Influence of Mulches on Ericoid Mycorrhizal Colonization in Blueberry Roots:

Field Trials in Fataca, Portugal (2024–2025)

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INTRODUCTION

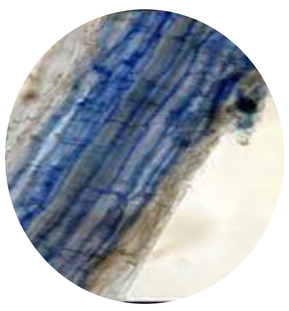
Blueberry plants (*Vaccinium virgatum* Aston cv Centra Blue) depend on ericoid mycorrhizal fungi (ErMF) to enhance nutrient uptake, particularly under acidic and nutrient-poor soil conditions. These symbiotic associations play a crucial role in plant health, resilience to environmental stress, and sustainable crop productivity. Agricultural management practices, such as mulching, can significantly influence soil microclimate, organic matter dynamics, and microbial community structure, potentially affecting ERMF colonization and function. Additionally, inorganic mulches, such as plastic films, can fragment over time, generating microplastics that may affect soil biota and plant–fungus interactions However, the impact of different mulching materials on ericoid mycorrhizal development in field-grown blueberries remains insufficiently understood.

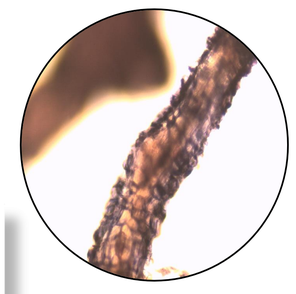
METHODS

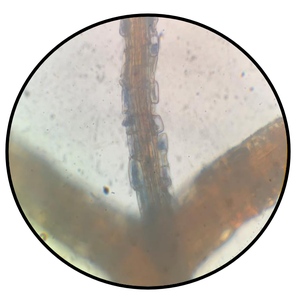
This study investigated how five different mulches affected ErMF colonization in blueberry roots in a field experiment conducted in **Fataca**, Odemira (Southern Portugal), over two consecutive years (2024–2025). The treatments included: **A:** pine bark (control); **B:** Kraft cellulose biofilm); **C:** geotextile fabric, a polypropylene (PP); **D:** polyethylene (PE) plastic film ; **E:** KRITIFIL®. Root samples were collected annually and analyzed to quantify ericoid mycorrhizal colonization.

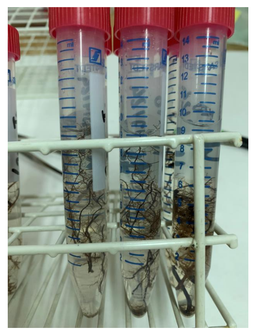
Characterization of soil cover materials

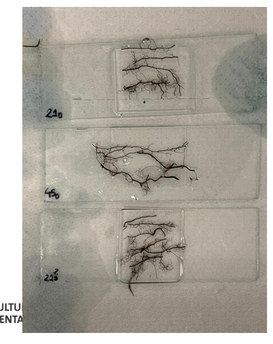
Mulch Code	Mulch Type	Description	Aspect
A	Control	Pine bark applied to soil surface.	
B	Kraft Paper Biofilm	Beige cellulose paper, 0.80 m width, provided by COTESI.	
C	Polypropylene (PP) Geotextile	Permeable, 50×70 cm, 97 g m^{-2}, 1.60 m width, black.	
D	Polyethylene (PE) Film	40 µm thickness, 1.50 m width, black.	
E	KRITIFIL Biofilm	Possibly PBAT-based, 15–17 µm thickness, 0.80 m width, black, provided by KRITIFIL.	











WORK AIM

This study evaluates the influence of organic and inorganic mulches on ErMF colonization in blueberry roots under field conditions in Fataca, Portugal (2024–2025), contributing to the optimization of sustainable management practices in blueberry cultivation.

Study site

Field trial conducted at the **Fataca** Innovation Hub, located in Odemira municipality, Beja district (37.5903° N, 8.7403° W), Portugal.

RESULTS

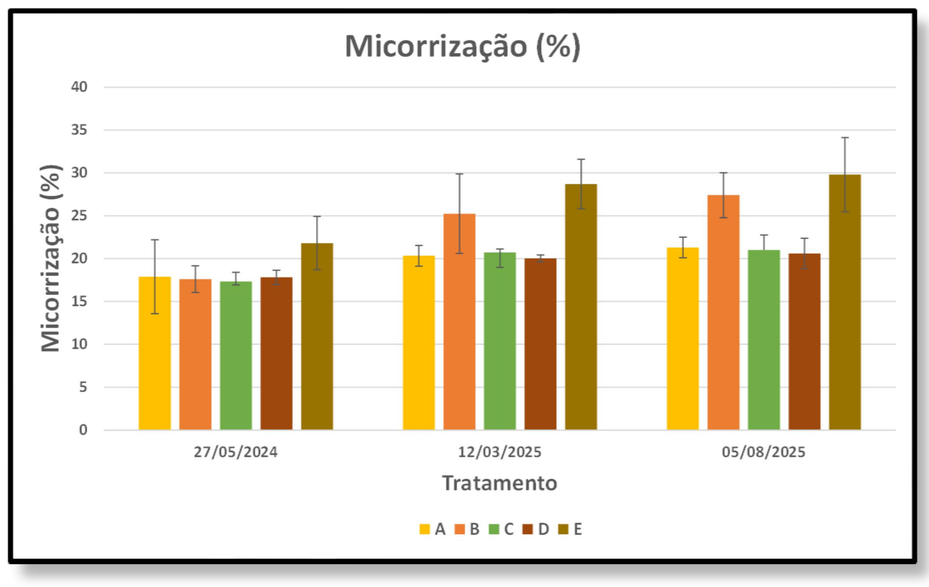


Figure 1. Percentage of mycorrhization in blueberry (*Vaccinium* sp.) roots under different treatments (A–E) at three sampling dates (27/05/2024, 12/03/2025, and 05/08/2025). Bars represent mean values ± standard error (SE).

The percentage of root colonization by ErMF increased over time in all treatments (soil cover types). Although no significant influence were observed among treatments at the first sampling (May 2024), mulch type B and E exhibited the highest levels of mycorrhization in March and August 2025. This pattern suggests a progressive establishment and stabilization of the symbiosis, likely reflecting the activity and adaptation of native ericoid mycorrhizal fungi.

CONCLUSIONS

Soil cover type influences ericoid mycorrhizal colonization in blueberry roots. Specific mulching materials, such as Kraft® cellulose and KRITIFIL® biofilms can enhance symbiotic interactions and support sustainable cultivation practices in Mediterranean environments, while also offering the advantage of being biodegradable in soil.

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