

Combined use of organic biofumigant materials and a biological control agent: First experience in Switzerland

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Introduction

Although the use of biological control agents (BCA) is currently widespread in contemporary agriculture, there are no studies of the combined use of BCAs and organic amendments for biofumigation. This study aims to be a first approach of the combined use of BCA and various organic *Brassicaceae* materials, for the reduction of soilborne pathogens and the multiplication of BCA.

Materials & methods

The trial was conducted during the summer of 2017 in a glasshouse located at the Agroscope facility in Conthey (Switzerland). Three different types of organic matter were tested in combination with a commercial BCA. Two different brown mustard cultivars (*Brassica juncea*), one with a high content of glucosinolates (ISCI-99) and other with a low content (Arid), and defatted *Brassica carinata* pellets (Biofence). The organic materials were combined with and without the biological control agent *Streptomyces griseoviridis* (Mycostop, Verdera OYTM) at the dose recommended by the manufacturer (0,01%) before the biofumigation process.



Fig. 1. (a) Greenhouse facilities Agroscope Conthey, (b) Detail Bioassay Tomato.

After 14 days of incorporation, the following parameters were analyzed: Microbial soil activity (FDA method), quantification of the number of *Streptomyces* colonies (WA-SCA method), quantification of the populations of *Verticillium dahlia* (NP-10 method), and a bioassay with two tomato varieties (*De Berao* and *Bonny Best*) to verify the influence of the treatments on growth.

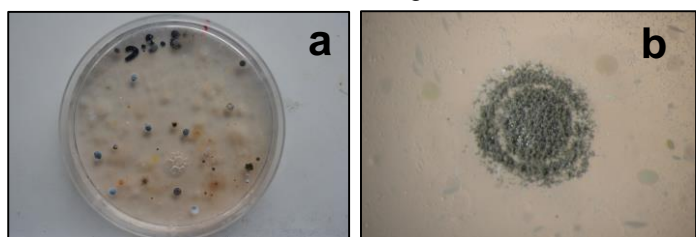


Fig. 2. (a) Detail WA-SCA Analysis, (b) Colony of *Streptomyces* sp.

Results

The microbiological activity of the treatments was significantly increased with the addition of the different organic materials.

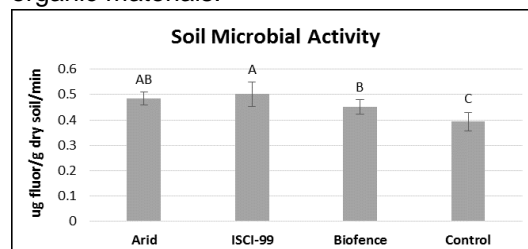


Fig. 3. Effect after 14 days of treatment on the microbial activity of the soils.

However, the addition of fumigant organic matter had a negative effect on the multiplication and establishment of *Streptomyces* spp., with the control treatment having the highest values.

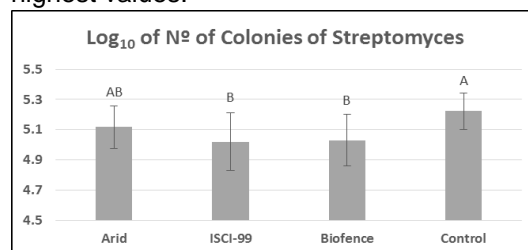


Fig. 4. Number of colonies of the *Streptomyces* spp. after 14 days of treatment.

The above-ground biomass production of two tomato cultivars one month after transplanting shows an improvement in favor of all treatments with organic matter.

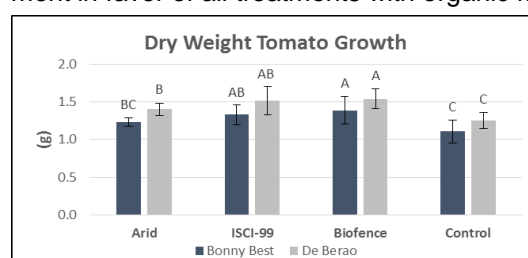


Fig. 5. Dry weight of 2 tomato varieties 1 month after planting.

Discussion

The effect of the addition of biofumigant organic materials caused an improvement in the microbial activity of the soil, and in the production of biomass. This was probably due to the nutritive contribution and microbial effect of the organic materials.

Conclusion:

The BCA-Biofumigation combined study suggest that the BCA should be added after the biofumigant treatments, to ensure that the two techniques have a synergistic effect.

