The UV-visible absorption and fluorescence spectroscopy indicators for monitoring the evolution of green waste composts.

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Abstract

The maturity process of compost goes through several phases that have to be monitored in order to optimize the production process which in turn assure a good quality product and less time consumption. In order to estimate rapidly the phase where the compost is present and to measure the cellulose, the ratio C:N and the Stability Index Organic Matter (ISMO) a crucial parameter that needs to be monitored and controlled is the temperature. However, the temperature is not really a good indicator for the maturity of the compost because it is not constant and it depends on the mixing and environmental processes. The final measurements are performed at the end of the production process after certain time period that is subjectively determined by the producer. The work presented here is based on the optical properties of the organic matter that are observed each month for a period of six months. The organic matter of 5 composts was extracted by water and analyzed by UV-VIS spectroscopic technique [1] and 3D fluorescence emission technique [2]. The usual indexes were calculated (E_2/E_3, E_4/E_6, E_{BZ}/E_{ET}, $SUVA_{254}$), but also the PARAFAC decomposition of the 3D fluorescence response by Milori [3] and the Hx indexes [4]. The comparison of these results and the cellulose composition with the corresponding ISMO index indicates that the maturity process occurs more rapidly then the expectation of the producers. Further, the combination of the indicators gives useful information about different processes that take place during the maturity of the compost such as aromatization, the condensation and the stabilization of the parameters.

[1] Guo, X.; He, X.; Zhang, H.; Deng, Y.; Chen, L.; Jiang, J. Characterization of dissolved organic matter extracted from fermentation effluent of swine manure slurry using spectroscopic techniques and parallel factor analysis (PARAFAC). *Microchemical Journal* **2012**, *102*, 115–122.

[2] Tian, W.; Li, L.; Liu, F.; Zhang, Z.; Yu, G.; Shen, Q.; Shen, B. Assessment of the maturity and biological parameters of compost produced from dairy manure and rice chaff by excitation-emission matrix fluorescence spectroscopy. *Bioresource Technology* **2012**, *110*, 330–337.

[3] Milori, D. M. B. P.; Martin-Neto, L.; Bayer, C.; Joao, M.; Bagnato, V. S. Humification degree of soil humic acids determined by fluorescence spectroscopy. *Soil Science* **2002**, *167*, 739–749.

[4] Zsolnay, A.; Baigar, E.; Jimenez, M.; Steinweg, B.; Saccomandi, F. Differentiating with fluorescence spectroscopy the sources of dissolved organic matter in soils subjected to drying. *Chemosphere* **1999**, *38*, 45–50.