Reforestation monitoring in Palo Laziale Forest: functional assessment of three Mediterranean tree species in field and drought conditions

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Int	roduction	Materials and Methods	
Mediterranean forests encounted arowth and survival of tree spec	er prolonged droughts that can hinder the	AREA OF STUDY:	
areas.	Early-stage seedlings face high mortality isks due to their shallow roots and limited	The study's area is Palo Laziale forest (SCI IT6030022), which is part of Natura 2000 network. The site is experiencing a forest decline due to lack of adequate management, increasing anthropization and worsening arid conditions.	
It Biotic agents	arbon storage.	As part of the European Life PRIMED project, around 2500 three-year-old	



Assessing species' carbon and water dynamics is essential for effective restoration planning.

McDowell et al. (2008)

The study aims to compare the functional and ecological strategies of three Mediterranean tree seedlings (*Quercus cerris, Quercus pubescens,* and *Fraxinus ornus*) of the same age and origin both in field in a reforestation site and potted subjected to experimental drought and well-watered conditions.



native tree seedlings were planted in the area.

EXPERIMENTAL DESIGN:

Species' leaf gas exchanges were measured in both experimental and field conditions using the portable photosynthesis system Ciras-2, along with key leaf traits associated with carbon economy and water status.



Measurements in the reforestation area (Palo Laziale Forest) were conducted between May and October 2023.





In June, a drought experiment was carried out in a botanical garden using seedlings of the same species, age, and origin as the plants observed in field. The traits were assessed in the "control" and "drought" groups, both during water withholding and subsequent recovery.

Mean and standard deviation of the leaf gas exchanges per each species and date. Pn (Net photosynthetic rate), g_s (Stomatal conductance), and E (transpiration rate). Site: Palo Laziale Forest.

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SEPTEMBER-JULY MAY-JUNE	0.000 0.000 0.039	0.000 0.000 0.360	0.000 0.551	0.000	0.984	0.710	0.992	0.491 0.933	Mea	n and standard d	eviation of	the leaf g	Time as exchai	nges per e	each spec	ies, treatr	nent and
SEPTEMBER-JULY MAY-JUNE OCTOBER-JUNE	0.000 0.000 0.039 0.000	0.000 0.360 0.000	0.000 0.551 0.980	0.000 0.000 0.000	0.984	0.710	0.992	0.491 0.933	Mea co	n and standard d ntrol, D: drought	eviation of reatment.	the leaf g Pn (Net p	Time as exchai hotosynth	nges per e netic rate),	each spec g _s (Stom	ies, treatr atal condu	nent and ictance)
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Tukey HSD results for species and treatment effects on each dependent variable (PN: Net photosynthetic rate, GS: Stomatal conductance, E: transpiration rate, iWUE: intrinsic water use efficiency, SLA specific leaf area, LDMC: leaf dry matter content, RWC: relative water content). C: control, D: drought treatment. FO: *Fraxinus ornus*, QC: *Quercus cerris*, QP: *Quercus pubescens*. Site: Rome's botanical garden.

• Predict future leaf gas exchanges of Q. cerris, Q. pubescens and F. ornus using a biochemical model based on the equations of Farquhar et al. (1980);

- Investigate the mechanisms underlying species' mortality by analyzing and comparing non-structural carbohydrates in the leaf and wood tissues of both survived and dead plants.
- Predict drought-induced mortality of Q. cerris, Q. pubescens and F. ornus.

Future developments