Effect of a non-mycorrhizal endophyte isolated from *Mentha piperita* L. on *in vitro* *Ocimum basilicum* L. cuttings

Dovana F.[1], Fusconi A.[2], Ingaramo A.[2], Berta G.[1], Mucciarelli M.[2]

[1]Department of Sciences and Innovative Technology, University of Piemonte Orientale, Viale T. Michel 11, 15121 Alessandria, Italy;

[2]Department of Life Sciences and Systems Biology, University of Torino, Viale P.A. Mattioli 25, 10125 Torino, Italy

francescodovana@libero.it

Background - Plant-symbiotic fungi play an important role in determining the ability of plants to resist to fungal pathogens and pests, to optimize the absorption of nutrients and to increase tolerance to abiotic stress such as temperature, pH, salt stress (1). Arbuscular mycorrhizal (AM) fungi have been shown to significantly affect plant growth, density of glandular trichomes and the quality and quantity of essential oils in basil (2). Peppermint vegetative growth is enhanced in the presence of a peppermint endophyte, the Ascomycetous plant growth promoter-hyaline sterile fungus (PGP-HSF) (3). Micropropagation techniques are suitable for the rapid and large-scale propagation of medicinal and aromatic plants, and to test the effect of beneficial fungi. The objective of the present study was to verify the effect of PGP-HSF in basil in order to assess the possible use of this fungus to improve the micropropagation of this economically important species.

Materials and Methods

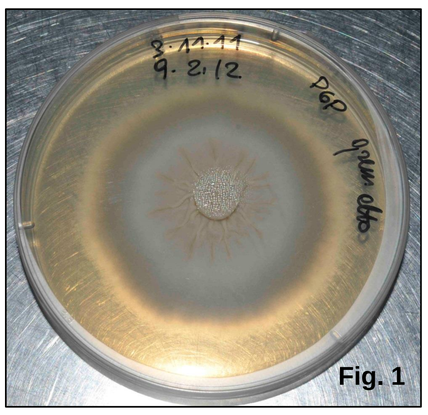

Fig. 1

Plugs from the young part of mature colonies of PGP-HSF grown on MS medium (**Fig. 1**) were co-cultured with shoot cuttings (**Fig. 2)** of *Ocimum basilicum* L. "Italiko" in squared Petri plates containing a MS medium (0.2x) (**Fig. 3).** Control plants were not inoculated. Plates were placed vertically in a growth chamber (26/22±1°C, 16/8h light/dark photoperiod, 90 µmol·m^{-2}sec^{-1}) for 35 days.

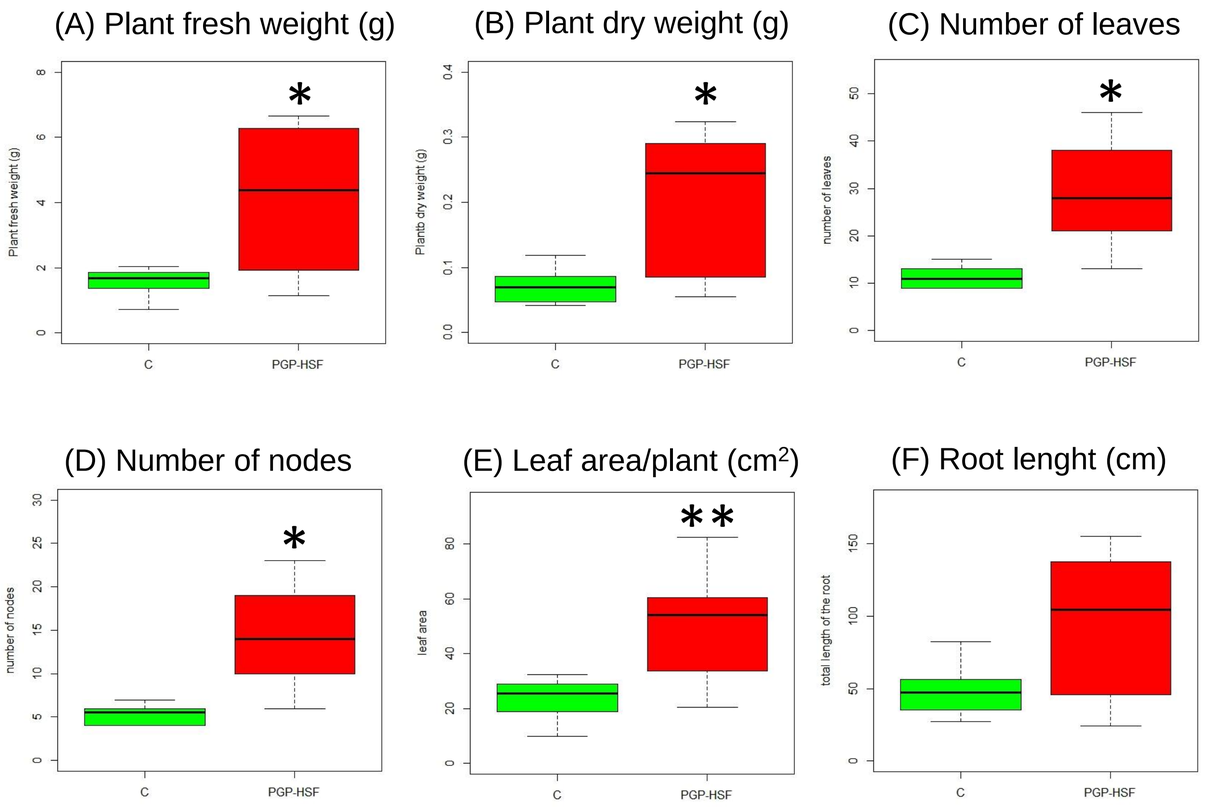

Figure 5. Sweet basil response to PGP-HSF after 35-d inoculation. Box plots show significant difference between parameters of basil growth in control (uninoculated: C) and PGP-HSF inoculated groups using one way analysis of variance. Asterisks on the top of the box indicate treatment difference from the control based on t-test at p<0.05 * and p<0.01 **.

Results

By the end of the culture the mycelium of PGP-HSF had grown into the MS medium in contact with sweet basil roots (**Fig. 4).** After 35-d inoculation, total plant biomass was statistically different from uninoculated plants. Plant fresh and dry weights showed an average 160% and 181% increase over the control plants (**Fig. 5A,B)**. This growth stimulation occurred along with a significant increase of the average number of leaves (**Fig. 3)** and of stem nodes per plant (153% and 165% respectively; **Fig. 5C,D**) resulting in a significantly larger (116%; p<0.01) total leaf area per plant (**Fig. 5E**). In the root system, PGP-HSF inoculation of sweet basil plants resulted in a significant increase of the number of roots (129%; p<0.01), and the mean total root length was almost double that of the control, although at p=0.059 (**Fig. 5F**).

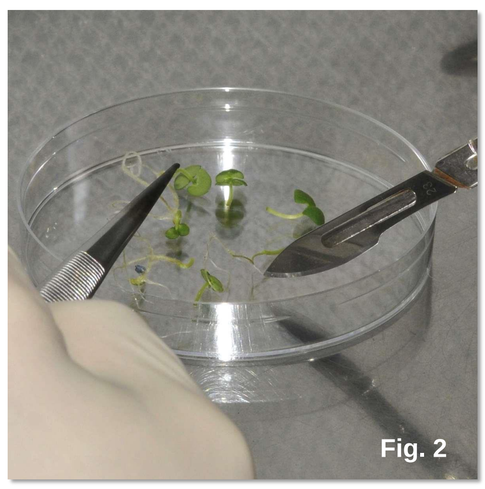
Fig. 2

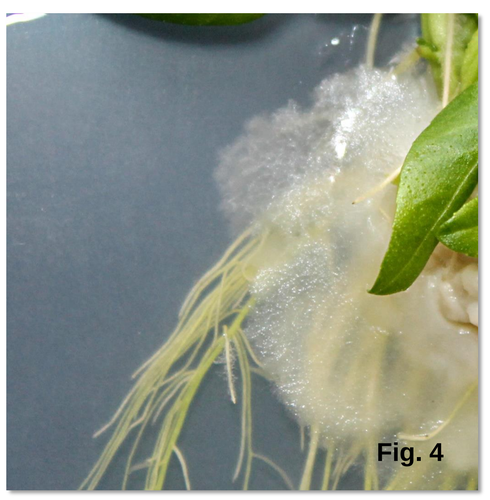
Fig. 4

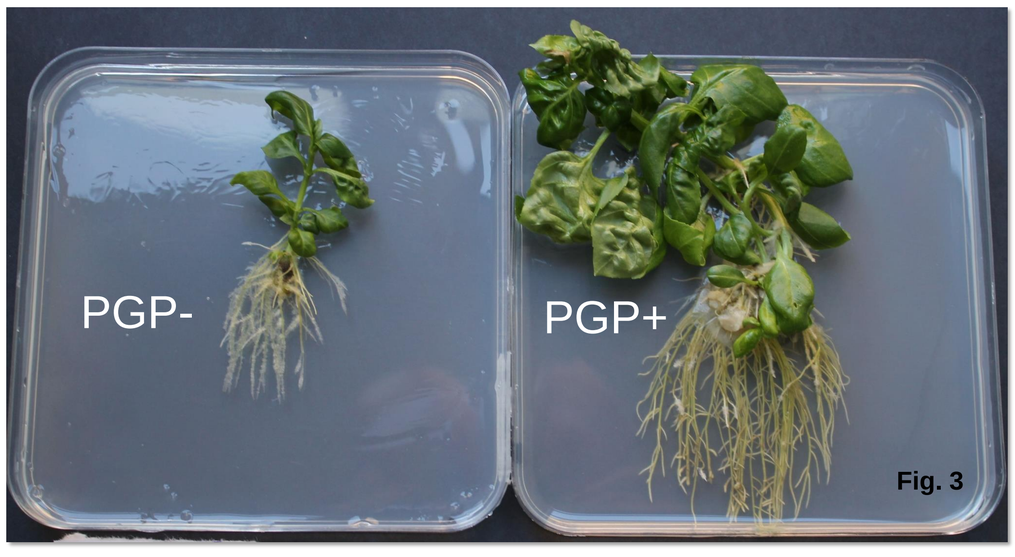

Fig. 3

Conclusion

This study demonstrated that the endophyte PGP-HSF may significantly increase the *in vitro* growth of sweet basil plants. The fungus induces an increase of the number of nodes which corresponds to an increase in the number of axillary meristems that can be employed for further propagation. This will save time at each cycle of micropropagation.

References

(1) Smith S.E., Read D.J. 2008 Mycorrhizal symbiosis, 2nd ed., Academic Press, London, UK
(2) Copetta A., Lingua G., Berta G. 2006 Mycologia, 16:485–494
(3) Mucciarelli M., Scannerini S., Bertea C., Maffei M. 2003 New Phytol., 158:579-591