

Ultrastructure of the Epiphytic Sooty Mold *Capnodium* on Walnut Leaves

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Cellular aspects of sooty mold on walnut leaves were investigated by using light and electron microscopy. A black coating developed on the adaxial leaf surface of a walnut tree. No infestations were found on the abaxial leaf surface with peltate glandular trichomes. Light microscopy showed that fungal complexes from the leaf surface were composed of brown conidia and hyphae. Conidia, with longitudinal and transverse septa, were variable in length ranging from 10 to 30 μm , and commonly found in clusters, forming microsclerotia. Neither epidermal penetration nor hyphal entrance to host tissues was observed. Based on their morphological characteristics, the fungal complexes were assumed to be *Capnodium* species. An electron-dense melanized layer was present on the cell wall of multi-celled conidia. Concentric bodies in the fungal cytoplasm had an electron-translucent core surrounded by an electron-dense margin with a fibrillar sheath. Chloroplasts without starch granules in the palisade mesophyll cells of sooty leaves had electron-dense stromata and swollen plastoglobuli. These results suggest that the epiphytic growth of fungal complexes can be attributed to the melanized layer and concentric bodies against a water-deficient environment on the leaf surface. Ultrastructural characteristics of the sooty leaves indicate typical features of dark-adapted and non-photosynthetic shade leaves.