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Substrate solarization for the control of fungi: The case study of *Fusarium circinatum*, the quarantine agent of Pine Pitch Canker

Silva AC^{1*}, Diogo E^{1,2}, Santos D³, Bragança, H^{1,4}

¹ National Institute for Agricultural and Veterinary Research, IP (INIAV); Oeiras, Portugal; ² BioISI—Biosystems & Integrative Sciences Institute, Faculty of Sciences, University of Lisboa; Lisboa, Portugal; ³ Instituto da Conservação da Natureza e das Florestas, IP (ICNF); Lisboa, Portugal; ⁴ GREEN-IT Bioresources for Sustainability, ITQB NOVA; Oeiras, Portugal. *anacristina.silva@iniav.pt

1 Background

- **Pine pitch canker**, caused by the quarantine fungus *Fusarium circinatum*, is one of the most concerning **forest diseases** in Europe, affecting both adult and young plant hosts, namely *Pinus* spp. and *Pseudotsuga menziesii*. In Portugal the fungus was already detected in different *Pinus* species, including *Pinus pinea* seedlings produced in nurseries.
- **Substrates** used in nurseries, especially those incorporating *Fusarium circinatum* host plant residues, such as pine bark, may represent a vehicle for the **spread of the fungus**.
- **Controlling** fungal pathogens through classical chemical methods in forests and nurseries may represent high economical expenses and considerable **environmental risks**.
- The search for environmentally friendly solutions, such as **solarization**, in order to control fungal diseases and avoid the use of pesticides, is of great relevance.

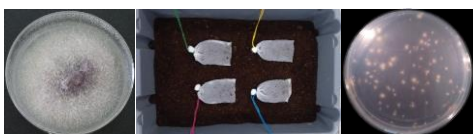
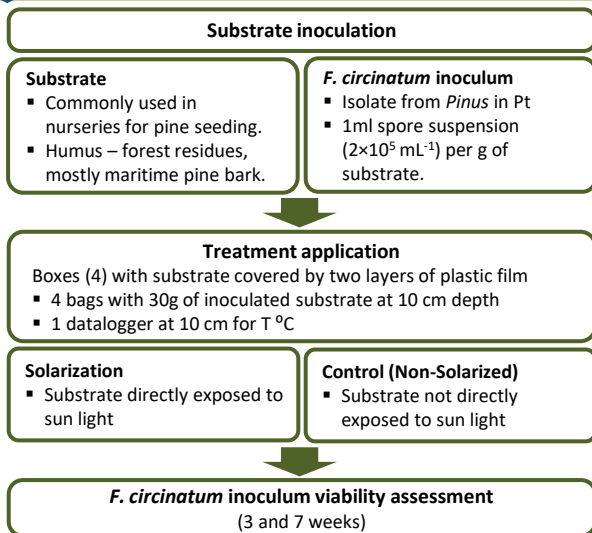


Pinus spp. production in nursery; symptomatic *Pinus radiata* seedlings affected by *F. circinatum*.

2 Objective

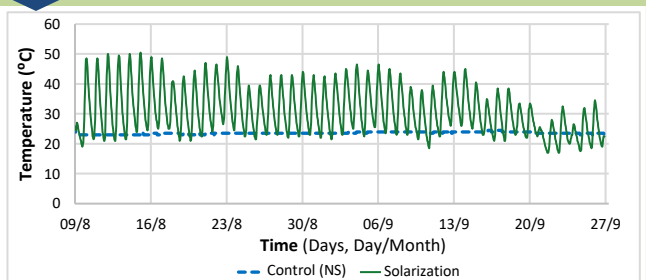
- Test the efficacy of solarization on the elimination of *F. circinatum* inoculum from an artificially inoculated substrate.

3 Methods

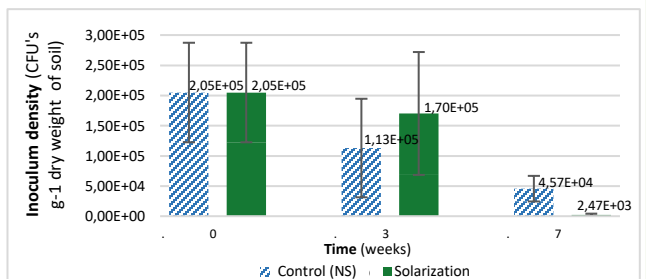


Fusarium circinatum (PDA); nylon bags containing inoculated substrate; CFU's on DCPA

4 Results



Daily range of substrate temperature (°C) at 10 cm depth from 9th August to 27th September 2019, subject to each treatment.



Effect of solarization and control treatments on *F. circinatum* viable inoculum density in substrate after 3 and 7 weeks of treatment application (Av. ± SD, CFU's g⁻¹ dry weight).

5 Conclusions & Future Perspectives

- **Substrate solarization** decreased *F. circinatum* viable inoculum density in the substrate after seven weeks of treatment. This gives good perspectives regarding the use of this technique for pathogen **inoculum reduction**.
- Under the conditions tested, the fungus was not completely eliminated from the substrate. Hence, for eradication purposes, an **optimization** of the solarization technique is needed in order to achieve complete elimination of the pathogen from the substrate, making solarization a viable solution to minimize biotic risks in a nursery.
- Given the relevance of pine pitch canker on nurseries around the world, it is extremely important to discover effective management techniques against this fungus to be applied in an **integrative management** strategy.

Reference: Silva et al. (2021). Effect of Substrate Solarization for the Control of Fungi: The Case Study of *Fusarium circinatum*, the Quarantine Agent of Pine Pitch Canker. Silva Lusitana, 29(2), 161-175.

