A Case Study

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Alleviation of SAP injury on sapota fruit through calcium hydroxide

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Abstract : The farmers of South Gujarat usually rub the sapota fruits in gunny bags to remove the dried latex and brown scurf for better appearance. Sometimes they also follow the wet rubbing practice according to the demand of the traders. This practice may lead to damage fruit skin and lessen the shelf life of fruits. Therefore, this experiment was formed to solve the problem of farmers along with the extending shelf life of sapota fruits. The study was conducted at ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari (South Gujarat) during peak season (winter) in year 2007 and 2008. Three treatments were tried and repeated seven times. Among all three treatment, gummy spot formation on fruit surface due to milky latex can be alleviated by dipping of sapota fruits immediately after harvest in 1 per cent calcium hydroxide for 5 minutes followed by wet rubbing which had improved the appearance of fruits and also helped to extend the shelf life of sapota fruits as compared to farmers' practice in South Gujarat *i.e.* only wet or dry rubbing. While immediately harvested fruits dipped in water may also minimized somewhat problem of gum sticking on fruit surface.

Key words : Sapota, Calcium hydroxide, Rubbing, Gum, Shelf life

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Sapota or sapodilla [*Manilkara achras* (Mill) Fosberg] belongs to family Sapotaceae, popularly known as *chiku*, is an important fruit of the tropical regions. In India, sapota is widely cultivated in the states of Karnataka, Gujarat, Andhra Pradesh, West Bengal, Maharashtra, and Tamil Nadu. However, South Gujarat, coastal Maharashtra and Karnataka are the major areas where it is extensively cultivated. In India, the area under sapota cultivation is about 148000 ha with an annul production of 1215000 MT (Anonymous, 2007b). Whereas, in Gujarat sapota occupies about 25833 ha with an annual production of 249951 MT. In South Gujarat, the area under sapota is 10925 ha with annual production of 97233 MT (Anonymous, 2007a).

The fruits are having habitat of oozing out of milky latex during harvesting of fruit which is if not removed properly the quality in terms of appearance will not be up to the mark for consumers' preference and moreover, this may deteriorated the appearance of fruit and ultimately fasten the ripening process. The farmers of South Gujarat usually rub the sapota fruits in gunny bags to remove the dried latex and brown scurf for better appearance. Sometimes, they also follow the wet rubbing practice according to the demand of the traders. This practice may lead to damage fruit skin and shorten the shelf life of fruits. Calcium hydroxide is generally used for reducing the sap injury on harvested mango fruits (O'Hare *et al.,* 1994). This practice can be adopted for sapota fruit also, which ultimately enhance the appearance of sapota fruits. The main aim of this experiment is to prevent the spot formation on fruit surface due to milky latex oozed out during harvesting and to improve the appearance of fruits by removing latex and scurf. Therefore, this experiment was laid out to alleviate the problem of sticking of latex on fruit surface and extend the shelf life of fruits.

RESEARCH METHODS

The sapota growers of South Gujarat are adopted two rubbing methods *viz.,* wet rubbing (with water) and dry rubbing (without water) for improving the appearance of fruits. But generally the co-operative societies are demanding dry rubbed sapota fruits while the traders are

demanding wet rubbed fruits. With these rubbing (dry and wet) practices, the appearance is improved but whatever latex oozing out during harvest is adhering on the fruit surface which could not be removed by this practice. Therefore, following three treatments were tried and all these treatments were again treated with 4 ppm 2,4-D (Madhavi and Srihari, 2002). All three treatments were repeated seven times.

C_1 : Dipping in 1 per cent calcium hydroxide for 5 minutes + wet rubbing after drying

C_2 : Dipping in water + rubbing (Wet rubbing)

C_3 : Rubbing without water (Dry rubbing)

Post Harvest Technology Laboratory, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, where this investigation was carried out. For the treatment of dipping in calcium hydroxide and water, the sapota fruits were dipped for 5 minutes immediately after harvest then dried for 10-15 minutes and then subjected to rubbing treatment. In rubbing treatments, the dried sapota fruits after dipping treatment of calcium hydroxide and water, were filled in gunny bag and rubbed in wetted gunny bag with water (wet rubbing) and without water (dry rubbing) according to treatments.

RESEARCH FINDINGS AND DISCUSSION

The sapota fruits dipped in 1 per cent calcium hydroxide for 5 minutes immediately after harvest and wet rubbed after drying dissolved the almost all latex oozing out after harvest and removed scurf from the fruit surface, therefore, the appearance of this fruits after rubbing was better than the wet rubbed and dry rubbed sapota fruits. When immediately harvested sapota fruits dipped in 1 per cent calcium hydroxide for 5 minutes and wet rubbed after drying (C_1) dissolved almost all the latex whatever sticked on skin after harvest. While fruits rubbed without water *i.e.* dry rubbing did not remove the gummy spot. Anderson and Ledbetter (1951) initiated the structural studies of carbohydrates contents. They found that sapota gum is a mixture of 90-94 per cent of polyuronide, which is water soluble and 6-10 per cent water insoluble resin which is responsible for spot formation. The dipping of sapota fruits in calcium hydroxide may solubilize the insoluble resins. Meanwhile, the dipping treatment of calcium hydroxide also enriches the calcium content in the cell wall which may help to improve the appearance along with physical and chemical properties of fruits during storage (Plate 1).

Whereas, immediately harvested fruits dipped in water and rubbed after drying (C_2) have also dissolved latex (90-94 %) but not all as in the C_1 treatment (Anderson and Ledbetter, 1951). If this practice is not carried out then the spot formation could not be alleviated and appearance of fruits will not be attractive due to dry scurf on the fruit skin. So if harvested fruits were immediately dipped in water and rubbed with water then it may minimize the sticking problem of latex on fruit surface and improves the appearance of fruit.

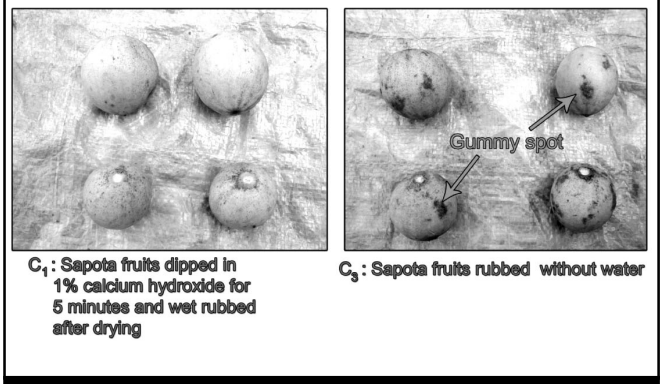

Plate 1 :

In both the years and in pooled, dipping of sapota fruits in one per cent calcium hydroxide for 5 minutes and wet rubbing after drying (C_1) had recorded maximum (6.98, 6.93 and 6.96, respectively) days taken for ripening which was statistically at par with treatment C_2 (dipping in water and wet rubbing) while the early ripening was measured in fruit rubbed without water (C_3) (Fig. 1). The delay in ripening might be due to dipping treatments in calcium hydroxide. Calcium hydroxide is a source of calcium. The role of calcium is to maintain membranes integrity and influence cellulose organization there by controlling respiratory breakdown. The binding action of calcium in the cell wall may suppress ethylene production and ultimately delays ripening process (Wills *et al.,* 1981). However, the faster ripening was observed in fruits rubbed without water (farmer's practice). During this dry rubbing process, there may be more chances of bruising of outer surface of fruit which leads to faster ethylene production

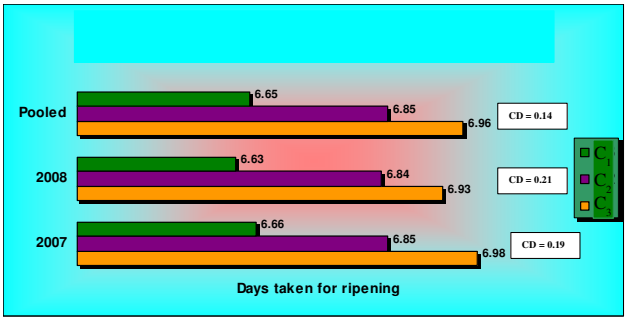

Fig. 1 : Effect calcium hydroxide and rubbing treatments on days taken for ripening of sapota fruits

and starts early ripening process.

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