Potential for a 300-year drought reconstruction in the Zagros Mountains, Iran based on the tree-ring width of *Quercus brantii* Lindl.

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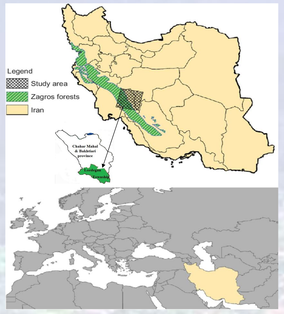
Aim: Assess the climatic sensitivity and reconstruct the multi-century drought history of *Q. brantii* L. Zagros forests in Iran, using dendrochronological techniques

Introduction

The **Zagros Forests** in the west of **Iran** are one of the most important natural habitats. Among the various oak species in the Zagros Mountains, ***Q. brantii*** with an area of 3.5 million hectares has faced a significant reduction due to **high aridity** (Rahimi *et al.*, 2022).

Climatic reconstructions based on tree rings provide valuable climate information in this area and indicate that the porous tree rings of oak species serve as suitable climatic indicators for annual climate reconstruction.

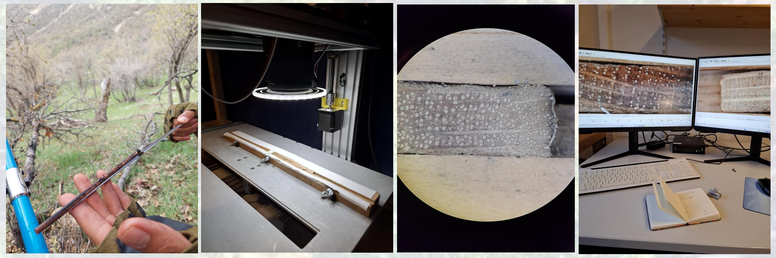


Location of the Lordegan area in Zagros Forests

https://www.tandfonline.com/doi/full/10.1080/01431161.2012.695095#d1e259

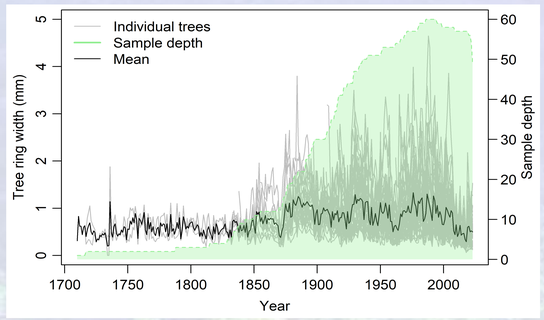
Material and Methods

- ✓ Choosing **30 trees** in Lordegan area (Chaharmahal and Bakhtiari province)
- ✓ Taking **two increment cores** from each tree
- ✓ Preparing the surface of them
- ✓ Capturing the high-resolution panoramic images by **Skippy program**
- ✓ Measuring samples by **CooRecorder 9.6**
- ✓ Cross-dating by **Cdendro, TSAP and COFECHA** programs
- ✓ Detrending the data by **dplR** software package
- ✓ Analysis of the climate data: Temp, Preci, SPEI and PDSI (1958-2023)

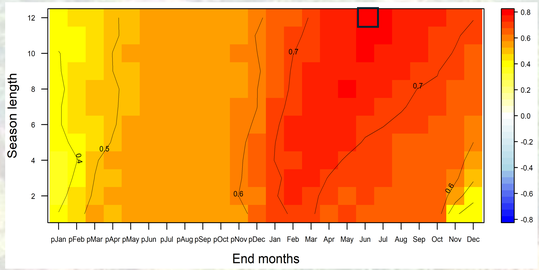


Sampling cores of *Q.brantii*, capturing the samples by Skippy program, a view of tree rings in recent years and measurement of them by CooRecorder (Left to right)

Results and Discussion



✓ Raw data, mean raw chronology and sample depth of *Q. brantii* (1710-2023)

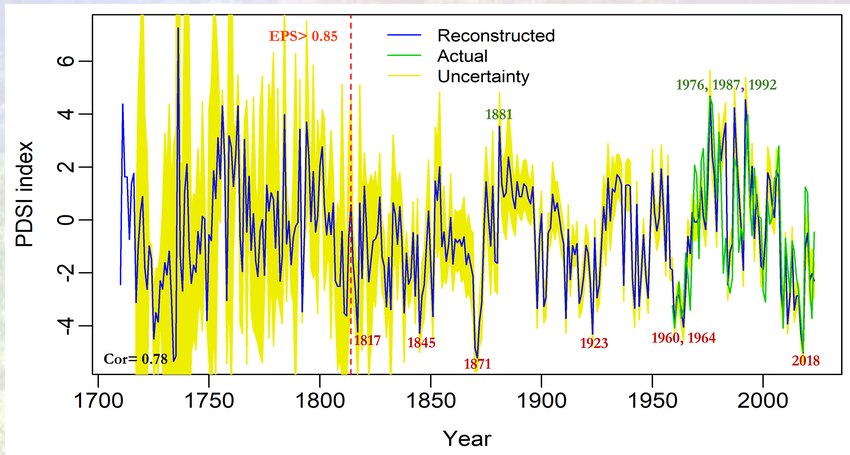


✓ The **strongest correlation** between climatic parameters and detrended tree rings of *Q. brantii* with **PDSI** was found from **previous July to current June (r=0.78)**

Characteristics of *Q. brantii* samples and chronology statistics after detrending the samples with a negative exponential curve

Species	Trees/Cores	Time span	MS	Rbar	SNR	Eps
Q. brantii L.	30/60	1710 - 2023	0.25	0.50	60.61	0.98 (1814-2023)

✓ MS = mean sensitivity, rbar = mean pairwise interseries correlation, EPS = Expressed population signal, SNR= Signal-to-noise ratio



✓ Reconstruction of the PDSI during 1710-2023
✓ Chronology is robust until 1814, with the potential to extend back to 300 years (with increased sample replication)
✓ **PDSI is a measure of soil moisture balance in Zagros Forests** (positive and negative values means wet and drought conditions relatively)
✓ The Great Persian Famine 1870-1872 (Melville, 1988) can be linked to the driest reconstructed period in our chronology (**1971**)

Conclusion

- ✓ Strong relationship between cumulative soil moisture and *Q. brantii* L. growth allows reconstructing past **hydroclimatic conditions** of the Zagros region.
- ✓ Classification of dry events shows that most of **the reconstructed extreme dry years (1971, 1923, 1960, 1964) occurred during the famine in Iran.**

References

✓ Melville, C. (1988). The Persian Famine of 1870-1872: Prices and Politics. Disasters, 12, 309–325.
✓ Rahimi, H., *et al.* (2022). The trend of dieback and decline of oak forests (Case study: Totshami and Barzeh of Kermanshah). Iran Nature, 7(5), 35–40.