

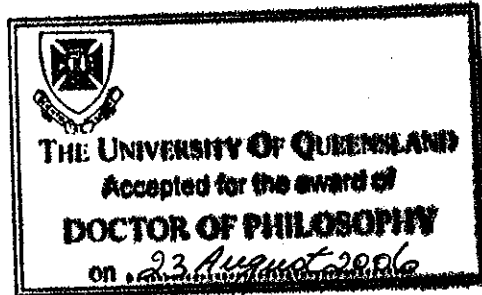
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**CONSTITUTIVE ALK(EN)YLRESORCINOLS  
AND RESISTANCE TO POSTHARVEST  
DISEASE IN MANGO (*MANGIFERA INDICA* L.)**

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## ABSTRACT

The present study aimed at investigating natural resistance mechanisms, especially constitutive alk(en)ylresorcinols in different mango (*Mangifera indica* L.) varieties in relation to postharvest anthracnose caused by *Colletotrichum gloeosporioides* (Penz.) Penz. and Sacc.

Resistance to postharvest anthracnose was studied in a range of mango varieties grown in Australia including 'Kensington Pride', 'Celebration', 'Nam Doc Mai', 'Calypso', 'Honey Gold', 'R2E2', 'Kent', 'Keitt', and 'Sensation' by comparing anthracnose lesion growth following inoculation with *C. gloeosporioides* ( $9.5 \times 10^6$  spores/mL). All fruits were obtained from commercial orchards at the mature-green stage of development. Results on fruits not subjected to preharvest chemical sprays showed significant differences among the varieties in resistance to postharvest anthracnose. Varieties 'Keitt' and 'Kensington Pride' were classed as resistant, whereas 'R2E2', 'Nam Doc Mai', 'Kent', 'Calypso' and 'Honey Gold' were classed as susceptible.

To gain some understanding of how resistance to anthracnose was maintained, concentrations of constitutive alk(en)ylresorcinols (5-*n*-heptadecylresorcinol and 5-*n*-pentadecylresorcinol) in fruit peel were investigated in a range of varieties over 2 consecutive mango seasons. The variety 'Kensington Pride' had the highest levels of 5-*n*-heptadecylresorcinol (107.27-123.70  $\mu\text{g/g}$ ) and 5-*n*-pentadecylresorcinol (6.32-7.99  $\mu\text{g/g}$ ) followed by 'Keitt' (49.90-61.44  $\mu\text{g/g}$  5-*n*-heptadecylresorcinol and 3.30-6.05  $\mu\text{g/g}$  5-*n*-pentadecylresorcinol). The susceptible varieties had much lower levels of both types of resorcinols. There were significant relationships between the levels of anthracnose (anthracnose lesion area,  $\text{mm}^2$ ) following inoculation with *C. gloeosporioides*, and concentrations of alk(en)ylresorcinols, especially for 5-*n*-pentadecylresorcinol ( $P < 0.001$ ,  $r^2 = 0.69$ ). The two types of alk(en)ylresorcinols in mango peel were also positively and strongly correlated with each other ( $P < 0.001$ ,  $r^2 = 0.71$ ).

Retention of a 2-3 cm long peduncle, and sap, in 'Kensington Pride' mango fruit, resulted in significantly smaller anthracnose lesions following inoculation with *C.*

*gloeosporioides* compared with those fruits 'destemmed' and 'desapped' after harvest. The natural stem-end rot infections were also greatly reduced by not-desapping. Peel obtained from 'not-desapped' fruits, had higher concentrations of alk(en)ylresorcinols compared with those obtained from the 'desapped' fruit.

Sap from a range of varieties collected at harvest was analysed over 2 consecutive seasons in order to investigate its physical and biochemical properties. Sap weight per fruit was the highest and the lowest in 'Celebration' and 'Keitt', respectively. 'Keitt' had the most acidic sap (pH 4.36-4.46) and 'Honey Gold' had the least acidic sap (pH 4.59-4.67). Sap was extracted and was subsequently analysed for alk(en)ylresorcinols by reverse-phase high pressure liquid chromatography (HPLC). 'Kensington Pride' and 'Keitt' had the highest concentrations of the predominant 5-*n*-heptadecenylresorcinol (12.44-14.09 mg/g and 6.33-13.04 mg/g), whereas 'Calypso' had the highest concentration of 5-*n*-pentadecylresorcinol (0.61-0.84 mg/g). The lowest concentrations of both resorcinols were found in 'Nam Doc Mai' sap.

The present study demonstrated that the non-aqueous phase (upper oil layer) of mango sap contained nearly all of the alk(en)resorcinols that were measured, and maturity (as indicated by dry matter contents of fruit pulp), was observed to influence the levels of non-aqueous sap, and ultimately the concentrations of constitutive alk(en)ylresorcinols. The varieties 'Calypso', 'Keitt', 'Kensington Pride', and 'Celebration' had the highest volume of non-aqueous sap (15-37% v/v), and 'Nam Doc Mai' had the lowest (0-3% v/v). The volumes of non-aqueous phase sap were positively and significantly correlated with the concentrations of 5-*n*-heptadecenylresorcinol ( $P < 0.001$ ,  $r^2 = 0.77$ ) and 5-*n*-pentadecylresorcinol ( $P < 0.001$ ,  $r^2 = 0.87$ ).

It would appear that the normal commercial practice of desapping mango fruit after harvest removes a large amount of the sap along with the constitutive antifungal resorcinols that confer some resistance to postharvest anthracnose.