IBC2024 XX International Botanical Congress Madrid Spain
July, 21st - 27th, 2024 ibcmadrid2024.com • info@ibcmadrid2024.com
613/2963

Cell division patterns during early cork development in two *Quercus spp.*

Davide Botticelli [1,2,3], Carlos Vila-Viçosa[1,2,3,4] and Ana Campilho[1,2,3]

1. CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBIO Laboratório Associado, Vairão -Universidade do Porto (UP), Portugal; 2. Departamento de Biologia, Faculdade de Ciências, UP, Portugal; 3. BIOPOLIS Program in Genomics, Biodiversity and Land Planning, CIBIO, Vairão, Portugal; 4. MHNC-UP - Museu de História Natural e da Ciência da UP, Portugal. **Correspondence: anacampilho@cibio.up.pt**

Overview

Quercus suber L. (Figure) and *Quercus rotundifolia* Lam. are iconic trees of Mediterranean landscapes. *Q. suber* provides cork, a sustainable resource for industry, while *Q. rotundifolia* provides crucial ecosystem services. They are phylogenetically related (Eurasian Subgenus Quercus) but display contrasting periderm development phenotypes. *Q. rotundifolia* produces a rhytidome (successive periderms) because the phellogen - the lateral meristem - cell ring collapses periodically, as opposed to the maintenance of a single periderm in *Q. suber*.

Aims

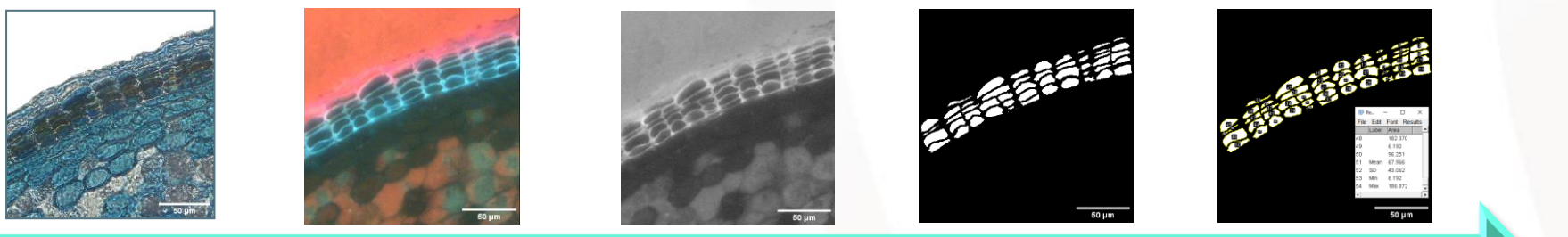
This study aims to explore the distinctive feature of the *Q. suber* phellogen: this tree's unique genetic program allows the same ring of meristematic cells to keep up with the inner trunk enlargement as long as the tree is alive. In this work, we hypothesize that *Q. suber*'s phellogen cells undergo frequent anticlinal divisions.

Quercus suber in Portugal after the typical cork harvest

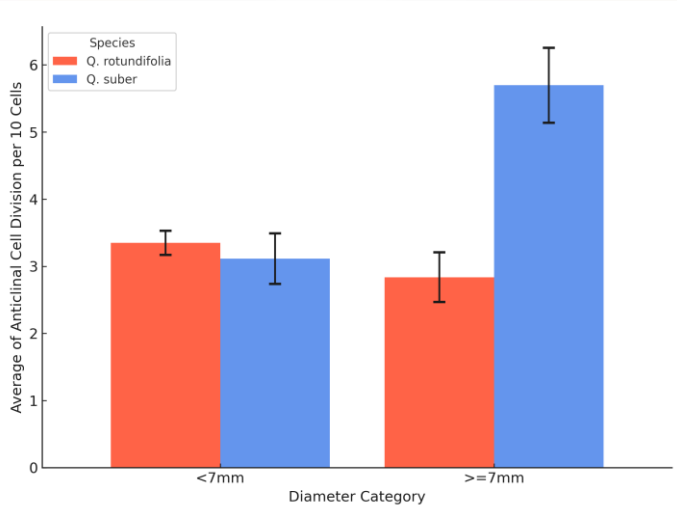
Methodology

As a strategy, early developmental stages of periderm tissue pattern are compared between two oak tree species: the *Q. suber* and the *Q. rotundifolia*.

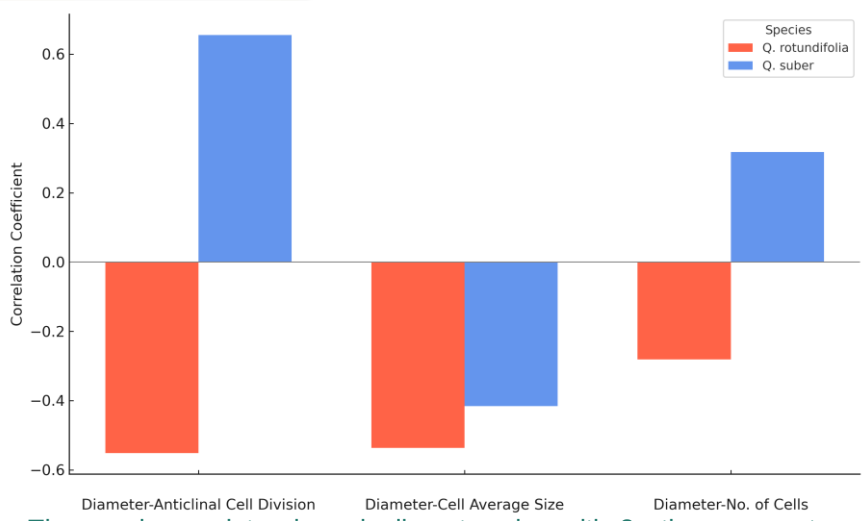
The figure represents a workflow example with a *Q. suber* sample.



Results



The graph compares the number of anticlinal cell divisions in *Q. suber* and *Q. rotundifolia* based on diameter branch size. It shows that *Q. suber* branches with larger diameters have a higher number of anticlinal cell divisions, while *Q. rotundifolia* did not show a significant difference.



The graph correlates branch diameter size with 3 other parameters in a 200x200 µm area of *Quercus* spp. images: anticlinal cell divisions, average cell size and the total nº of cells. It shows that *Q. suber*, have a higher number of periderm cells due to an higher frequency of anticlinal cell division.

Conclusion

The analysis of cell tissue pattern support the hypothesis that *Q. suber*'s phellogen cells undergo more frequent anticlinal divisions than *Q. rotundifolia*, enabling a continuous phellem formation. Furthermore, the data collected show that, as the diameter of a *Q. suber* branch increases, it correlates with greater number of cells, suggesting more cell division activity, compared to *Q. rotundifolia* branches of the same diameter. These findings indicate a species-specific variation in the relationship between diameter/age and anticlinal cell divisions.

The project was funded by FCT (EXPL/BIA-EVL/0997/2021)