

Carbohydrate storage and root persistence in historically coppiced *Quercus pyrenaica*

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Introduction

Quercus pyrenaica is a vigorous **root-resprouting** species intensively and historically **coppiced** for firewood, charcoal and woody pastures. Due to the rural exodus and the appearance of new energy sources, coppicing was **abandoned** towards 1970s. Since then, tree over-aging has resulted in **stand stagnation** displayed by slow stem growth, branch dieback, and scarce acorn production.

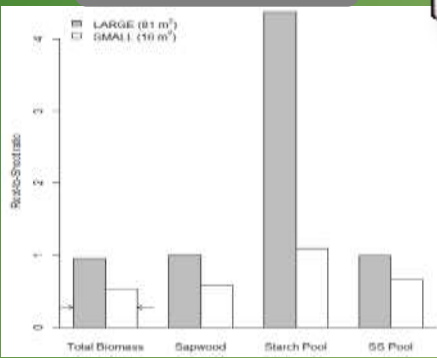
Root attributes and concentrations of non-structural carbohydrates (NSC) were studied to test the hypothesis of a **physiological imbalance** between above- and below-ground organs, result of long term coppicing, as the underlying cause of *Q. pyrenaica* decay.

Materials and Methods

- Genetic analyses to delineate **clonal structure**
- Seven clones sampled for non-structural carbohydrate (NSC) analyses
- Two clones harvested and excavated for **biomass** partitioning
- Root **connections** and root **longevity**

Results

Root-to-Shoot ratios



Root-to-shoot ratios

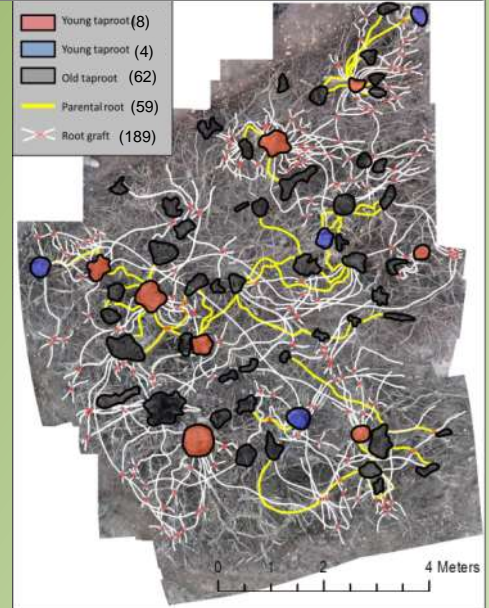
R:S > 0.3 → Root systems proportionally larger than in sexually regenerated trees

Living parenchyma in sapwood → Roots systems maintain functionality

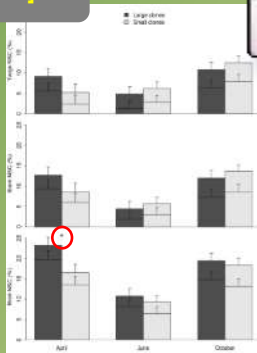
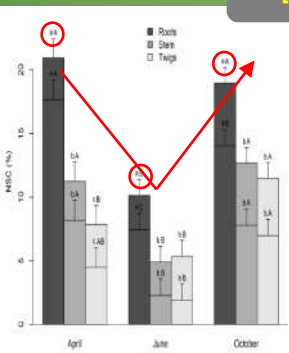
Large starch pools → High ratios "storage-to-production"



Old, massive and highly interconnected root systems



[NSC]



[NSC]

NSC reserves for:
- spring leaf production
- stem growth

Favored allocation to roots → Resprouting after disturbance

Higher [starch] in the roots of the large clone

Conclusions

Enhanced belowground NSC storage



Trade-off between vegetative **RESILIENCE** and aboveground performance



Specific strategy for regeneration **PERSISTENCE**