Peres (2)

(1) Escola Agrotécnica Federal de Satuba, 56.120-000, Satuba, AL, Brasil; (2) Departamento de Solos, Universidade Federal de Viçosa, 36.571-000, Viçosa, MG, Brazil; (3) CEBAS-CSIC, Campus Universitario de Espinardo, Apartado de Correos 164, 30.100 Espinardo, Murcia, Spain. (claudivancosta@ig.com.br)

ABSTRACT

The agricultural use of organic wastes of agro-industrial origin is a suitable way to contribute to the sustainability in agriculture systems. Thus, the use of these composted wastes would enable the efficient recycling of their nutrients in the system y the reduction of the environmental pollution. These composts can be enriched by adding mineral fertilisers that could contribute to the production of compost rich in humic substances with specific agronomic characteristics. The aim of the present work was to evaluate the effect of different mineral amendments on the evolution of the humic fraction during composting. Five different composts were prepared using sweet cane bagasse, ashes of sweet cane bagasse and poultry manure in the rate of 3:3:2 (dry weight basis). The treatments were as follow: 1) Control without mineral amendments; 2) enriched with the mineral fertilisers rate recommended for the sweet cane NPK, using urea as N source; 3) enriched with the fertiliser rate recommended for the sweet cane, using ammonium sulphate as N source; 4) enriched with serpentinite and micaxisto powdered rock; and 5) enriched with phosphate rock. The mixtures were placed in containers of 60 litres with lateral holes to allow natural aeration, and distributed in randomised blocks with three replicates per treatment. Sampling was performed in the following times: 0, 30, 90 and 120 days, in order to carry out the following analysis: total organic carbon and total nitrogen, carbon and nitrogen in the humic and fulvic acid fractions, light organic matter (LOM), fractionation of LOM in lignine, cellulose and hemicellulose. Together with the functional groups, at the end of the composting process, in the mature compost. The results indicated that there was a decrease in the LOM throughout the composting time, whereas there was a relative increase in the rate of lignine and a decrease in the structural carbohydrate (cellulose and hemicellulose). A decrease in total carbon and nitrogen contents in compost were observed. The same tendency was detected in the humic and fulvic fractions in all the treatments except in the compost enriched with phosphate rock. It is relevant to indicate that the mineral enrichment of the compost causes modifications in the humic substances contents.

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