THE RELATIONSHIP BETWEEN RESISTANCE TO GLOEOSPORIUM LEAF DISEASE (*Colletotrichum gloeosporioides*) AND SOUTH AMERICAN LEAF BLIGHT (*Microcyclus ulei*) IN *HEVEA*

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by

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A B S T R A C T

1. Pre penetration studies revealed that there was no significant difference in conidia germination of C. gloeosporioides on susceptible and resistant Hevea leaves when compared within hours. However, the rate of germination was higher in susceptible clones. The rate of germtube elongation in resistant clones decreased after 12 h and the appressoria formation occurred earlier at 3 h after inoculation in resistant leaves.

2. The penetration of leaves of resistant clones was limited to epidermal and palisade layers. In susceptible clones the fungus colonised the mesophyll cell layers, after 48 h and acervuli development was detected after 72 h.

3. Conidia germination and germtube growth of C. gloeosporioides in the leachate of resistant Hevea clones was lower compared to their behaviour in leachate of susceptible clone. However, there was an increase of appressoria in leachate of resistant clones.

4. The germination of C. gloeosporioides conidia in chloroform extracts of leaf waxes of different Hevea clones showed that there was an inverse relationship between germtube length and SALB resistance. 4 compounds which were phenolic and unsaturated fatty acid in nature were isolated chromatographically. They were responsible for the inhibition of germtube length.

Bioassays on these compounds showed that there were quantitative differences in these compounds among the Hevea clones. An inhibition of germination and germtube length was observed with increased wax concentration.

5. Chromatographic studies of leaf methanol extracts showed 8 phenolic compounds. Of these 6 compounds, showed inhibition of germination and germtube elongation. Bioassays on these compounds, showed that the susceptible clones possessed quantitatively different amounts of phenols. 6 inhibitory compounds were observed in leaf methanol extracts of resistant clones and in susceptible clones there were 2 inhibitory compounds.

6. Among the naturally occurring phenols kaempferol and quercetin were present in considerable amounts in Hevea leaves. Some SALB susceptible Hevea leaves possessed higher amounts of quercetin.

7. The total phenol content and ortho-dihydroxy phenol content of Hevea leaves did not show any relationship to the SALB resistance. However, ortho-dihydroxy phenol content in bark of Hevea increased with SALB resistance.

8. Qualitatively there were no differences in the sugars and amino acids in leaves of Hevea clones tested.

9. Major and trace nutrient contents in Hevea did not show any relationship with SALB resistance.

10. The ortho-dihydroxy phenol content increased after 24 h, in inoculated resistant Hevea clones; inoculated susceptible leaves showed an increase of phenols after 48 h. The phenol content declined after 72 h and 96 h. The flavanol content of different Hevea leaves also showed a pattern similar to the ortho-dihydroxy phenol content.

11. Peroxidase increased with the maturity of all clones tested when examined at three different development stages, the 7-day-old copper-brown stage showed an inverse relationship with SALB resistance. Peroxidase activity was higher in SALB susceptible leaves than in the resistant leaves. An increased PA at 24 h after inoculation could be observed in resistant clones but susceptible clones showed increased PA after 72 h.

12. The glycoside content showed an inverse relationship to SALB resistance. However, in infected resistant leaves the liberation of HCN was higher after 24 h and 48 h than in the infected susceptible leaves.

13. Gibberellic acid showed 59% conidia germination even at 100 ppm concentration. An increased concentration of IAA significantly reduced the colony growth of resistant leaves when compared to susceptible leaves. The germination also increased with IAA concentration.

14. IAA increase the PA of inoculated resistant leaves, but susceptible leaves exhibited lowering of PA. Increased PA was not related to the reduction of colony growth.

15. Eventhough some of the reactions of Hevea leaves to M. ulei are not similar, it is possible that the glycoside content and PA can assist in early selection of SALB resistant clones.

C O N T E N T S