

Sustainable Recycling of Compost Products in Plant Production

Tiina Tontti¹, Keijo Lehtonen² & Ritva Mäkelä-Kurtto²
MTT Agrifood Research Finland, Environmental Research,
¹Ecological Production, Karilantie 2A, FIN-50600 Mikkeli
²Environmental Management, FIN-31600 Jokioinen
E-mail: Tiina.Tontti[a]mtt.fi

The research project "Sustainable recycling of compost products in plant production" is carried out at the MTT Agrifood Research Finland in 2000-2002 with financing from the Ministry of Agriculture and Forestry and the Ministry of the Environment and in co-operation with the Plant Production Inspection Centre (KTTK), Häme Regional Environment Centre and Agropolis Ltd. There is a two-sided background for this project. First, environmental regulations require increased utilisation and recycling of wastes, thus increasing composting of municipal organic waste. Second, humus resources of soil are continuously depleted by current agricultural practices, leading towards ever weakening physical properties of the soil. This latter process has to come to a standstill or even to come to a turnaround.

The project aims at improving the quality of composts made of municipal biowaste and sewage sludge and at developing the quality control of composts in co-operation with compost producers and governmental authorities. The most important objective is to study and verify the effects of the use of biowaste and sewage sludge composts in plant production under Finnish conditions. The manure problems in livestock industry may also be decreased by the development of co-composting systems. This project is divided into three sub-projects; 1) Compost quality, 2)

Fertilising effects, and 3) Soil improving and environmental effects.

The Compost quality sub-project concentrates on the development of a compost quality control system for composts used in plant production as well as on promoting the production of quality composts for plant production. Observations of composting processes are carried out in co-operation with the composting facilities. Compost maturation piles are sampled at different points of maturation, and maturity indicators (C:N ratio, NH₄:NO₃ ratio, plant growth tests), heavy metal content and general properties are analysed. Surveillance of selected composting processes is conducted by regular temperature and oxygen measurements in maturation piles. Preliminary results show that poor compost quality requires improved quality control.

The Fertilising effects sub-project aims at producing extensive knowledge of fertilising effects of the composts in plant production. The objective is to improve the utilisation of compost nutrients and to produce better recommendations for the compost use. Composts made of source-separated biowaste, sewage sludge, or forest industrial sludge are provided by co-operative composting facilities, and applied for the establishment of 3-year field experiments on malt barley and forage grass (grass and red clover-grass). Compost application is based on total P content

for 2 or 4 years, with supplementary N and K, if necessary. Plant nutrient content in the soil, nutrient uptake, and yield of plants after compost application are determined and compared to NPK fertiliser or farmyard manure compost. Preliminary results indicate that low plant-available nutrient (N, P) contents in composts will require higher application rates of municipal waste composts or supplementary fertilisation.

The Soil improving and environmental effects sub-project studies soil conditioning effects of composts as well as the advantages and

disadvantages of compost application to the environment. The aim is also to minimise nutrient leaching when using composts. In the same field experiments as in the fertilising study, the changes in soil physical parameters are measured. Humus content, nutrient release, and heavy metal contents in soil are determined and followed up. Preliminary results suggest that quality control leads to a dual compost product development. One compost product useful as organic soil conditioner, and another compost product to be used as organic fertiliser with a high nutrient value.