Thermal disturbance of fertile soils to search for new biological control options in strawberry crops affected by yield decline

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Thermal disturbance of fertile soils to search for new biological control options in strawberry crops affected by yield decline

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Abstract

A study aiming at investigating biological control agents for protecting strawberry during the post-transplant period was performed. For this purpose, a series of fertile soils, rich in organic matter, which had been subjected to intensive strawberry cultivation, were selected. Soil samples taken from those soils were subjected to thermal treatment (up to 80 °C) for a short time to induce microbial changes aiming at improving soil suppressiveness. A greenhouse growth assay with treated and original soils was carried out in pot using frigo-plants. Plants were grown for two months, up to the end of the first production cycle; productive parameters were measured during this period, whilst plant vigour was estimated at the end of the trial as dry matter of the above ground part of the plants. At the end of the trial, root colonizing fungi were evaluated with culture base methods, whilst rhizosphere fungi and bacteria were quantified in terms of DNA amplicons using specific primers. Soil thermal treatments gave an overall increase of both vegetative and productive parameters of strawberry plants, even though the highest plant growth improvements were observed in soil samples originating from the fields showing most severe yield decline amongst the four contemplated in this study. Such an increase in soil health, besides the expected reduction of root infection by the fungal pathogens responsible for root rot in strawberry (mainly *Pythium* spp. and *Dactylonectria torresensis*), was related to qualitative and quantitative microbial changes in root and rhizosphere. Root-colonising fungal communities shifted towards *Aspergillus*, *Penicillium* along with a series of other non-pathogenic fungal saprophytes. A dramatic reduction of total soil fungi was observed in rhizosphere, whilst total bacteria increased in heat treated soil.