

***Quercus suber* infected by *Phytophthora cinnamomi*.**

Effects at cellular level of cinnamomin on roots, stem and leaves

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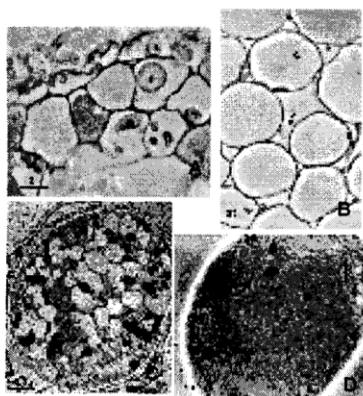
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Phytophthora cinnamomi has been reported to be regularly associated with cork and holm oak decline. This oomycete secretes elicitors, a group of unique highly conserved proteins that can enhance plant defence reactions.

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 μg 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 $\mu\text{g}/\text{ml}$] and [100 $\mu\text{g}/\text{ml}$] during 24 h. Roots were then inoculated with *P. cinnamomi*, the samples were collected 2 days after pathogen inoculation and processed for light and transmission electron microscopy.



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

Figs. C and D. *P. cinnamomi* cells. C- in treated roots; D- in non-treated roots.

Roots pre-treated with α -CIN at concentrations of 250 $\mu\text{g}/\text{ml}$ and 100 $\mu\text{g}/\text{ml}$ and inoculated with *P. cinnamomi* revealed similar histological and cytological aspects.

The treatment induced loss of pathogen viability and it was evident the pathogen membranar degradation, loss of organelles and reduction of cytoplasm density. The hyphae were mainly intercellularly located, restricted to the external cortex.

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. The intrathylacoide spaces were swollen and the aspect of grana was changed, less regularly stacked or even non-stacked.

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 [1,2,4,5].

The increase of accumulation of osmiophylic materials, probably phenol compounds, in the stem suggests a defence response.

In leaves the chloroplasts are the most sensitive organelles. Their ultrastructural alteration was a consequence of elicitor action and was similar to that described for tobacco treated with cryptogin [3]. In our experiments the organelles 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 the concentration 100 $\mu\text{g/ml}$ and no irreversible damage occurred.

References

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