

Synergistic effect between different plant growth promoting bacteria and various nitrogen rates on production and quality of fennel grown in open field

Lorena Vultaggio¹, Beppe Benedetto Consentino¹, Salvatore La Bella¹, Leo Sabatino¹

¹Department of Agricultural, Food and Forestry Sciences - University of Palermo, Viale delle Scienze, ed. 5, 90128 Palermo, Italy.

INTRODUCTION & AIM

It is well known that traditional agriculture makes extensive use of chemical nitrogenous fertilisers. In line with the provisions of the European Green Deal, it is necessary to reduce the use of chemical inputs in favour of the application of more environmentally sustainable alternatives. Microbial biostimulants are an alternative and environmentally sustainable agronomic tool to achieve these results.

The aim of this study was to evaluate the interactive effect of four different levels of N (0, 45, 90 and 180 kg ha⁻¹) and three PGPBs (*Azospirillum brasilense*, *Bacillus subtilis* and *Streptomyces violaceoruber*) on the quanti-qualitative performance of fennel 'Leonardo' F₁ grown in open field.

METHOD

The experiment was conducted under field conditions, in an experimental field at the University of Palermo located in Termini Imerese (PA). The investigation was performed during 2021-2022 winter period.



Treatments

1° fix factor: NITROGEN DOSE (kg ha⁻¹)

- 0
- 45
- 90
- 180

2° fix factor: PGPBs

- Control
- *Azospirillum brasilense* DSM 2298
- *Bacillus subtilis* DSM 10
- *Streptomyces violaceoruber*

- Split-plot experimental design;
- 2-factor experiment producing 12 treatments, 3 replicates per treatment (10 plants per replicate);
- Two-way ANOVA and separation of means by Tukey's test.
- Root inoculation of bacteria before planting and under cover (after 15 days) 10⁹ CFU/mL
- Nitrogen was supplied from 20 days after transplanting in 3 applications

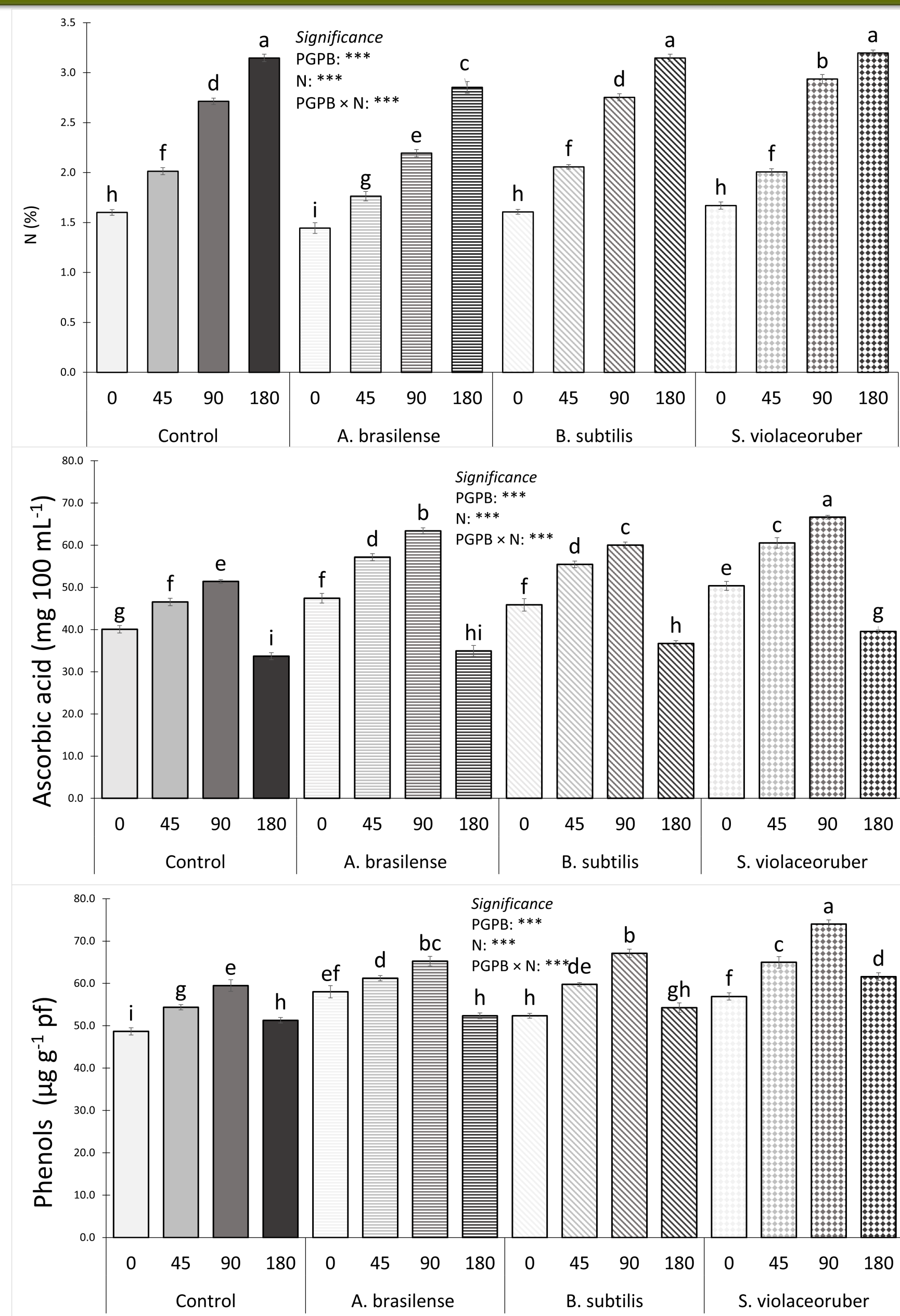


AGRONOMIC AND ANALYTICAL DETERMINATIONS

- Fennel fresh weight
- Total sugars
- Ascorbic acid
- Phenols
- Nitrogen



RESULTS & DISCUSSION



Treatments	Total sugars (g 100g ⁻¹ pf)	Fennel fresh weight (g)
Control	4.408c	739.9b
<i>A. brasilense</i>	5.508a	776.8a
<i>B. subtilis</i>	4.942b	755.5b
<i>S. violaceoruber</i>	5.492a	779.8a
0	5.092a	677.2d
45	5.092a	737.5c
90	5.083a	802.8b
180	5.083a	834.6a

CONCLUSION

In conclusion, our results suggest that the tested PGPBs can be considered an eco-friendly tool to improve fennel productivity and quality, particularly when combined with sub-optimal N doses (45 or 90 kg ha⁻¹).

FUTURE WORK / REFERENCES

The experiment will be repeated another year to confirm or refute the results obtained. Moreover, we will test these microorganism on other plant species.