

Introduction of biocontrol agents of fusariosis on the composts

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© SGEM 2018. In the process of growing organic products farms face many problems including the need to treat phytopathogens without fungicides or to increase yields without mineral fertilizers. In organic farming, agents of biological control as well as nonconventional organic fertilizers can be used to achieve these goals. One of the main problems with biocontrol agents is that their survival after introduction into soil may be very different since it depends on many biotic and abiotic factors in soil ecosystems. The problems with nonconventional organic fertilizers are connected with their nonstable content and properties, and compost is one of the types of such fertilizers that is widely used. In our study, we were trying to combine composts with biocontrol agents producing so called suppressive composts, which simultaneously possess soil improving as well as phytopathogen inhibiting properties. The compost was prepared from chicken manure, cow manure and straw (2:2:1 w/w) for 4 months. After that it was inoculated by four microbial strains that were previously demonstrated to be suppressive towards plant fusariosis-*Trichoderma asperellum* T203, *Streptomyces* spp., *Pseudomonas fluorescence* WCS365 and *Pseudomonas putida* PCL1760. The suppressiveness of the compost was estimated using tomato plants grown in the soil that was artificially infected with *Fusarium oxysporum*. It was shown, that suppressiveness of the compost during the first months after inoculation was 1.8-4.0 fold higher as compared with non-inoculated control. After 30 days, inoculated compost was divided into two parts, and one of the parts was inoculated for the second time in order to check our hypothesis that multiple inoculation leads to significant increase of survival rate of introduced strains, and therefore to additional increase of suppressiveness. Indeed, during the next 30 days the suppressiveness of the twice-inoculated sample was 1.3-2.0 fold higher than that in once-inoculated compost and 2.4-3.6 fold higher than that in the control. Using qPCR we demonstrated that gene copy numbers of *Streptomyces* spp. were significantly higher in both inoculated composts as compared with control, and that of *P. putida* PCL1760 was higher in the compost that was inoculated twice. The counts of two other strains did not differ significantly from the control in none of the inoculated composts. This means that i) suppressiveness of the composts was caused presumably by *Streptomyces* spp., or indigenous compost species which altered their amounts because of inoculation of the four strains, and ii) not all the strains added to composts are able to survive in it. We conclude that the inoculation of mature compost by biocontrol agents may lead to the increase of its suppressiveness, especially when inoculation is conducted twice. However, different biocontrol agents survive differently in the composts, and their ability to survive in the specific compost should be checked before using this technique in agricultural practice.

Keywords

Biocontrol agents, Compost, Fusariosis, Suppressiveness

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