Microbial Inoculants and Agroecological Practices in Vineyards: Impacts on Grapevine Performance and Soil Health

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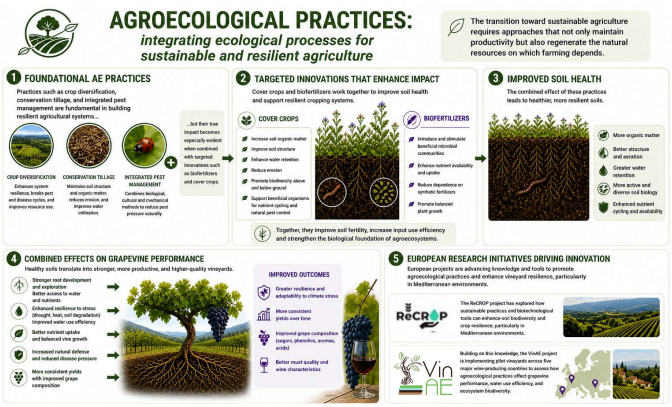
Aims and Scope



Trial 1

Aim: To evaluate the effects of microbial inoculants, particularly the strain *A. nicotinovorans* EAPAA, on must attributes and soil health across contrasting experimental field sites

Treatments

Vitis vinifera L.

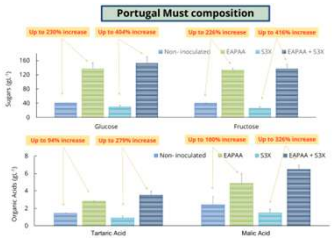
São João da Pesqueira, Portugal

Control (C) – non-inoculated
PGPB 1 –*A. nicotinovorans* EAPAA
PGPB 2 - *Pseudomonas fluorescens* S3X
PGPB 1 + PGPB 2 – EAPAA + S3X

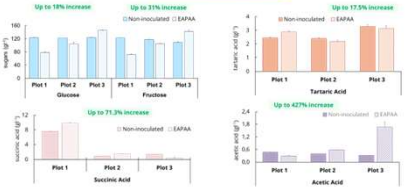
Esposende, D.O Ribeiro, Spain

Control (C) – non-inoculated
PGPB 1 - *A. nicotinovorans* EAPAA

Must analysis



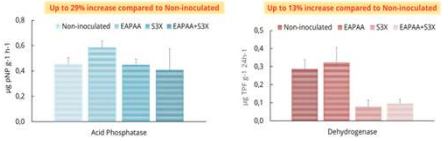
Spain Must composition



✓ The strain EAPAA influenced must composition, particularly sugars and organic acids, at both sites

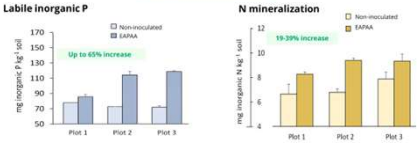
Soil analysis

Portugal Soil analysis



✓ The strain EAPAA enhanced soil enzymatic activity, with notable increases in overall microbial activity and in enzymes related to P availability

Spain Soil analysis



✓ The strain EAPAA positively impacted soil fertility indicators, with increased availability of P and N observed following inoculation

✓ The study demonstrates the adaptability of *A. nicotinovorans* EAPAA across diverse field conditions

Trial 2

Aim: To assess the combined effects of hydrogels and inter-row cover crops on soil health and grapevine performance

New experimental field trial
Quinta dos Acipreste (Douro region), Real Companhia Velha

Treatments applied in the inter-rows (October 2025)

Control (C) – Natural cover
T1 – Sown cover
T2 – Natural cover + hydrogel
T3 – Sown cover + hydrogel

Floristic diversity (after 6 months)

✓ Vegetation cover was generally high, with differences among treatments

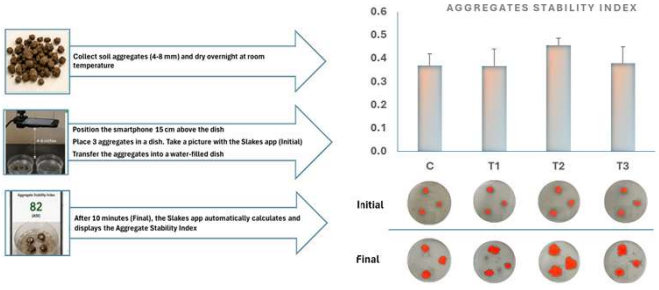
✓ A few species dominated, particularly *Rumex pulcher* in T2 and T3; other frequent species included *Convolvulus arvensis*, *Lolium rigidum*, and *Hordeum murinum*

✓ Hydrogel application (T2 and T3) favoured competitive species, especially *Rumex pulcher*, rather than increasing diversity

✓ T1 (Sown cover) increased species richness by introducing *Trifolium* spp. and *Medicago doliata*, although these species showed low cover and did not become dominant

Soil analysis (after 6 months)

Aggregate Stability Index (ASI) - https://soilhealthinstitute.org/our-work/initiatives/slakes/



✓ Aggregate stability differed among treatments

✓ T2 presented the highest ASI values, indicating greater resistance of aggregates to slaking and improved soil structural stability

✓ Control and T1 showed intermediate ASI values

✓ Overall, treatments promoting greater aggregate cohesion, indicating better soil structural quality and potentially greater resistance to erosion

Acknowledgements

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