

Abstract

Postharvest (detached) and in planta (attached) fruits of pepper plants, *Capsicum annuum* cv. Jejujaerae (susceptible) and *Capsicum baccatum* cv. PBC80 (resistant), inoculated with the anthracnose pathogen *Colletotrichum gloeosporioides* were examined using light, confocal laser scanning, and electron microscopy to compare the cytological differences between the compatible and incompatible interactions. In nonwound inoculation of postharvest pepper fruit, resistant pepper tissues showed a significant increase in the thickness of the cuticle layer compared with that of the susceptible and noninoculated fruit. Cytological features of programmed cell death (PCD) were observed in the resistant pepper fruit with postharvest inoculation, and these were characterized by positive responses to terminal deoxynucleotidyl transferase-mediated dUTP nick end labeling. The oligonucleosomal fragments of DNA were confirmed electrophoretically as DNA laddering. The PCD-positive responses occurred around the inoculation sites early in in planta wound inoculation in the resistant pepper. Nuclear modifications and structural changes of hypersensitivity were also observed in the resistant fruit, including separation of the plasma membrane from the cell wall, dilation of the endoplasmic reticulum, accumulation of electron-dense inclusions in vacuoles, and cytoplasmic vacuolization accompanying fragmentation of the cytoplasm. These structural changes may also implicate PCD-like host responses. In addition, in planta wound inoculation resulted in cell enlargement and cell division during the later stages of infection to form a periderm-like boundary layer around the inoculation site.