ASSESSING RESILIENCE COMPONENTS IN MARITIME PINE PROVENANCES GROWN IN COMMON GARDENS

C. Lisella *[1], S. Antonucci [2], G.Santopuoli [2], M. Marchetti [1], R. Tognetti [2]

[1] Department of Biosciences and Territory, University Study of Molise, Contrada Fonte Lappone, 86090 Pesche, Italy
[2] Department of Agricultural, Environmental and Food Sciences, University Study of Molise, Via Francesco De Sanctis, 86100 Campobasso, Italy

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* Corresponding author 's information:
c.lisella@studenti.unimol.it

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BACKGROUND

The Mediterranean basin is a climate change hotspot. Unraveling the response of populations of Mediterranean tree species to drought is an important step to guide climate-smart forest strategies, e.g., assisted migration. *Pinus pinaster* Ait. (maritime pine) – an important forest species – has a range distribution strongly fragmented that covers different environmental conditions, which may trigger the development of intraspecific strategies.

AIMS

- determine whether variation for resilience components occurs among provenances
- assess the relationship between climatic variables and resilience components

MATERIALS AND METHODS

Experimental design

1	2	3	4	5
A	B	D	C	E
D	C	A	E	B
B	E	E	A	D
C	A	B	D	C
E	D	C	B	A

Each **letter** correspondS to a **provenance**: Telti (A), Corsica (B), Tuscany (C), Portugal (D) and Limbara (E)

SAMPLING

- **Tree cores**
- **Climate** data

DATA ELABORATION

- Identification of drought years
- Calculation of **resilience components**

DATA ANALYSIS

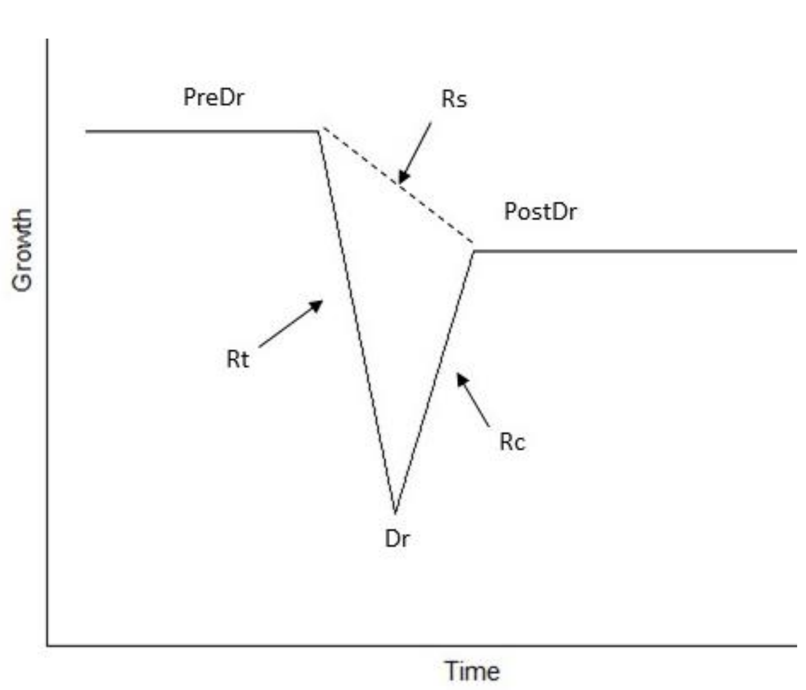
- Non-parametric tests: Kruskal Wallis and Conover test
- Generalized Linear Model

Resilience components

Rt=BAIDr/BAIPreDr

Rs=BAIPostDr/BAIPreDr

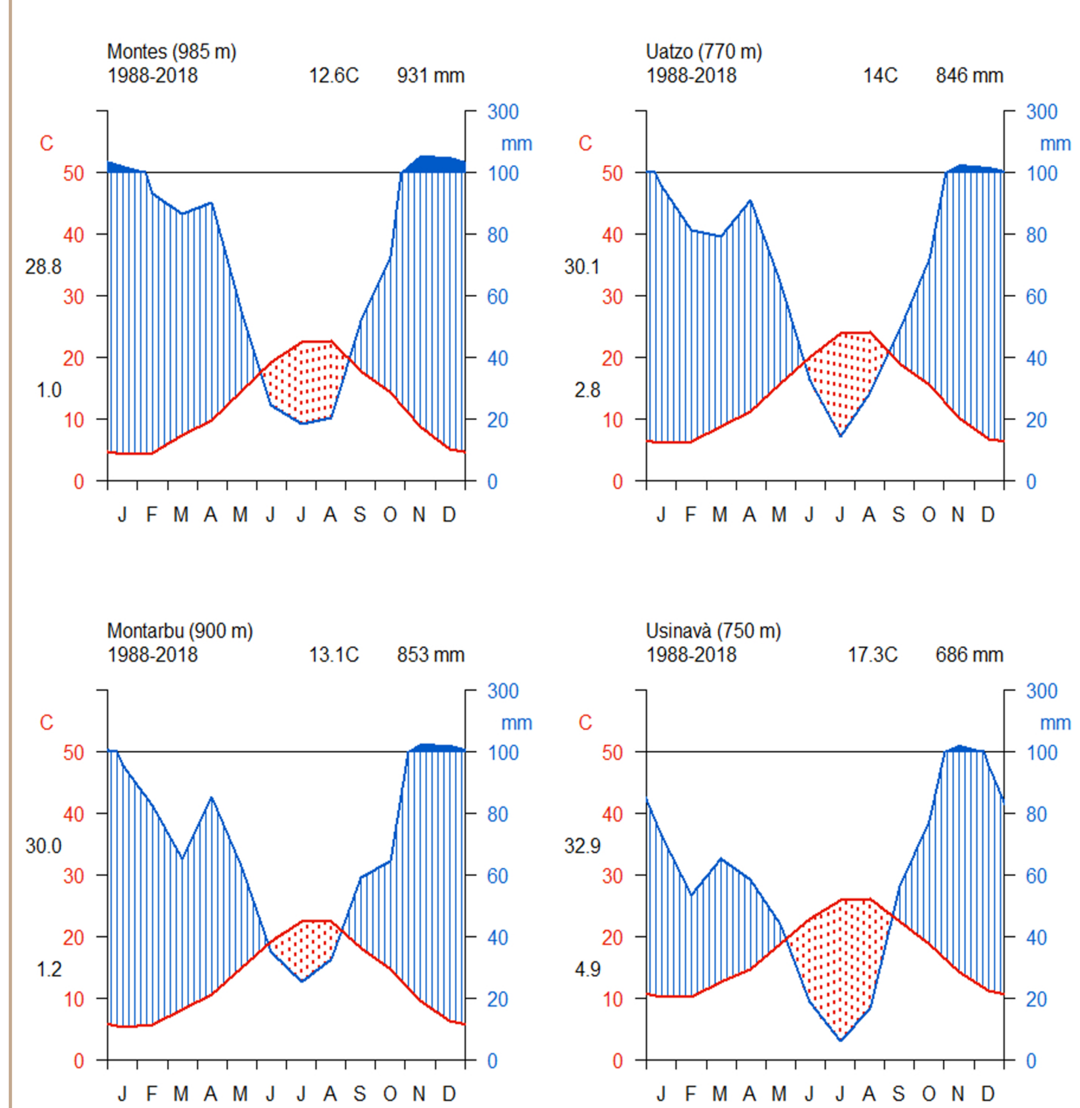
Rc=BAIPostDr/BAIDr



PACKAGES used:

- DplR → dendrochronology data
- SPEI → climate data analysis
- PointRes → resilience components

RESULTS



	Resistance		Resilience		Recovery	
	Estimate	SE	Estimate	SE	Estimate	SE
(Intercept)	0.50 **	0.17	1.51 ***	0.11	2.87 ***	0.25
T min	**0.05 *** **	0.01	0.01	0.01	**-0.02 ** **	0.01
T max	0.02 **	0.01	---		---	
Height	-0.02 ***	0.01	-0.03 ***	0.01	-0.01 *	0.00
DBH	---		---		---	
$SPEI_{6AUG}$	---		**0.60 ** **	0.18	**0.97 *** **	0.17
AIC	-153.44		-118.58		-128.16	
R^2	0.39		0.25		0.26	

- **Mesic** and **xeric** provenances differed in growth rates
- Minimum temperature was an important **proxy** for resilience components
- A **trade-off** exists between resistance and recovery
- Comparison of **resilience** and **recovery** models showed drought adaptation
- Influence of **$SPEI_{6AUG}$** was **less** pronounced in **resilience** than in recovery model

CONCLUSIONS

Predictive models showed different probability in the response of resilience components to climate variables.
The models' results indicated a noticeable adaptation of maritime pine to the drought conditions of Sardinia, particularly the local provenances.

MAIN REFERENCES
Giannini et al., 1992, «Prove di provenienza di Pinus Pinaster Ait. in Sardegna»
Giannini et al. 2022 «Risultati Di Prove Di Provenienza Di Pino Marittimo in Sardegna.»
Lloret et al., 2011, «Components of tree resilience: Effects of successive low-growth episodes in old ponderosea pine forests», doi: 10.1111/j.1600-0706.2011.19372.x