

Sap volatile components in relation to susceptibility of anthracnose and Aspergillus rot of mangoes (*Mangifera indica* L.)

N. Krishnapillai^{a,b} and R. S. Wilson Wijeratnam^c

^aDepartment of Botany, University of Jaffna, Jaffna, Sri Lanka; ^bPostgraduate Institute of Science, University of Peradeniya, Peradeniya, Sri Lanka; ^cFood Technology Section, Industrial Technology Institute, Colombo 07, Sri Lanka

ABSTRACT

Sap burn injury and postharvest diseases are major causes of mango fruit quality deterioration, resulting in considerable postharvest losses in many countries. Susceptibility of selected cultivars of mango in Sri Lanka to sap burn injury and the incidence of anthracnose and *Aspergillus* rot of mango were examined in this study. Volatile components of non-aqueous (oil) phase were investigated using GC-MS, and artificial inoculation studies were carried out to assess disease resistance with *Colletotrichum queenslandicum* (KC 820802) and *Aspergillus niger* (KC 820801). It was observed that the popular 'Karuthakolumban' and 'Willard' mangoes with high sap flow at harvest and high sap burn incidence were more susceptible to sap burn injury compared with 'Chembaddan' and 'Ambalavi' mangoes. Cultivar variations in susceptibility to *Aspergillus* rot of mangoes are reported for the first time in this study, where 'Willard' mangoes were more resistant to *Aspergillus* rot than other cultivars. The sap exudates of 'Ambalavi' and 'Karuthakolumban' mangoes were observed to contain the preformed antifungal compounds 5-pentadecyl resorcinol and 5-(Heptadeca-8,11-dienyl) benzene-1,3-diol, with variety 'Ambalavi' showing a high resorcinol level. These cultivars were found to be resistant to anthracnose disease. These results suggest that presence of sap volatiles is cultivar dependent and could be used to identify cultivars resistant to postharvest diseases and sap burn.

ARTICLE HISTORY

Accepted 4 October 2016

KEYWORDS

Mango sap; postharvest diseases; disease resistance; postharvest disorder

The mango (*Mangifera indica* L.) is the most important fruit in tropical countries, where a wide range of cultivars exist. Each cultivar produces fruits of distinctive taste, appearance, flavour, and aroma. However, mangoes of some cultivars are particularly susceptible to sap burn injury, resulting in fruit quality deterioration. Sap burn injury is one of the major postharvest disorders that reduces consumer acceptance and storage life of fruits. The Thai cultivar 'Nam Dok Mai' is reported to be less susceptible to sap injury than cv 'Kensington' (O'Hare, 1994). Rapid ripening of mango fruits and progress of postharvest diseases cause heavy postharvest losses in tropical environments. Loss of mangoes due to postharvest diseases and disorders is estimated at between 20 and 42% in Jaffna district, Sri Lanka (Krishnapillai & Wilson Wijeratnam, unpub. data). Cultivar resistance to postharvest disease is an important but poorly addressed aspect of disease management in many tropical countries. Cultivars resistant to anthracnose are reported to have higher levels of resorcinols (Karunanayake, Sinniah, Adikaram, & Abayasekara, 2014; Rymbai, Srivastav, Sharma, Patel, & Singh, 2013). However, published information regarding sap volatile components and disease resistance of mango is limited despite the highly

palatable cultivars of the fruit available in the tropical world.

The amount of sap exuded by a fruit varies with maturity stage, cultivar, and time of harvest. On centrifugation, the fruit sap is known to separate into two phases. Skin damage is caused predominantly by the upper non-aqueous phase, and a major component of this phase is terpinolene. Sap burn injury occurs when the oil fraction containing volatile components comes in contact with the skin, resulting in tissue damage and subsequent enzymatic browning (Loveys, Robinson, Brophy, & Chacko, 1992). Sap burn injury causes cosmetic damage to fruits and provides entry points for decay-causing pathogens. There is relatively little information available regarding cultivar variation and the relationship between sap composition and sap burn injury of various mango cultivars.

This study was designed to determine the susceptibility to sap burn in selected mango cultivars in Sri Lanka and to find out whether the levels of sap burn could be correlated with aspects of sap composition. In addition to this, the present investigation aimed to assess cultivar resistance of mango to postharvest diseases and to correlate this with presence of volatile components in the sap.