RESPONSES OF COTTON ROOTS TO VERTICILLIUM DAHLIAE.

F. Daayf, M. Nicole, B. Boher, J. F. Daniel, A. Pando and J. P. Geiger.

ORSTOM, Laboratoire de Phytopathologie, BP 5045, 34032 Montpellier, France.

Verticillium dahliae (VD) is a fungal pathogen that causes vascular wilt disease of cotton (Gossypium sp.). Although numerous works deal with cotton defense mechanisms against wilt parasites, little is known about cytological aspects of root responses after infection with VD. The objective of this study was to get better insights into the early reactions that cotton roots differentiate against VD. Ultrastructural and cytochemical experiments were carried out on resistant and susceptible cotton cultivars (cv) infected by dipping with an aggressive strain of VD. The present investigation emphasized on host cell wall modifications, the production of electron-dense compounds by vascular parenchyma cells and the disorganization of infecting hyphae.

One day after inoculation, host cell wall modifications were observed in resistant roots whereas they were seen only 2 and 3 days after infection in roots of the susceptible cv. The use of gold probes (enzymes, lectins and antibodies conjugated to colloidal gold) indicated that polysaccharides such as cellulose, pectin and overall callose were present in wall appositions localized in parenchyma and phloem cells. Fluorescence and histochemical tests revealed that phenolis also accumulated in xylem vessels.

Another reaction of root cells to VD consisted in the production of electron-dense compounds (EDC) both in the susceptible and the resistant cv. In the resistant cv, EDC were detected as soon as 1 day after infection, while in the susceptible one they were observed later. The EDC appeared in parenchyma companion cells associated with xylem vessels, first in the cytoplasm before being seen within paramural spaces. EDC were also described later in various root parenchyma cells.

Observations of infected roots between 3 and 4 days after inoculation have shown damaged or dead hyphae within vessels. Hyphae were found to be trapped by structures that could be from plant origin. The apparent integrity of the fungal cell wall associated with the disorganization of the fungal cell suggested a toxic effect of plant molecules on the pathogen. Histochemical tests and biochemical studies revealed that cotton terpenoids and flavanes were produced as the first day after infection in the resistant cv.

Active defense of cotton roots to VD occurred early in the resistant cv; it mainly results from the reinforcement of physical barriers associated with phytoalexin synthesis.

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