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Development of new tools for sustainable management of olive trees crop

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INTRODUCTION & AIM

Climate change significantly impacts agrarian systems, compromising the quality of agricultural production.

This situation has led farmers to demand sustainable tools to enhance crop performance while maintaining soil fertility and product quality.

Plant Growth Promoting Rhizobacteria (PGPR) represent an opportunity for cultivating healthy crops through growth promotion and biostimulation.

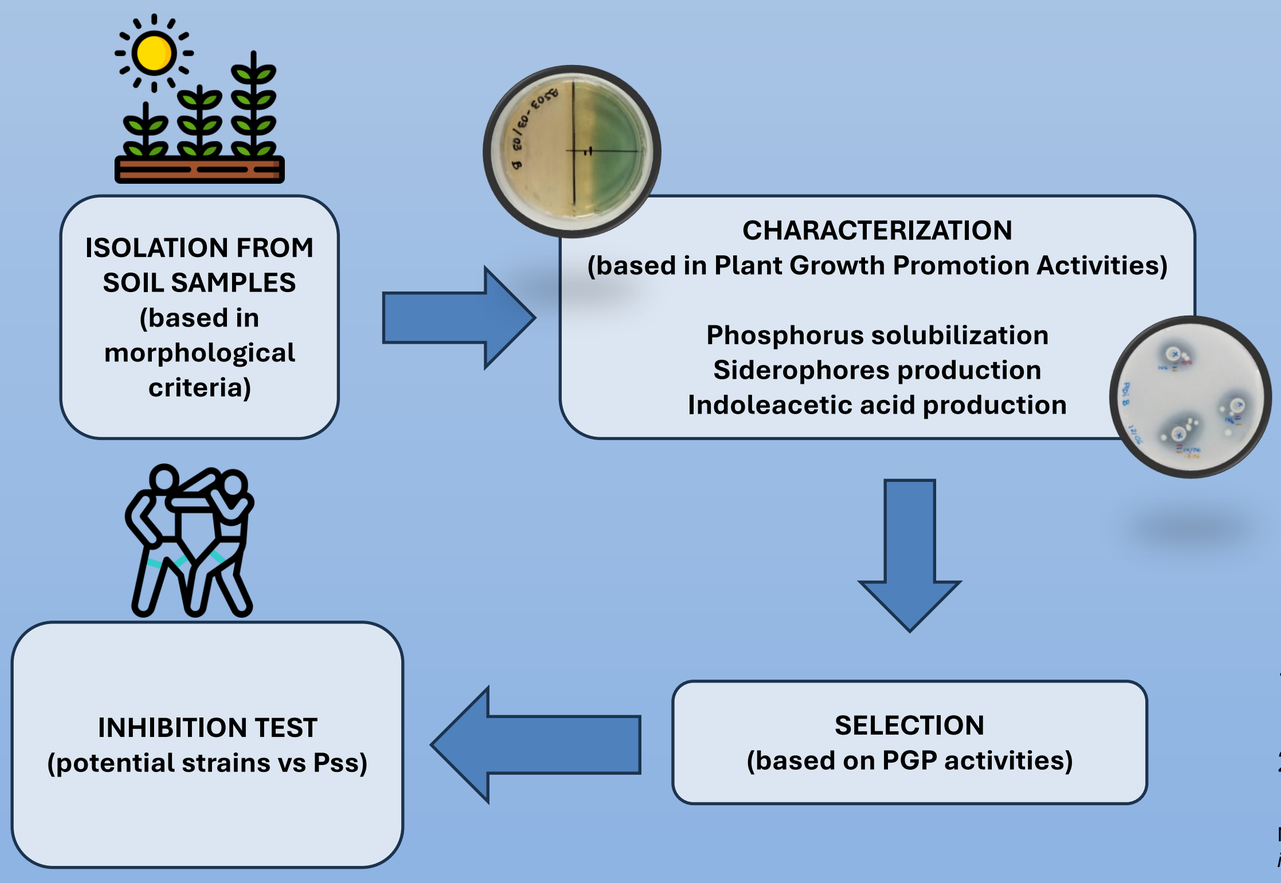
Figure 1. Tumors caused by olive knot disease on the trunk of an olive tree.

Olive knot disease is caused for *Pseudomonas savastanoi* pv. *savastanoi (Pss)* and is responsible for a global loss of 1.33%. However, in affected plantations it can reach 70%. Olive tree represent a high value crop and find tools to eradicate this disease are important for farmers.

AIMS

Finding antagonist strains of Pss from soil isolates and assess microbial diversity in two phenological stages

METHOD



RESULTS & DISCUSSION

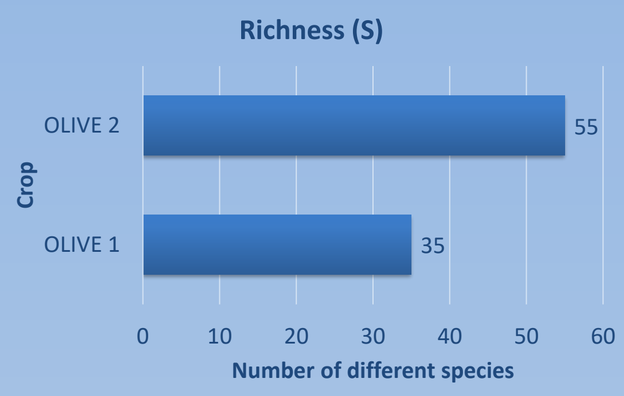


Figure 2. Number of different cultivable species found at the two phenological moments evaluated (1) Flowering (2) Fruit fattening.

Table 1. Different PGPR evaluated and importance as biotechnological tools

PGPR	Importance
Phosphorus solubilization	Insoluble phosphate is a limiting factor for plants. Some bacteria solubilize this phosphate to make it bioavailable.
Siderophore production	Components that use to sequester and solubilize ferric ions**. Important defense mechanism against pathogens.**
IAA production	Plant hormone involved in phytostimulation

Table 2. Microorganisms selected based on their PGP characteristics with identification based on MALDI-TOF

Isolate	Phosphate solubilization halo(cm)	Siderophores production halo (cm)	IAA production (µg/mL)	Gram	Species (MALDI-TOF)
CtA 59B	+++	+	-	+	*Bacillus amyloliquefaciens*
OliA 4	-	+	40,91	+	*Micrococcus luteus*
OliA 54	+++	+	1,19*	-	*Bacillus mojavensis*
OliB 1	-	+++	-	+	TBA
OliB 8	-	+++	-	+	TBA
OliB 9	+	+++	-	+	*Bacillus subtilis*
OliB 40	-	+++	1,1	+	TBA
OliB 43	-	++	24,78	+	TBA
OliB 49	-	+++	TBA	+	TBA

Phosphate solubilization in NBRIY medium (72 h): (–) no halo; (+) 0.1-0.3 cm; (++) 0.3-0.6 cm; (+++) ≥0.6 cm.
Siderophore production (7 days): (–) no halo; (+) 0.1-0.5 cm; (++) 0.5-1.0 cm; (+++) ≥1 cm.
Indole-3-acetic acid (IAA) production (120 h) in ppm. TBA: to be analized. (*) Measured at 24 h.
In green: positive strains for inhibition assay.

Table 3. Measurements of the solubilization halo of the positive strains in *Pss* inhibition together with their standard error.

Isolate	Average ± SE (cm)*
CtA 59B	2,35 ± 0,46
OliB 8	1,62 ±0,11
OliB 43	0,60 ± 0,14

*This measurement was carried out after 3 days after inoculation

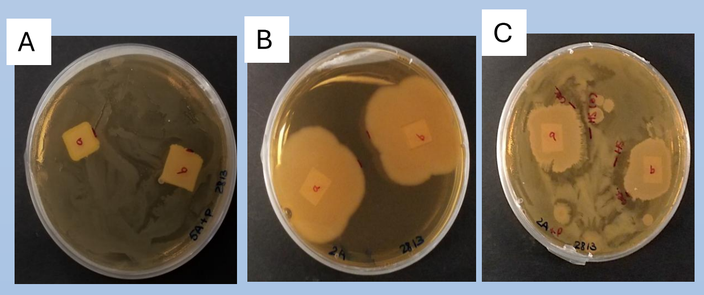


Figure 3. From left to right: (A) Strain with negative inhibition (B) Layer control with positive inhibition (without *Pss*) (C) Strain with positive inhibition and *Pss*

CONCLUSION

1. Regarding the diversity evaluated in the two phenological moments, we observed greater diversity in flowering than the fruit fattening.
2. Of the 9 isolates studied, 33.33% have the capacity to inhibit *Pss* after 3 days.
3. The three isolates that show inhibition against *Pss* performed positive values regarding siderophore production.
4. More work is needed on biocontrol tools for phytopathogens, and soil rhizobacteria are a rich reservoir for this.

FUTURE WORK / REFERENCES

1. The nutritional capabilities of the plant will be assessed for their relevance to disease control.
2. Work will be done on testing bioinoculants and field trials will be conducted.

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