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Tree growth and cambial activity in response to fire: insights into *Pinus pinaster* Mediterranean forests

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Introduction

Fire is one of the major ecological factors influencing forest structure, tree growth, and physiological functioning in the Mediterranean environment.

Understanding tree responses to fire is essential for evaluating ecosystem resilience and predicting adaptive strategies under increasing environmental stress.



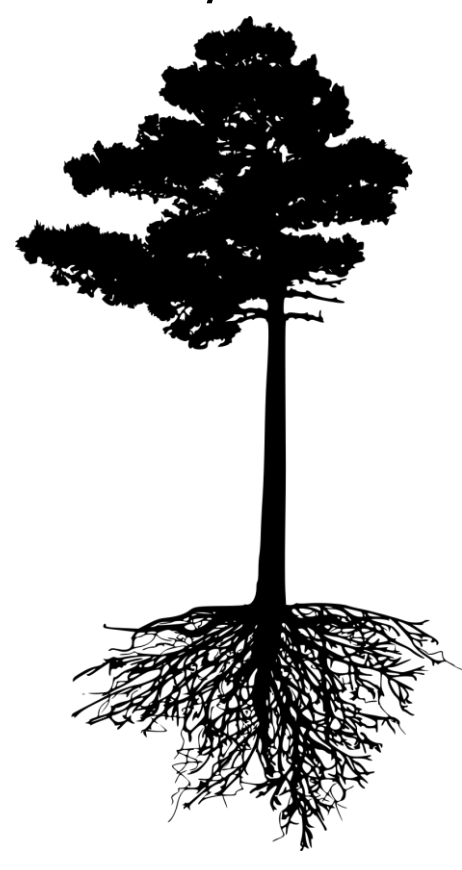
Aim and Hypothesis

The study aims to monitor and evaluate the effects of environmental constraints, defined by fire occurrence, on tree growth and functionality in the short- and medium-term. Linking wood anatomical traits with physiological responses to fire could provide actionable insights into designing management strategies that enhance forest resilience, promote sustainable growth, and mitigate risks under increasingly variable environmental conditions.

Materials and Methods

Tuscany, Italy

Pinus pinaster

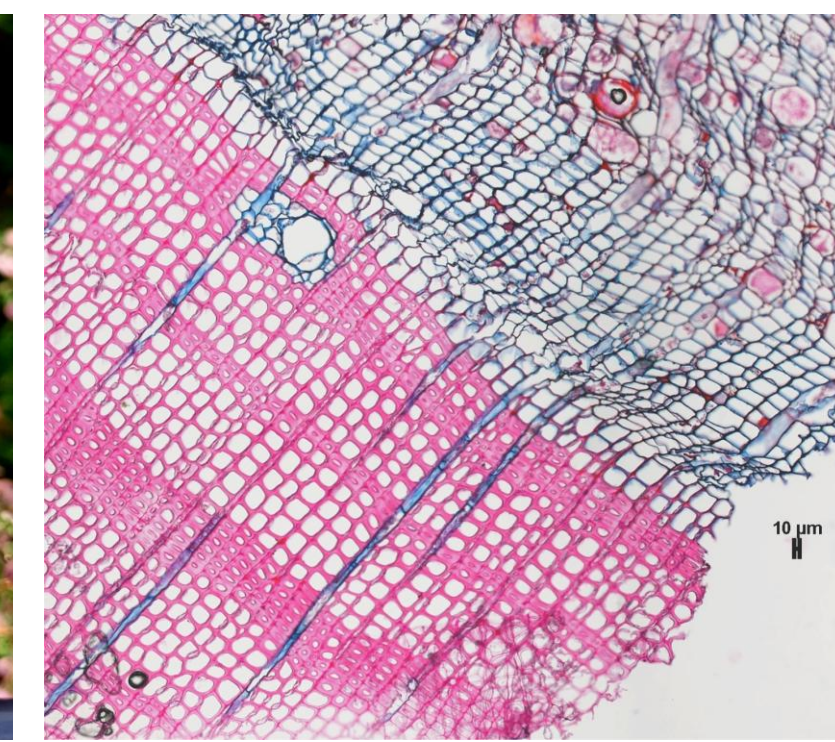


Tree-ring width (TRW) and isotopes analysis to assess past growth trends and to detect potential effects of the previous prescribed fire in 2012 and 2017.

Analysis of cambial activity in 2024 (pre-) and 2025 (after- a prescribe fire) to assess the potential presence of stress conditions following the fire.

March 2024

March 2025



Expected results

The prescribed fire will cause changes of the anatomical and functional traits of *Pinus pinaster* by revealing prompt stress signals useful to assess the occurrence of the latent mortality. However, the species is expected to show mechanisms of resistance and adaptation, maintaining its functionality despite the disturbance. Thus, anatomical traits pre- and post- fire will serve as key tools to visualize and quantify changes by enabling a clear interpretation of the species' responses.