

Title Effects of thymol fumigation on survival and ultrastructure of *Monilinia fructicola*

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Abstract

Postharvest treatment of stone fruit with thymol vapours controls brown rot, caused by *Monilinia fructicola*. While the mechanism of the fungicidal action is not known, the gross effect of the thymol vapours appeared to be on the fungal spores and surface mycelia. Harvested plums were inoculated with conidia of *M. fructicola* and incubated for 4–6 days at 21 °C to allow for sporulation. Sporulating fruit was treated with thymol vapours from 0 to 8 $\mu\text{g mL}^{-1}$. The viability of the conidia obtained from thymol treated and untreated brown rot lesions was tested with four vital stains. *M. fructicola* conidia were immediately affected with a 50% reduction in viability after treatment with 2 $\mu\text{g mL}^{-1}$ thymol as detected by the vital stains fluorescein diacetate, propidium iodide, fluorescent dye DiOC₆(3) and the commercial product FungoLight™. Conidia treated with 8 $\mu\text{g mL}^{-1}$ thymol exhibited 17–23% survival. One millimeter square sections of the infected fruit skin with the associated surface mycelial mass were prepared for transmission electron microscopy. The electron micrographs display the intra and intercellular ultrastructure of the fungal conidia. Thymol crystallized on the outer surface of the fungal cell wall. The cytoplasm of the thick walled spores did not appear changed from the untreated spores. In contrast, all other fungal fine structures on the surface of the lesion were severely affected by thymol vapours. Sections of germ tubes, appressoria and surface hyphae exposed to thymol vapours were characterised by disrupted and disorganised cytoplasmic organelles. The fine structures of the fungal intra- and intercellular hyphae inside the plum tissue were unaffected by thymol treatments.