INFLORESCENCE DISEASES AND NATURAL DISEASE RESISTANCE IN MANGO (*MANGIFERA INDICA* L.) IN RELATION TO ANTHRACNOSE DEVELOPMENT

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Mango production is limited by inflorescence and fruit diseases. This study investigated mango inflorescence diseases and re-assessed the natural disease resistance (NDR) mechanisms, particularly the induced NDR and their role in the resistance of unripe fruit to anthracnose disease caused by *Colletotrichum gloeosporioides*. Blossom blight, powdery mildew and sooty moulds were the most common inflorescence diseases. Inflorescence malformation and *Cladosporium* disease were recorded for the first time in Sri Lanka. The causal agent of mango malformation was identified as *Fusarium mangiferae* and confirmed by artificial inoculation and Polymerase Chain Reaction (PCR) analysis.

Several local mango cultivars were evaluated for resistance against anthracnose disease. The cultivars, *'Gira'*, '*Karuthacolamban*' and '*Malvana*' were found resistant while '*Ambalavi*', '*Neelam*' and '*Rata*' were moderately resistant. '*Seylum*' *'Dilpasan*', '*Petti*' and '*Willard*' were susceptible to anthracnose. To understand the basis of resistance of unripe fruit to anthracnose, the defences that operate at structural and biochemical level were investigated. Anthracnose development was negatively correlated with the cuticle thickness ($r = -0.84$). Removal of surface wax increased fruit susceptibility. Germination and appressoria formation of *C. gloeosporioides in vitro* were enhanced by epicuticular wax. Preformed antifungal system in mango is composed of resorcinols and gallotannins in the peel and chitinase, resorcinols and some non-resorcinol antifungal compounds in the latex. The level of each preformed defence constituent varied among the mango cultivars tested conferring different level of resistance to the fruit.

Inoculation of unripe mango fruit with *C. gloeosporioides* resulted in localized generation of superoxide (O_2^-) and hydrogen peroxide (H_2O_2) within hours in the

challenged epidermal cells, as early defence responses. O_2^- production was greater in a more resistant cultivar, *'Karuthacolamban'*, than the susceptible *'Willard'*. O_2^- production was also greater in inoculated unripe fruits than the ripe fruits. *C. gloeosporioides*-infected epidermal cells showed autofluorescence indicating pathogen-induced hypersensitive reaction. Constitutive peroxidase and chitinase enzymes were present in the fruit peel and they were enhanced after pathogen inoculation. The induced chitinase isozymes had molecular weights, 59.4-56.4 kDa and 52.3-45 kDa. There was enhanced Phenylalanine ammonia-lyase (PAL) activity in the inoculated peel which may have a role in lignification and enhanced level of phenolic compounds. Transcriptional activation of defence genes and difference in the gene expression between *'Karuthacolamban'* and *'Willard'* were revealed in mRNA differential display. In general, the induced defence responses were more prominent in the resistant cultivar '*Karuthacolamban*' than the susceptible cultivar '*Willard*'.

Application of a silicon-based defence elicitor, Kasil®, as a soil supplement prior to fruit set or a postharvest treatment delayed anthracnose development in fruit at ripe stage, suggesting the potential of Kasil® to be used as a defence inducer.

In conclusion, it would appear that multifaceted constitutive defences with structural and biochemical components confer initial resistance to invading pathogens which is reinforced by further defences induced during pathogen infection.