

***Quercus suber* Infected by *Phytophthora cinnamomi*.
Effects at Cellular Level of Cinnamomin on Roots, Stem
and Leaves**

I. Maia ^{a,*}, C. Medeira ^a, E. Melo ^a, A. Cravador ^b,

^a INRB. Estação Agronómica Nacional, Quinta do Marquês, 2784-505
Oeiras, Portugal. * isabel.maia@etcabo.pt

^b Universidade do Algarve, FERN, Campus de Gambelas, 8005-139
FARO, Portugal

Phytophthora cinnamomi has been reported to be regularly associated with cork and holm oak decline. This oomycete secretes elicitors, a group of unique highly conserved proteins that can enhance plant defence reactions.

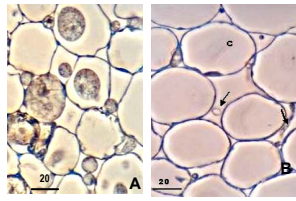
In our previous work it was shown that the absorption of one of these elicitors— α -CIN— by the roots of cork and holm oak at concentrations of 500 μ g and 1 mg/ml reduced *P. cinnamomi* viability and its progression into internal tissues.

The objectives of the present work were to study the restriction of host tissue colonization and the loss of pathogen viability in the roots treated with lower concentration of α -CIN, and to verify structural alterations at cellular level induced by this elicitor in aerial part of the plantlets.

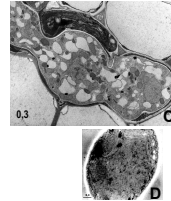
Roots of *Quercus suber* seedlings two month old were immersed in aqueous α -CIN solutions [250 μ g/ml] and [100 μ g/ml] during 24 h. Roots were then inoculated with *P. cinnamomi*.

The samples pre-treated with α -CIN at the two concentrations and inoculated with *P. cinnamomi* revealed similar histological and cytological aspects. The hyphae were mainly intercellularly located, restricted to the external cortex (Figs.A and B).

The treatment induced loss of pathogen viability and it was evident the pathogen membranar degradation, loss of organelles and reduction of



Figs. A, B. Cortical root parenchyma infected with *P. cinnamomi*. A- non-treated with α -CIN; B- α -CIN treated.



Figs. C, D. *P. cinnamomi* cells. C-in α -CIN treated roots; D- in α -CIN non-treated roots.

cytoplasm density (Figs.C and D). The hyphae were mainly intercellularly.

In stem of α -CIN pre-treated plants, the external cortical and medullar parenchymas concentrated osmiophylic materials in vacuoles. In leaves the histological structure was maintained, but in spongy parenchyma the chloroplast ultrastructure was modified. In leaves the histological structure was maintained, but in spongy parenchyma the chloroplast ultrastructure was modified.

The loss of viability of the pathogen and its confinement to the root cortex are in accordance with our previous observations as well as those by other authors [1,2,3,4]. The increase of accumulation of osmiophylic materials, probably phenol compounds, in the stem suggests a defence response [1,2,3,4]. In leaves the chloroplasts are the most sensitive organelles but did not appear much damaged, allowing the recovering of the plantlets.

We can conclude that α -CIN induced a defence response against *P. cinnamomi* in cork oak, at 100 μ g/ml and no irreversible damage occurred.

References:

- [1] J. Lheirmnier, *et al.* Phytopathology, 93 10 (2003) 1308.
- [2] C. Medeira *et al.* IUFRO Tree Biotech. Congress, 2007, Ponta Delgada, Azores.
- [3] N. Mohamed, *et al.* Phytopathology, 97 5 (2007) 611.
- [4] K. Piccard, *et al.* Plant Physiology, 124, (2000) 379.