Laboratory study of tolerance and toxicity of CCA preservative and heavy metal constituents copper, chromium and arsenic to Malaysian tropical fungi

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Abstract

CCA preservative and its constituent heavy metal tolerance and toxicity to 3 Malaysian isolates *Phialophora fastigiata* (soft rot fungus), *Paecilomyces variotii* (mould fungus) and an unidentified white rot Basidiomycete, was investigated by the modified 'Strange-Smith' agar-well-plate technique with 1.6% CCA concentration and the malt-agar-plate bioassay technique with a range of CCA and constituent metal salt concentrations of 0.0024 – 5%m/m. Daily linear hyphal extension was measured between 6 and 22 days depending on relative fungal growth rates. The slow growing *Phialophora fastigiata* sustained mean daily hyphal growth (mm) at relatively higher concentrations of CCA preservative (toxic limits: 0.24 – 0.48%m/m) and their heavy metal constituents (copper-salt: 5.0 – 10.0%m/m; chromium-salt: 0.076 – 0.24%m/m) than the faster growing mould isolate *Paecilomyces variotii* (CCA: 0.019 – 0.076%m/m; chromium-salt: 0.076 – 0.24%m/m) and the white rot Basidiomycete of intermediate growth rate (CCA: 0.076 – 0.24%m/m; copper-salt: 0.076 – 0.24%m/m; chromium-salt: 0.0095 – 0.019%m/m) except for arsenic-salt (*Phialophora fastigiata*: 0.076 – 0.24%m/m; *Paecilomyces variotii*: 0.48 – 0.95%m/m; Basidiomycete: 0.24 – 0.48%m/m). The results showing varying efficacies (toxicity versus tolerance) *in vitro* of CCA and their metal constituents between these fungi can have implications to ground-contact wood protection capabilities of CCA.

Keywords: Tropical fungi, *Phialophora fastigiata*, *Paecilomyces variotii*, Basidiomycete, CCA preservative, copper, chromium, arsenic, tolerance, toxicity