

**B-03: A study of some peel characteristics of five local varieties of banana, and non-pesticidal chemicals that promote resistance to postharvest diseases**

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Most local varieties of banana are difficult to transport, and have a high susceptibility to postharvest diseases. This is a major limitation to both local and export markets. Although diseases could be controlled by fungicides, there is a dislike for their use on fresh fruits.

This study was to determine degree of susceptibility of 5 local varieties of banana (Ambon, Ambul, Kolikuttu, Seeni, Puwalu) to the major postharvest diseases, find reasons for the differences, and recommend measures to delay diseases.

A market survey was done in the fruits stalls of the Kandy market and Peradeniya, to determine the major diseases. A score was given to each variety depending on degree of susceptibility to each disease, based on information gathered from the survey, and an inoculation study with *Colletotrichum musae*. Following measurements were taken; peel thickness of ripe bananas using a Vernier caliper, firmness and pH of unripe and ripe peels using a penetrometer and a pH meter respectively.

In separate experiments. Ambul bananas were pressure infiltrated ( $4.3 \times 10^{-3}$  kg m<sup>-2</sup>) for 5 min. with 0.4% NaHCO<sub>3</sub> (pH 8.6), 0.2% acetic acid (pH 3.35), 0.5% ethanol (pH 6.84) and 4% CaCl<sub>2</sub>. Dipping at ambient conditions and vacuum infiltration (250 mm Hg) in 0.4% CaCl<sub>2</sub> were tried out separately. The above concentrations were chosen after preliminary studies with 0.1, 0.2, 0.3, 0.4 and 0.5% acetic acid, and 2,4,6 and 8% CaCl<sub>2</sub>. Fortnightly preharvest sprays of 0.1% CaCl<sub>2</sub> from fruit set to harvest were given to banana hands.

All bananas were left at ambient conditions and colour changes and disease appearance were assessed daily, until the bananas were unsuitable for consumption.

Natural calcium levels were determined at 3 different stages of ripening in peel and pulp tissues by wet digestion followed by atomic absorption spectrophotometry.

The most frequent fungal diseases were anthracnose (*Colletotrichum musae*) and crown rot (*Verticillium theobromae*, *Colletotrichum musae*, *Botryodiplodia theobromae*, *Fusarium* spp). The inoculation study was to determine the delay in disease appearance and lesion characteristics. Disease appearance was delayed and spreading of the lesion was the slowest in Puwalu and fastest in Kolikuttu. "Finger-fall" was also common in Kolikuttu. The high disease susceptibility of Kolikuttu may be due to its softer skin ( $0.8 \pm 0.15$  kg cm<sup>-2</sup>) and the low susceptibility of Puwalu may be due to its firmer ( $1.54 \pm 0.2$  kg cm<sup>-2</sup>) and thicker ( $3.004 \pm 0.66$  mm) skin.

All 5 varieties had the same firmness in mature green stage ( $4.5 \text{ kg cm}^{-2}$ ) but decreased to varying levels when ripe. The pH range reduced with ripening from 5-6 to 4-6 in all 5 varieties.

Treating with 0.2% acetic acid delayed ripening by 1-2 days and disease appearance by 3-4 days. Treating with an alkaline solution ( $\text{NaHCO}_3$ ) delayed ripening and disease appearance by 1 day.

Natural calcium level in the peel decreased from 261.9 to 203.4 ppm. However, treating with  $\text{CaCl}_2$  expedited disease appearance by 2 days significantly ( $p=0.05$ ). Ethanol which was expected to react with free carboxylic groups in pectin molecules of the peel did not affect ripening or disease development.

A firmer skin appeared to help resist anthracnose infection. As pH reduced with ripening, alkaline treatment was tried out. As disease appearance was expedited by this, acid treatment was done, which reduced diseases by about 40%. It is possible that the enzymes which degrade pectins get deactivated with acid treatment.

As ethanol treatment did not reduce diseases, it is possible that pectins in banana peels are highly methoxylated, and hence cannot respond to these treatments.

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