Use of Quality Compost after Soil Steaming

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Introduction

Soil steaming is a very efficient and radical measure to eliminate soilborne plant pathogens, micro-organisms and weed seeds. It is used frequently in vegetable production in the field and the green house.

Because of it's nonselectivity it destroys the whole complex of flora and fauna in the soil, irrespective if organisms are beneficial or harmful. Since soils are "biologically empty" after steaming they are very susceptible to microbial colonisation.

Problematic is also the buildup of phytotoxic compounds in the soil because of degradation of dead biomass after the soil treatment.

Material and methods

Soil from a vegetable field was steamed for 6 hours at 100°C. When the soil temperature reached 40°C during the cooling process compost (10% of soil volume) with controlled high biological activity was added. The progress of the nitrite level in the soil was measured. In a experiment, phytotoxicity symptoms on seedling stages of tomato and lamb's lettuce were determined. In a second experiment, *Pythium ultimum* (1, 2, 4 and 8 g inoculated sorghum grains / litre soil) was added to the soil five weeks after the soil treatment and the development of damping off disease on cucumber seedlings was assessed.

Results

Already a few hours after steaming, the compost tested stabilised the nitrite level in the soil (Fig. 1). Tomato seedlings which were transplanted one day after steaming into the soil activated with the compost developed vigorously and without any symptoms of phytotoxicity (Fig. 2). Even the very sensitive lamb's lettuce sown 24 hours after steaming grew healthy and vigourously (Fig. 3).

Disease incidence on cucumber sown in steamed soil without compost already was high with little inoculum quantity of *Pythium ultimum*. However, the addition of 10% of the compost reduced significantly plant death. Five to ten times more inoculum quantity of the pathogen would have been necessary to obtain approximatively the same disease incidence in the soil with compost as in the soil without compost.

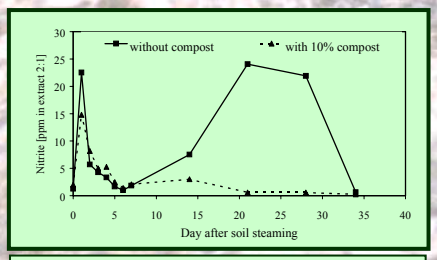

Fig. 1: Influence of compost on the progress of the nitrite level in the soil after steaming. Compost was added to the soil after steaming. Each value is the mean of three independent experiments.

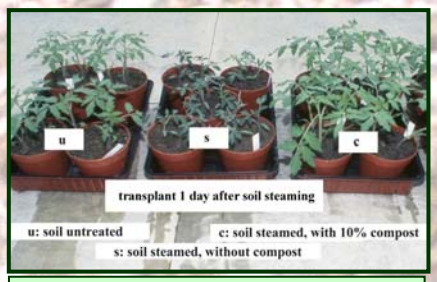

Fig. 2: Influence of compost on the phytotoxicity of tomato seedlings.

Fig. 3: Influence of compost on the phytotoxicity of lamb's lettuce.

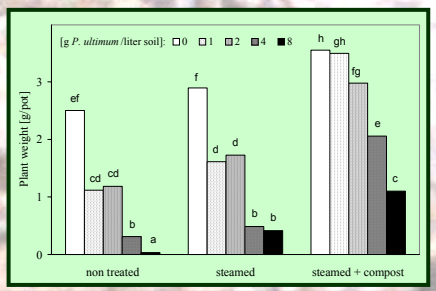

Fig. 4: Influence of compost on the receptivity of steamed soil to *Pythium ultimum* causing damping off on cucumber. Each value is the mean of three independent experiments.

Conclusion

- The addition of compost with controlled and high biological activity to soil after steaming detoxicate the soil and avoids/reduces phytotoxicity. Earlier transplant of seedlings is possible.
- Microorganisms of the compost buffer the soil and prevent its recolonisation with plant pathogens. The compost used is efficient to control biologically soilborne plant pathogens.
- Compost with controlled and high biological activity allows sustainable soil steaming with long-term efficacy.

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