ICOM 9

9th International Conference on Mycorrhiza

BOOK OF ABSTRACTS

Prague, Czech Republic

30TH JULY – 4TH AUGUST 2017

International Mycorrhiza Society

9th International Conference on Mycorrhiza

30th July – 4th August 2017 | Prague, Czech Republic

BOOK OF ABSTRACTS

P (ID 374)

Use of soil microorganisms combined with reduced fertilization to improve bean fruit yield and quality

Nadia Massa *(Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale, Alessandria, Italy),* ***Elisa Bona*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale, Alessandria, Italy),* ***Simone Cantamessa*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale, Alessandria, Italy),* ***Patrizia Cesaro*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale, Alessandria, Italy),* ***Valeria Todeschini*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale, Alessandria, Italy),* ***Elisa Gamalero*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale, Alessandria, Italy),* ***Guido Lingua*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale, Alessandria, Italy),* ***Graziella Berta*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale, Alessandria, Italy)*

Phaseolus vulgaris cv. Billò is an important and valuable crop widely cultivated in western Piedmont. Arbuscular Mycorrhizal Fungi (AMF) are known to improve plant nutrition and hence fruit quality. *Rhizobium leguminosarum* is a gram-negative bacterium, symbiont of various species of *Fabaceae* and able to fix atmospheric nitrogen. Aim of this study was to test, in field conditions, the possibility to improve bean fruit yield and quality by means inoculation with AMF and/or rhizobia under conditions of low fertilization.

At harvesting, yield parameters (pod and seed number and weight) and fruit quality (starch, protein, fiber and metal contents) were evaluated. Nodulation and mycorrhizal colonization of roots were assessed.

Yield parameters and fiber content were not influenced by the presence of microorganisms nor by the reduced fertilization, whilst protein concentration was significantly higher in the fruits of rhizobium-inoculated plants in combination or not with AMF. Starch concentration significantly increased in the seeds of plants inoculated with rhizobia alone. Mg, K and Zn concentrations were positively affected by AMF, while Mn concentration was higher in the presence of rhizobia. Ca and Fe levels did not show differences between the treatments.

In conclusion, a low chemical fertilization, an environment-friendly practice, can be associated to inoculation with soil microorganisms to improve fruit quality. Finally, different combinations of microorganisms induced different effects on the fruit characteristics.

P (ID 382)

P nutrition and AMF inoculation modulate growth and photosynthetic rate of tomato plants

Valeria Todeschini *(Dipartimento di Scienze e Innovazione Tecnologica (DiSIT), Università del Piemonte Orientale, Alessandria, Italy),* ***Cesaro Patrizia*** *(DiSIT, Università del Piemonte Orientale, Alessandria, Italy),* ***Nadia Massa*** *(DiSIT, Università del Piemonte Orientale, Alessandria, Italy),* ***Elisa Bona*** *(DiSIT, Università del Piemonte Orientale, Alessandria, Italy),* ***Elena Chiara Nalin*** *(DiSIT, Università del Piemonte Orientale, Alessandria, Italy),* ***Graziella Berta*** *(DiSIT, Università del Piemonte Orientale, Alessandria, Italy),* ***Roberto Barbato*** *(DiSIT, Università del Piemonte Orientale, Alessandria, Italy),* ***Guido Lingua*** *(DiSIT, Università del Piemonte Orientale, Alessandria, Italy)*

AMF colonize the roots of most plant species, improving their nutrition (especially the phosphatic one) and promoting photosynthesis. Phosphorus has a key role in plant physiology, also affecting the photosynthetic process, as it is involved in sugar/carbon metabolism. Since AMF can act as a sink of carbohydrates, they can also influence carbon metabolism.

The aim of this work was to evaluate the growth and photosynthetic parameters of *Solanum lycopersicon* plants inoculated or not with *Funnelliformis mosseae* and grown in controlled conditions at different P levels (32, 96 and 288µM) for 40 days.

Fresh and dry weight of different plant organs, mycorrhizal colonization and the concentration of photosynthetic pigments were assessed. Chlorophyll(a) fluorescence, biochemical analysis of thylakoid proteins and fractionation of thylakoid membranes were evaluated in order to assess the photosystem I and II activities. Results were statistically analyzed by one- and two-way ANOVA followed by Fisher's post hoc test.

Root and shoot biomass were positively correlated with P concentration in the growth media. Inoculation did not significantly affect growth parameters, also in the plants grown at 32µM of P, despite their higher mycorrhizal colonization. AM symbiosis was strongly inhibited at the highest P level. No significant differences were observed between the various treatments for photosynthetic pigment content, while some differences were observed in terms of quantum yield, NPQ (Non-Photochemical-Quencing) and LHCII (Light-Harvesting-Complex) fractionation.

Data relative to chlorophyll fluorescence and western blot analyses suggested that P and AMF affected NPQ and electron transport efficiency, probably modulating the xanthophyll cycle.

IL (ID 152)

Arbuscular mycorrhizal fungi and the production of health-promoting foods: perspectives for the future

Guido Lingua *(Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale, Alessandria, Italy),* ***Valeria Todeschini*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale, Alessandria, Italy),* ***Elisa Bona*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale, Alessandria, Italy),* ***Patrizia Cesaro*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale, Alessandria, Italy),* ***Nadia Massa*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale, Alessandria, Italy),* ***Elisa Gamalero*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale, Alessandria, Italy),* ***Graziella Berta*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale, Alessandria, Italy)*

Arbuscular mycorrhizal fungi can positively affect plant health and growth. This is possible because AMF help their host plants to take up minerals and water from the soil and promote defense responses against pathogens. As a consequence, mycorrhizal plants require lower chemical inputs in the form of fertilizers and pesticides, and the use of inoculated plants (or the management of the existing AMF populations in the soil) can significantly contribute to the development of more sustainable agricultural practices. Also, the yield of crop plants colonized by AMF can be higher than that of plants without AMF.

In recent years, increasing attention has been devoted not only to the amount of food production, but also to the quality of food. Indeed, the awareness of the importance of food quality has increased more and more and it has been associated to the development of the idea of functional foods. These are foods containing health-promoting compounds, decreasing the risk of chronic or acute diseases.

AMF have been shown to affect the quality and quantity of secondary metabolites in plants; such molecules can act as health-promoting compounds in humans. Increasing evidence indicates that AMF, alone or in combination with plant growth-promoting bacteria, can improve the quality of crop products. In this presentation, relevant examples from the literature and some original results will be shown, together with the discussion of future perspective and possible applications.

Keywords: arbuscular mycorrhiza, crop quality, functional foods, plant growth-promoting bacteria

P (ID 377)

AM fungal community associated to *Vitis vinifera* cv. Pinot Nero treated with integrated pest managements

Patrizia Cesaro *(Dipartimento di Scienze e Innovazione Tecnologica, Università Piemonte Orientale, Alessandria, Italy),* ***Lara Boatti*** *(SmartSeq s.r.l., Alessandria, Italy),* ***Elisa Bona*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università Piemonte Orientale, Alessandria, Italy),* ***Nadia Massa*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università Piemonte Orientale, Alessandria, Italy),* ***Giorgia Novello*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università Piemonte Orientale, Alessandria, Italy),* ***Valeria Todeschini*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università Piemonte Orientale, Alessandria, Italy),* ***Flavio Mignone*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università Piemonte Orientale, Alessandria, Italy),* ***Elisa Gamalero*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università Piemonte Orientale, Alessandria, Italy),* ***Guido Lingua*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università Piemonte Orientale, Alessandria, Italy),* ***Graziella Berta*** *(Dipartimento di Scienze e Innovazione Tecnologica, Università Piemonte Orientale, Alessandria, Italy)*

Vitis vinifera (L.) is an economically important crop whose value largely depends on fruit quality that can be influenced by soil migroorganisms, among which arbuscular mycorrhizal fungi (AMF). AMF, able to establish symbiotic associations with vine roots, have beneficial effects on grapevine performance, including water use efficiency and replant success. Most grapevine varieties are susceptible to diseases, whose control can be performed by different approaches, including integrate pest practice (IPM). Previous reports suggested a host specificity among grapevine and AMF and the importance of soil characteristics on this association. In the present study, we examined the AMF communities in the rhizospheric and bulk soil of *V. vinifera* cv Pinot Nero, subjected to IPM, by using 454 Roche sequencing technology. The bulk and the rhizospheric soil of the grapevines were sampled before and after grape production. Genomic DNA was amplified, after extraction, according to the methods for pyrosequencing, by nested PCR using AMF specific primers of the large ribosomal subunit (LSU rDNA). Sequences were compared with both NCBI and an AMF LSU rDNA reference databases. Our data showed different AMF communities in the rhizospheric and bulk soil of *V. vinifera* and the importance of the sampling time in regulating AMF biodiversity.