

Use of bioinoculants in wine terroir: effects on soil microbial activity and on must properties

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Introduction & Objectives

Terroir is a very well-known concept in viticulture and refers to the ecosystem surrounding the grapevines. It comprises all factors affecting grapevines' development and wine attributes, such as e.g., climatic conditions, soil characteristics, geography, the topology of terrain, grapevine variety, and humans' influence [1]. Recently, the term "microbial terroir" has gained interest from researchers, as microorganisms play an important role in both soil and fermentation characteristics, and have an impact on grapevine development and wine quality [2].

This study aimed to assess the effect of bioinoculants on i) soil microbial activity, ii) productivity parameters of grapevines and iii) must attributes.

Experimental Design

The experimental field plot was established in 2018 in a farm located in Douro Valley. The experimental design comprised 6 plots (3 control and 3 inoculated), with 5 grapevines each. Three grapevines were planted between plots. Inoculated plants were inoculated twice (2018 and 2019) with the rhizobacteria *Pseudomonas fluorescens* S3X and with the AMF *Rhizophagus irregularis* (INOQ).

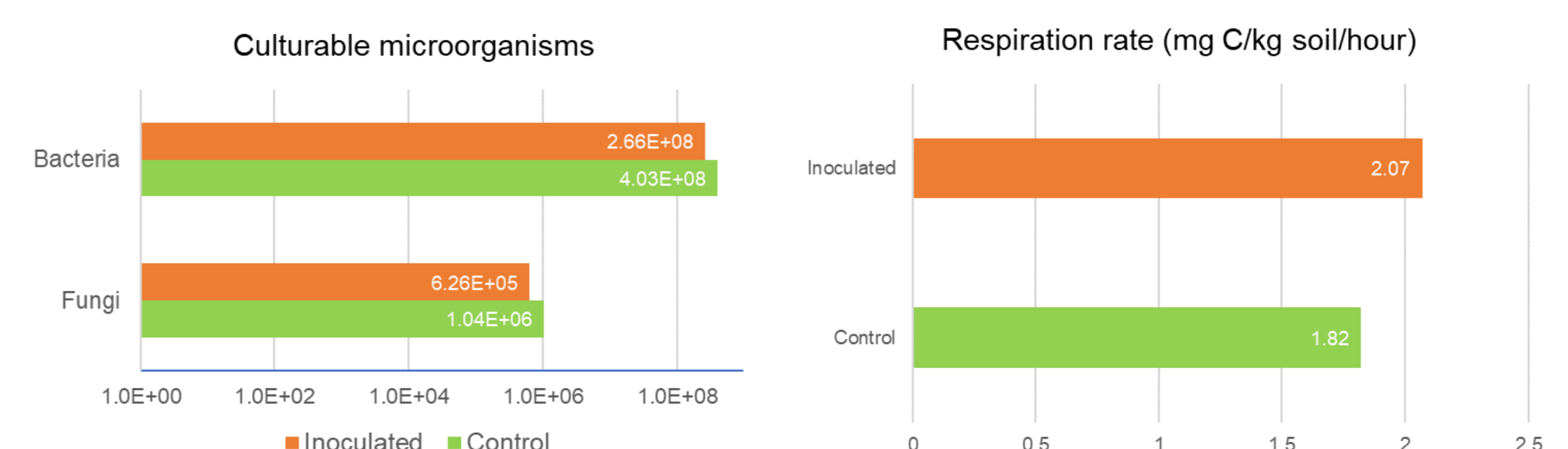


The analysis was divided into 3 main parts: 1. biometric and productivity parameters, 2. soil, and 3. must

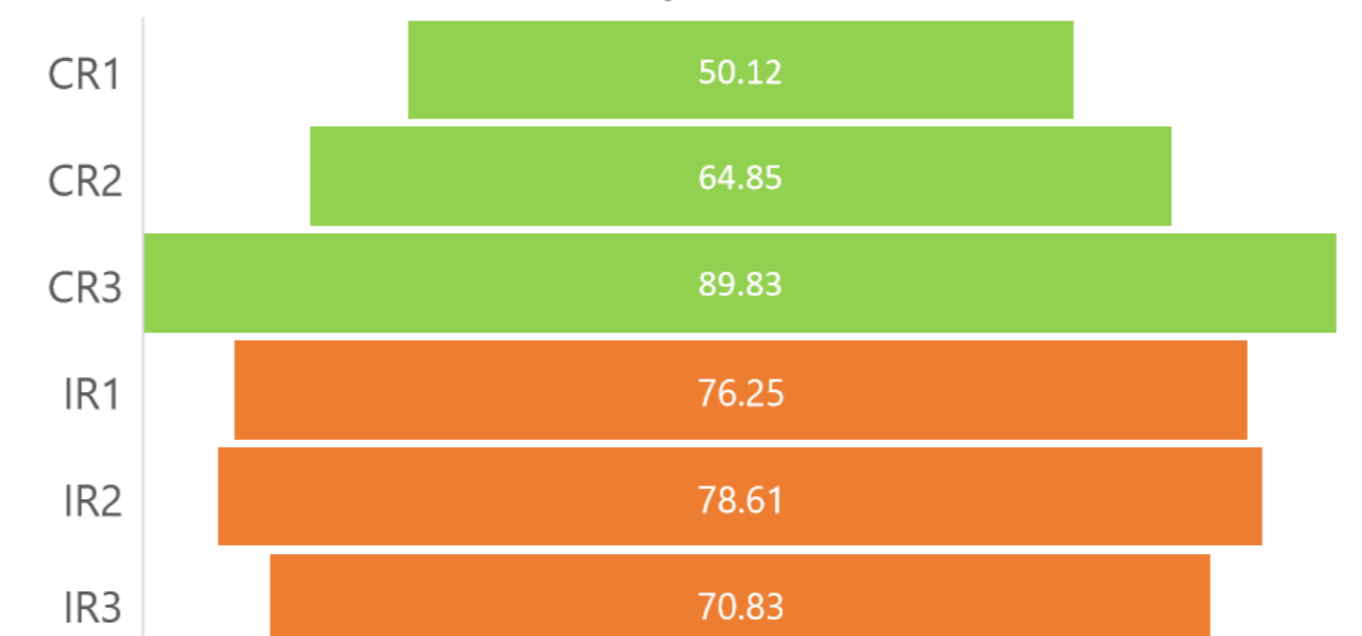


Results

2. SOIL ANALYSIS



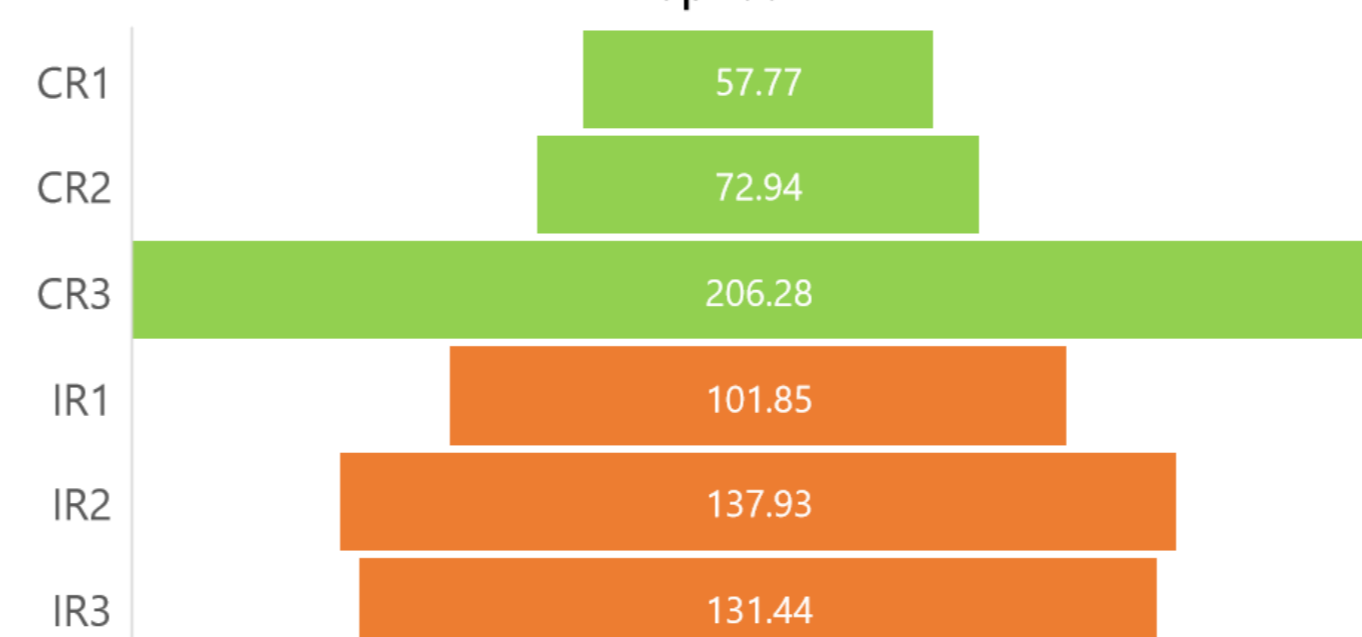
Phosphatase activity (µg pNP / g soil / hour) per replica



Soil enzymes: mean ± standard deviation

	Phosphatase activity	Dehydrogenase Activity
Control	68.26 ± 20.08	112.33 ± 81.72
Inoculated	75.23 ± 3.99	123.74 ± 19.23

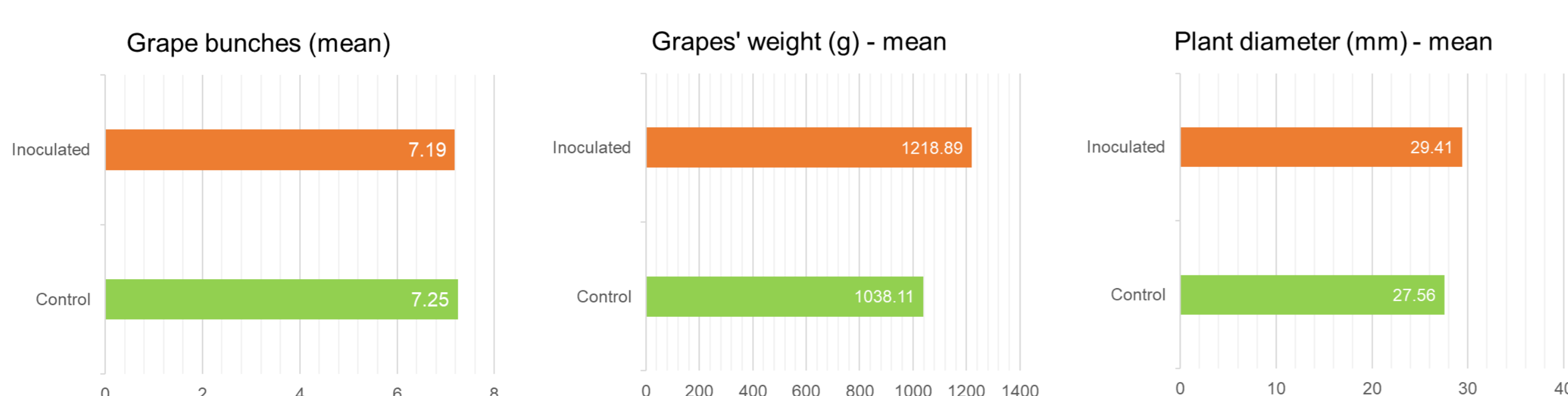
Dehydrogenase activity (µg TPF / g soil / day) per replica



- ❖ Microbial counts were similar in both soil samples
- ❖ Respiration rate was higher in inoculated soils
- ❖ A similar trend was observed for enzymatic activities

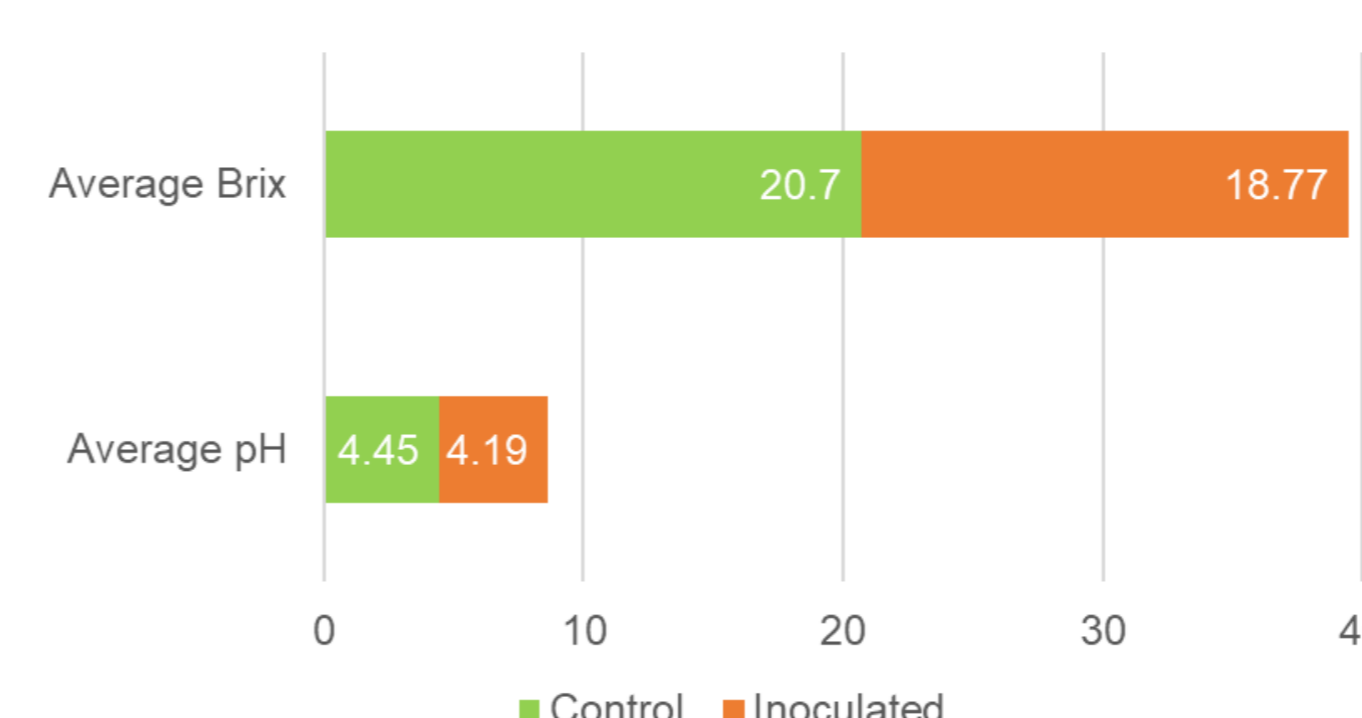
Results

1. PRODUCTIVITY



- ❖ Bioinoculation seems to have positively influenced grapevines' productivity

3. MUST ANALYSIS – ON GOING



Sample	YAN (mg/L)	Mean ± SD
Control	R1	131.25
	R2	140
	R3	140
Inoculated	R1	140
	R2	61.25
	R3	122.5

- ❖ No significant differences were observed among control and inoculated plants regarding pH, Brix and YAN values

Volatile compounds (on going work)

- ❖ Volatile compounds such as 1-hexanol, β-ionone, limonene, linalol, nerol, terpeniol and trans-2-hexenol were found in all samples
- ❖ α-ionone, β-damascenone and isobutyric acid were not detected

Conclusions

Preliminary results indicate a positive impact of bioinoculants in grapevines' productivity and in soil microbial activity. The initial analysis of must suggests a marginal impact of bioinoculants in must properties. However more research is needed in order to confirm this trend.

References

- [1] C. van Leeuwen (2010) DOI: 10.1016/B978-0-08-102067-8.00005-1
 [2] Kioroglou et al. (2019) DOI: 10.3390/microorganisms7120669

Acknowledgements

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