

Chapter 11

Interactions Between Beneficial and Harmful Microorganisms: From the Composting Process to Compost Application

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Abstract Numerous microorganisms are involved in the composting process, but their precise roles are often unknown. Compost microorganisms are influenced by the composition of the substrate and by the temperature in the compost pile. In addition, different microorganisms also influence each other, e.g. through competition. In the first phase of composting, microbial activity increases drastically, leading to a rise in temperature. The initial bacterial dominance is replaced by a fungal one during compost maturation.

Compost management aims to achieve favourable conditions for beneficial and unfavourable conditions for harmful microorganisms. The type of input substrate, the size of compost piles, the frequency of turning, particle size, aeration and moistening all affect the microbial processes. They influence microorganisms mainly by affecting nutrient, oxygen and water supply. Sometimes, composts are inoculated with selected microorganisms. Harmful microorganisms are introduced into the compost mainly with the input substrate. They are mainly inactivated by high temperatures, but other mechanisms of inactivation have also been demonstrated, e.g. certain plant-derived compounds and antagonistic interactions. Beneficial microorganisms are capable of outcompeting harmful ones during the process and/or have a beneficial effect on crops after field application. Application of compost increases the microbial activity of soils, and crops are less sensitive to diseases after compost application (disease suppressiveness); the mechanisms are largely unknown. Better knowledge in this field would certainly allow optimizing the composting process to enhance disease suppressiveness.

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