RUBBER ROOT ROT: THE ORSTOM APPROACH

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In all the rubber-producing areas of Africa, especially in the Ivory Coast, root diseases due to Rigidoporus lignosus and Phellinus noxius cause considerable damage. The phytopathologists of ORSTOM have undertaken research on the biology of these parasites and their relations with the rubber tree (Hevea brasiliensis). This poster explains how the research work meshes with the field work.

One of the main concerns of the rubber planter or the pathologist is to intervene as early as possible in a plantation to attempt to eradicate sites of infection while they are still localized. Therefore, in order to identify trees in the early stages of infection, three detection techniques were tested: characterization of the fungal parasites in the soil by rubber-wood stick trapping (Declert, 1961); aerial infra-red photography (Nandris et al., 1983a); and seeking in the latex a biochemical marker of the pathological state of a tree.

Field observations suggested some specialization of the mycelium of R. lignosus. A study of the morphogenesis of the thallus of this fungus did in fact show that there are two types of mycelium with fundamentally different morphological characteristics (Boisson, 1968) and enzymatic arsenals (Geiger, 1975). In terms of pathogenesis one type of mycelium specializes in superficial dissemination of the fungus while the other possesses the infectious potential. These two mycelial forms can interconvert under hormonal control. The capacity of the infectious mycelium alone to live under partial anoxia and its preferred site of attack deep underground on the taproot suggest that poor aeration favors the infection. On the basis of this hypothesis, which was subsequently confirmed in vitro and in vivo (Nandris et al., 1981), a system of artificial inoculation of young rubber plants was developed in which anoxia was obtained experimentally by keeping the soil at a high level of humidity (Nandris et al., 1983b).

Epidemiological analysis demonstrated, first, that there is great variability in the spread of the foci of infection of each pathogen (Nandris et al., 1983c). In order to determine whether this observation reflects a variability in pathogenicity within each parasitic population, isolates of R. lignosus and of P. noxius, originating from various geographical regions and from different hosts, were simultaneously inoculated on young rubber plants. These experiments demonstrated the existence of different pathotypes in both of these parasites (Nicole et al., 1983).

Secondly, comparison of the ways in which the two fungal infections develop and of the aggressiveness revealed differences in the respective infectious processes, which were defined by biochemical and cytological studies of these host-parasite interactions (Nicole et al., 1982a). Two aspects were studied:

- the aggressiveness of the parasite, by describing the sites and means of penetration, and the natures of the tissue lesions and of the fungal enzymes that degrade cell-wall components (Geiger et al., 1976, 1981; Geiger and Huguenin, 1981a; Nicole et al., 1982b);
- the host's defense reactions, by determining their anatomical, cellular, and molecular natures (Geiger and Huguenin, 1981b; Nicole et al. 1981).

The results acquired by these various approaches make it possible both to propose a general pattern of pathogenesis for R. lignosus and P. noxius and also to explain the differences in behavior of these two parasites in situ.

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