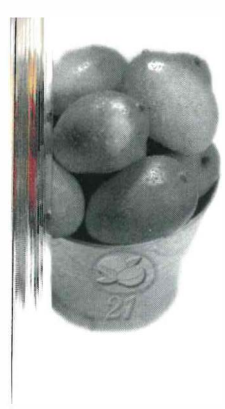

# Evaluation of orchard dips for reducing post-harvest diseases, sapburn and lenticel damage on mango

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**ABSTRACT**

*Detergent washes used for the removal of mango sap have been implicated as a factor contributing to lenticel damage. Sanitising agents and acid-neutralising substances were evaluated as alternatives to Teepol detergent for control of post-harvest diseases, sapburn and lenticel injuries. Trials were done on Tommy Atkins, Kent, Keitt, Sensation and Heidi fruit. Fruit were dipped for 30 sec in the orchard, then placed in cool storage at 10°C for 21 days and evaluated for disorders and diseases upon ripening. Lime dip or Sporekill dip reduced sapburn most effectively. Lime dip also reduced lenticel damage, while Sporekill reduced incidence of anthracnose.*

**KEY WORDS**

Mango, sapburn, lenticel, post-harvest.

## INTRODUCTION

The caustic latex exuded from the site of the peduncle of harvested mango fruit, can cause injuries to the fruit surface, known as sapburn (D'Angles & Parodi, 1993). In most orchards and pack houses, fruits are dipped in a soap solution to rid the fruit of dust and excess sap. However, the soap solutions used by the growers have been found to aggravate the lenticel problem (Dr Frans Kruger, ITSC, ARC pers. comm.). In Australia, it was also concluded that detergents play a major role in lenticel spotting (Bally, *et al.*,1997).

In South Africa, reports from PPECB and simulated shipments from several pack houses revealed that lenticel damage caused notable losses to fruit. Lenticel damage (spotting) is characterized by the localised darkening of skin tissue surrounding the lenticels (Oosthuyse, 1998). An evaluation of exported mangoes from South Africa in the 95/96 season, showed that lenticel damage was most severe in Tommy Atkins cultivar (Donkin & Oosthuyse, 1996). Pack house treatments such as detergent washes to remove sap, as well as growing conditions and various cultural factors, have been implicated as factors contributing to this disorder. Cool, humid or wet conditions at harvest have been shown to increase the occurrence of lenticel damage (Oosthuyse, 1998).

Mango sap consists of an oil fraction (alkenyl resorcinol) and a protein saccharide fraction – the oil fraction being responsible for the injury. Sapburn on Kensington mangoes in Australia, was greatly reduced by using calcium hydroxide and lime (O'Hare & Prasad, 1992), while lime is used commercially in Brazil with great success to control sapburn and lenticel damage (W Conradie, pers. comm.). A highly refined paraffinic oil was tested in Australia and was shown to be more effective than an alkaline dishwashing liquid and calcium hydroxide (Lim & Kuppelweiser, 1993). During 1997 and 1998, sapburn caused losses of up to 9.9% of the annual Mexican mango production destined for exportation and several detergent-like dips were evaluated to reduce sapburn (Bosquez *et al.*, 2000). However, lenticel damage, possibly arising from these treatments, was not assessed in any of above- mentioned trials.

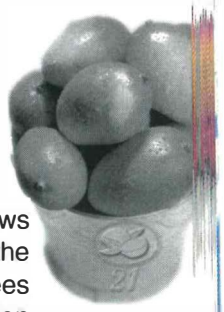
***Table 1. Control of disorders and diseases by orchard dips.***

| Treatment | Sapburn | Lenticel | Anthrac. | SE rot | SBR |
|---|---|---|---|---|---|
| Water | * | x | more | ? | ? |
| Teepol (4 ml/l) | ** | x | x | ? | ? |
| Lime (300 g/l) | *** | * | x | ? | ? |
| Lime sulphur (15 ml/l) | ** | more | x | ? | ? |
| Sporekill (0.2 ml/l) | *** | x | * | ? | ? |
| Prasin Agri (0.2 ml/l) | ** | x | x | ? | ? |

*dips*

? = unknown  more = increase  ** = good control

x = no control  * = slight control  *** = excellent control



There are currently no alternatives to the soap solutions used by growers, that have been properly evaluated for mangoes in South Africa. In the present study, acid neutralising substances and detergent compounds were evaluated as orchard dips for the reduction of sapburn, lenticel damage and post-harvest diseases.

## MATERIALS AND METHODS

Fruit of cultivars Tommy Atkins, Kent, Keitt, Sensation and Heidi were evaluated. Fruit were randomly picked from commercial orchards in the Mooketsi Valley and Constantia, and 50 fruit were used for each treatment. Sporekill (QAC, Hygrotech Seed (Pty) Ltd), Lime (INCA Calcitic Agricultural Lime), Lime Sulphur (Polysun 320, Unisun (Pty) Ltd) and Prasin Agri (QAC, SIDL cc.) were tested in comparison with standard Teepol (Acorn Products (Pty) Ltd) and water alone. All treatments were compared with untreated control fruit. Fruit were dipped in the orchard for 30 seconds, packed into boxes, and then placed in a cold room maintained at 10°C, 90% RH. After 21 days, fruit were removed from cold storage, allowed to ripen at 22°C in a well-ventilated room, and evaluated for disorders and diseases. A scale of 0-3 was used for rating incidence of each disease or disorder (where 0 = no disease occurrence; and 3 = severe disease occurrence), and the percentage unaffected fruit was determined for each disease or disorder and each treatment. Results of all the individual trials were analysed with Tuckey = s multiple range test (P = 0.05), and summarised in a table format, indicating the degree of disorder or disease control on the following scale: slight = slightly significant control; good = significant control; excellent = highly significant control; more = increase in disease or disorder; ? = unknown due to low incidence of disease or disorder.

## RESULTS AND DISCUSSION

Results were similar for all cultivars, and are therefore summarised in Table 1. All treatments gave some control of sapburn, but Lime and Sporekill both gave excellent control. Water alone was the least effective. Lime significantly reduced lenticel damage, while Lime sulphur increased the incidence of lenticel damage and all other treatments gave no control. Sporekill reduced incidence of anthracnose but water increased anthracnose incidence. Due to the low disease incidence of stem-end rot (SE rot) and soft brown rot (SBR), the effect of the treatments could not be assessed in this regard.

The results clearly indicate that Lime shows potential as an alternative orchard dip to the standard Teepol detergent wash. This agrees with an Australian study, where the oil fraction of sap (that causes the burn) tended to emulsify under alkaline conditions (pH12.5), and it was suggested that bonding may occur between the ionised fraction of the sap and the divalent Ca ions (O'Hare & Prasad, 1992). Sporekill also shows potential as an orchard dip for sapburn and post harvest disease control. The semi-commercial testing of Lime dip and Sporekill dip for the replacement of Teepol dip in the orchard is therefore recommended.


## ACKNOWLEDGEMENTS

The financial support of SAMGA and Hans Merensky Holdings is appreciated, as well as the supply of fruit by Westfalia Estate. The technical assistance of Ms. A Willis, Mr. T Mookamedi and Mr. H Mashele is also much appreciated.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