

Antifungal Effects of Soluble silica on Several Postharvest Pathogens of Papaya in-vitro

A.S. Sewwandi, W.A.M. Daundasekera*

Department of Botany, Faculty of Science, University of Peradeniya, Peradeniya, 20400, Sri Lanka

**malkantheid@pdn.ac.lk*

Papaya (*Carica papaya* L.) is a popular fruit grown worldwide in tropical and sub-tropical climates. The shelf life of papaya is comparatively short due to its climacteric nature and postharvest fungal diseases. This study aimed investigating the effects of a GRAS (Generally-Regarded-As-Safe) compound, soluble silica (potassium silicate; K_2SiO_3), on the *in vitro* growth of several postharvest fungal pathogenic species from papaya fruit. Their pathogenicity was confirmed through Koch's postulates. Through colony morphology and micromorphology, the fungal pathogens were identified as two *Aspergillus* spp. (sp. 1, and sp. 2), *Cladosporium* sp., *Fusarium* sp., *Lasiodiplodia* sp., *Penicillium* sp., *Pestalotia* sp. And *Rhizopus* sp. Effects of soluble silica on fungal growth were tested by assessing radial growth on 7500 ppm silica- amended potato dextrose agar (PDA), mycelial dry mass in potato dextrose broth (PDB) and spore germination percentage in 7500 ppm silica-amended sterilized distilled water (SDW). Silica-free PDA, PDB and SDW served as the controls in those experiments, respectively. Silica effect on the dimensions of fungal structures was measured using light microscope. Silica treatment significantly ($P < 0.05$) inhibited the radial growth of *Aspergillus* sp. 1 and 2, *Fusarium* sp., *Lasiodiplodia* sp., *Pestalotia* sp. And *Rhizopus* sp. On PDA, as well as the mycelial dry weights of *Aspergillus* sp. 2, *Cladosporium* sp., *Fusarium* sp., *Lasiodiplodia* sp., *Penicillium* sp., *Pestalotia* sp. And *Rhizopus* sp. In PDB. Spore germination percentages of *Fusarium* sp., *Lasiodiplodia* sp., *Pestalotia* sp., and *Rhizopus* sp. Were also significantly inhibited by silica treatment. A reduction of the mycelial width, conidial length and width of all fungal spp. Was observed upon silica treatment. This study indicates a direct inhibitory effect of soluble silica on papaya postharvest fungal pathogens *in vitro* and warrants further investigation of its applicability on fruit, as a safer alternative to conventional fungicides in managing postharvest fungal diseases.

Keywords: Papaya, Postharvest Fungal Pathogens, Soluble Silica, Direct Inhibitory Effects