

## Reduced impact of dodecan-1-ol on soil bacteria compared to conventional nematicides

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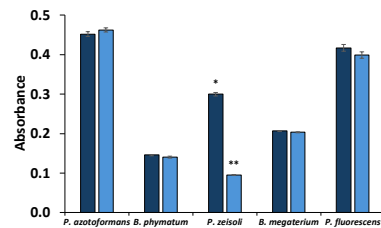
### INTRODUCTION & AIM

Conventional pesticides used in modern agriculture can disrupt soil microbiota, including beneficial plant growth-promoting bacteria, leading to long-term soil degradation and reduced plant productivity [1]. Safer and more sustainable pest management strategies are needed to support plant health while minimizing environmental impact. Volatile phytochemicals, known for their bioactivity against plant pests, offer a promising solution due to their lower toxicity and reduced ecological footprint [2]. In this study, the effects of dodecan-1-ol, a volatile compound with nematicidal properties, were evaluated on several soil bacterial species.

### METHODS

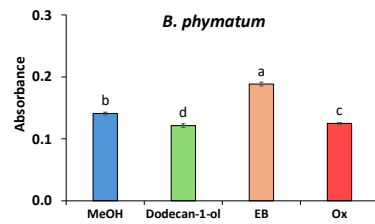
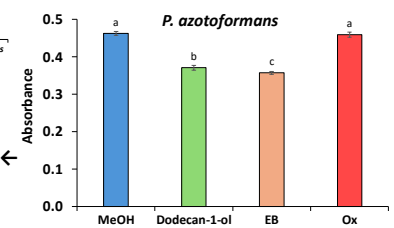
- *Bacillus megaterium*, *Pseudomonas azotoformans*, *Pseudomonas fluorescens*, *Paenibacillus zeisoli* and *Burkholderia phymatum* were grown in 40 mL TY medium (Tryptone-Yeast), for 24 h at 120 r.p.m. and 30 °C;
- Bacterial liquid cultures were adjusted to an OD of 0.05 (600 nm) by dilution in TY medium;
- In flat bottom 96-well microplates, TY medium was used as a negative control (8 replicates, 1 row), and 195 µL of bacterial culture was used as a positive control (8 replicates, 1 row);
- The treatments consisted of 195 µL of bacterial culture and 5 µL of each of the stock solutions (0.8 mg per mL of methanol (MeOH)) of the compounds dodecan-1-ol, oxamyl (Ox) and emamectin benzoate (EB), for a final concentration of 0.02 mg / mL (16 replicates per treatment, 2 rows). Five µL of MeOH was used as a blank;
- The microplates were kept for 24 h, in the dark, at 120 r.p.m. and 30 °C;
- After 24 hours, the OD was determined in a microplate reader at 600 nm to evaluate growth of the bacterial cultures in the presence of the compounds.

### RESULTS & DISCUSSION



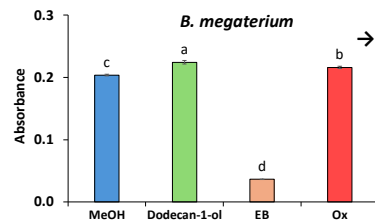
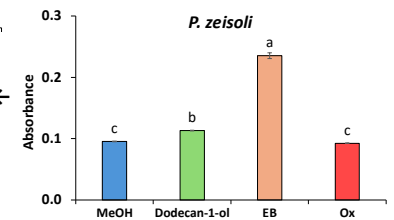
→ **Figure 1.** MeOH (light blue) induced no significant growth inhibition, except for *P. zeisoli*.

**Figure 2.** For *P. azotoformans*, only dodecan-1-ol and EB inhibited growth by 20 and 23 %, respectively.



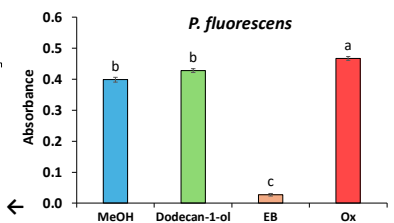
→ **Figure 3.** For *B. phymatum*, dodecan-1-ol and Ox slightly inhibited growth while EB stimulated growth.

**Figure 4.** For *P. zeisoli*, apart from MeOH, no compound inhibited growth. EB stimulated growth.



→ **Figure 5.** For *B. megaterium*, EB had a strong negative effect, suggesting toxicity.

**Figure 6.** For *P. fluorescens*, similarly to *B. megaterium*, EB had a strong negative effect, indicating toxicity.



### CONCLUSION

These findings highlight the potential of dodecan-1-ol as a sustainable alternative for integrated pest and soil management, while not significantly impacting the growth of soil bacteria.

### FUTURE WORK / REFERENCES

[1] Aravind Jeyaseelan et al. 2023, <https://doi.org/10.1016/j.envres.2023.118020>

[2] Cavaco T, Faria JMS. 2024, <https://doi.org/10.3390/toxics12060406>