

The role of syringic acid in the interaction between oil palm and *Ganoderma boninense*, the causal agent of basal stem rot

Abstract

Novel inoculation and assessment methods for *Ganoderma boninense* infection of oil palm are reported. The involvement of phenolic acids in the interaction was examined. HPLC was used to monitor changes in the concentrations of three specific phenolics: syringic acid (SA), caffeic acid and 4-hydroxybenzoic acid, identified as the main compounds that accumulated. The work reported here focuses on SA, the most antifungal of the molecules detected. The oil palm cv. AVROS, reported by local planters to be less susceptible than others, showed higher accumulation of SA than cvs Ekona and Calabar. Accumulation was promoted by addition of chitosan to the plant growing medium. By the end of the time-course, the concentration of SA decreased in the oil palm tissues inoculated with *G. boninense*, suggesting possible metabolism by the pathogen. This loss was, however, not detected in tissues treated with chitosan alone and was greatly reduced when *G. boninense* was combined with this polymer. In vitro studies on antifungal activity of SA were done using concentrations ranging from 50 to 110 $\mu\text{g mL}^{-1}$, those typically recorded in oil palm roots. SA was found to be antifungal (EC 50 90-100 $\mu\text{g mL}^{-1}$). The concentration of SA detected in root tissues, especially in the presence of chitosan, could inhibit growth of *G. boninense*. The pathogen was shown to degrade SA in vitro. However, at the highest concentration tested, metabolism was greatly delayed, only occurring after a lag phase in pathogen growth. Accumulation of phenolic acids, especially SA, may prove a useful trait in breeding resistant oil palm cultivars.