

13<sup>th</sup> International Conference on**Microbial Interactions & Microbial Ecology**

July 19-20, 2018 | Rome, Italy

**Inoculation with soil beneficial microorganism improve fruit quality and production in strawberry plant**

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Arbuscular Mycorrhizal Fungi (AMF) and Plant Growth Promoting Bacteria (PGPB) are soil beneficial microorganisms strictly associated with plant roots, able to improve plant growth. The interaction between plants and AMF and/or PGPB can also affect plant metabolism, increasing photosynthetic rate and the production of the so-called healthy compounds. In this study, three different AMF (*Funneliformis mosseae*, *Septoglomus viscosum*, *Rhizophagus irregularis*) were used in combination with three different strains of PGPB (19Fv1t, 5vm1K, Pf4) to inoculate plantlets of *Fragaria x ananassa* Duch var. Eliana F1 in order to investigate the effects of different AMF/PGPB combinations both on plant growth and fruit quality. The plants, grown in a greenhouse for 4 months, were irrigated with nutrient solution at two different level of phosphate: half of the control uninoculated plants (C) was fed with 32 $\mu$ M phosphate, while the remaining controls (C-P) and all the inoculated ones were fed with 16 $\mu$ M phosphate. The number of newly produced flowers and fruits was recorded weekly. Mature fruits were harvested, weighted, measured and used for biochemical analyses. At harvest, fresh and dry weights of roots and shoots, mycorrhizal colonization (M%) and content of leaf photosynthetic pigments were measured. Moreover, the following fruit parameters were recorded: pH, titratable acids, concentration of organic acids, sugars, vitamin C and anthocyanidins. Volatile profile and elemental composition in fruits were also evaluated. Data were statistically analyzed by one-way and two-way ANOVA. Moreover, principal component analysis (PCA) and PCA-DA (discriminant analysis) were used to draw a general profile of strawberry plants through the different considered variables. AMF/PGPB combinations differently affected plant growth parameters, increasing root and shoot biomass and the concentration of photosynthetic pigments. Plants inoculated with *R. irregularis* showed the highest M% (20-30%). Co-inoculation also improved plant growth, fruit yield and quality: plants inoculated with Pf4, regardless of its combination with the used fungus, showed a higher number of flowers and fruits produced per plant, an increase of malic acid concentration and a decrease of pH in the fruits, if compared to the other treatments. The PCA-DA analysis reveal that the presence of a specific fungus and/or bacterium in the soil determined the production of specific compounds in fruits: volatile profile and elemental composition observed for each treatment were different from the other ones, underlining the uniqueness of strawberry flavour, aroma and odor of each treatment. In general, the factor “fungus” mostly affected the parameters associated with the vegetative portion of the plant, while the factor “bacterium” was more relevant for fruit yield and quality.

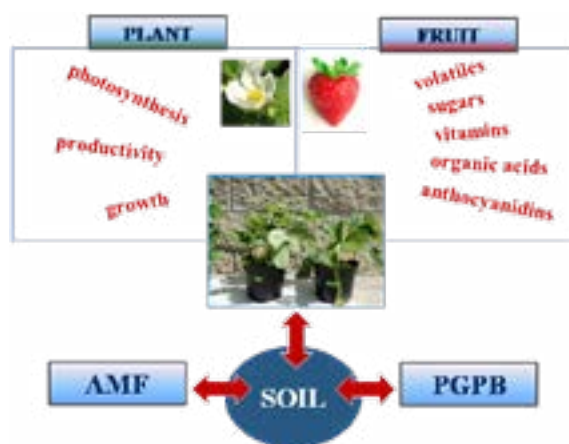


Figure 1: the interaction between plants and soil microorganisms such AMF and PGPB improve plant growth, physiology and fruit quality.

**Recent Publications:**

1. Bona E\*, Todeschini V\*, Cantamessa S, Cesaro P, Copetta A, Lingua G, Gamalero E, Berta G, Massa N (2018). Combined bacterial and mycorrhizal inocula improve tomato quality at reduced fertilization. *Scientia Horticulturae* 234: 160-165.
2. Bona E, Lingua G, Todeschini V. (2016) Effect of bioinoculants on the quality of crops. In: *Bioformulations: For Sustainable Agriculture* Eds. Arora NK, Balestrini R, Mehnaz S. pp. 93-124.
3. Bona E, Lingua G, Manassero P, Cantamessa S, Marsano F, Todeschini V, Copetta A, D'Agostino G, Massa N, Avidano L, Gamalero E, Berta G (2015). AM fungi and PGP pseudomonads increase flowering, fruit production, and vitamin content in strawberry grown at low nitrogen and phosphorus levels. *Mycorrhiza* 25: 181-193.

**Biography**

Valeria Todeschini is a researcher in Botany since November 2016. She obtained her graduation in Biology at the University of Piemonte Orientale (UPO) in July 2003, achieving in the same year the qualification to the profession of biologist. In 2007 she received her PhD in "Scienze Ambientali, Acque Interne e Agroecosistemi" from the same University. After discussing her PhD thesis, she continued her research relying on post-doctoral fixed-term positions. She regularly serves as a reviewer for various international scientific journals; from May 2015 she is a member of the "Plant Physiology and Biochemistry" editorial board. At present she is in charge with the teaching of the Plant Biotechnology course. Her studies are focused on plant-microbe interaction. In particular, she worked on phytoremediation of soils polluted by heavy metals, relying on poplar plants inoculated or not with soil beneficial microorganisms (PGPB and AMF). The effects both of pollutants and inoculation have been investigated at different levels: whole plants, cellular and molecular. Since 2013 her research line concerned also the qualitative improvement of crop and medicinal plants using bioinoculants. In particular, growth parameters, photosynthetic activity, fruit yield and quality of crop and medicinal plants were assessed in response to different AMF and PGPB inoculation at different levels of fertilization. Her studies have been carried out with researchers from various Italian and foreign Universities. The above described activities have been disseminated in the national and international scientific communities attending conferences, submitting communications, publishing papers (17) and book chapters (1)..

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