

Mastering the quality of compost by measuring and monitoring the persistence of micro-organisms and organic trace compounds as well as its agricultural value

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The Narbonne Town Council has decided within the framework of its wastewater depollution policy to opt for sludge treatment directed at the production of compost. This choice has given rise to a research programme whose aim is to ensure that the resulting compost does in fact correspond to user requirements : specifically, to define its agricultural value and to verify by means of a tracability protocol that it is harmless for the use envisaged.

The initial step has been to identify and characterise the various micro-organic pollutants (MOP) and microbiological organisms present, from the arrival of the effluent at the sewage plant to the final compost. Mineral traces (especially of heavy metals) are not taken into account in this study because the wastewater under consideration is essentially domestic in origin.

The analyses carried out on the wastewater, the sludge and the compost concern the following elements :

- MOP : APH, PCB, derivatives from detergents (LAS, NEP), phtalates, dioxines and furanes. The techniques used were mainly those based on chromatography.
- Microbiological parameters : E. coli, Salmonellae, Clostridium perfringens, Campylobacter jejuni, Pseudomonas syringae, helminth eggs, enterovirus. The methods used are those based both on the techniques of Pasteur's microbiology and on molecular biology, so as to take into account the fact that only a small fraction (less than 10%) of the microbial population in a sewage works can be cultured.

During the second stage, to last three years, a study will be made of the transfer of these undesirable elements from the compost to the soil and the plants (vines). Experiments to be carried out on a vineyard plot are designed to measure resistant microbiological elements and the residual MOP in both the soil and the vines after the spreading of compost and green plant refuse. These field experiments will be backed up by laboratory investigations aimed at characterising the transfer of MOP from the soil to the plant. Marker molecules added to plants grown in pots are to be used to measure the quantity of radioactivity absorbed by a plant then channelled throughout (roots, stems, leaves and fruit). Liquid chromatographic analyses make it possible to identify and quantify the residue from the original compounds finally incorporated into a plant.

A third stage will enable the agricultural value of the compost to be determined, particularly the effectiveness of urban sewage compost in erosion prevention in viticulture. Two kinds of anti-erosion application are to be studied : 1) the physical protection of soils against rain and run-off by the addition to the soil in an existing vineyard of a course compost with a mulching effect ; 2) the improvement of the structure and functioning of the soil by the addition to it, before the planting of the vines, of a well-rotted compost made up of quite small particles. These trials will last for three years.

This programme of experiments, designed to go on for a period of four years beginning in mid-2003, involves the following associated partners : INRA (laboratories at Narbonne, Pech Rouge, Montpellier, Toulouse, Dijon, Arras), the Institut Technique du Vin, the Véolia Group (Générale des Eaux, Creed, Orval, Anjou Recherche). Funding has come from ADEME (the French National Agency for the Environment and Energy), the Rhône-Méditerranée-Corse Water Board and the Languedoc-Roussillon Regional Government Council.