

Effect of Stage of Maturity at Harvest and Artificial Ripening on Postharvest Quality of “Red Lady” Papaya

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Introduction

Papaya (*Carica papaya* L.) is one of the major fruit crop cultivated in tropical and sub-tropical zones. Over 10.48 million tonnes of fruits were produced in 2009 on about 420,279 ha (FAO, 2009) worldwide. It is consumed as a table fruit in both fresh and processed forms and cultivated mainly for its nutritive value (Singh, 1990). Tropical fruits are highly perishable and need to be handled with extreme care from the time they are harvested until they reach the consumer. A considerable quantity of production is lost in the postharvest phase. According to the Department of Agriculture, the highest percentage of postharvest loss is found in papaya (46 %) compared to banana and pineapple (20-30 %). Many of the indigenous as well as introduced varieties of papaya fruits are subjected to the post harvest losses due to a range of disease causing agents such as *Fusarium moniliforme*, *Lasiodiplodia theobromae*, *Phomopsis caricae-papayae*, and *Colletotrichum gloeosporioides*. Red Lady is an introduced variety to Sri Lanka from Taiwan. Harvesting, handling and transporting of papaya are very difficult since it is having an easily damageable soft skin. Many people harvest papaya at the immature stage to avoid these physiological damages but those fruits do not ripe correctly and give off flavours. The peel colour and flesh colour also do not develop well and skin gets damaged due to high latex exudation in immature fruits during harvesting. Those damages cause negative consumer preference in the market place. Uneven ripening causes poor quality peel colour and flesh colour in Red Lady papaya. Dark yellow peel colour and the thick red colour flesh in ripe fruits attract the consumer (Sarananda and Wijesundara, 2009). Papaya is often harvested at a mature but unripe condition, and is subsequently allowed to ripen further. Under natural conditions, they ripe slowly, lead to weight loss, desiccation and uneven ripening. Thus, fruit ripening is a very important process in order to get good quality ripened fruits for the consumption. This study was conducted to select the best harvesting stage for artificial ripening using Ethrel ((2-chloroethylphosphonic acid), effect of artificial ripening on postharvest quality considering the peel and flesh colour and disease severity of the red lady papaya to minimize the post harvest losses.

Methodology

Red Lady papaya was harvested at four different maturity stages namely colour break, 10% yellow, 20% yellow and 30% yellow and ripen naturally and artificially by using 0.01 ppm Ethrel. The experiment was designed according to two factor factorial design with four replicates. Quality parameters such as peel colour, flesh colour, pH, Titrable Acidity (TA), Total Soluble Solid (TSS), time taken to natural disease development and percentage of weight loss were measured. *Fusarium* conidial suspension was artificially inoculated to the fruits and disease development, disease severity and time taken to disease development were measured for artificially and naturally ripen fruits harvested at different maturity stages. Non-Parametric data were analyzed by using Friedman test. Parametric data were analyzed by using two-way ANOVA. Mean separation was done using General Liner

Model at $p \leq 0.05$ level and MINITAB 14.1 statistical software was used. All the data were taken at table ripe stage.

Results and discussion

Results of the experiment showed a significant difference between four maturity stages and both ripening methods. Highest peel colour was recorded at 20% yellow and 30% yellow maturity stages under both ripening methods (Figure 1) and highest flesh colour (Figure 2) and TSS (Figure 3) were given by artificially ripened Red Lady papaya harvested at 30 % yellow stage and minimum values were recorded at naturally ripen fruits harvested at colour break stage. Minimum percentage of weight loss (Figure 4), disease severity (Plate 1), TA, time taken to natural disease development, *Fusarium* disease development, and time taken to ripe were recorded at artificially ripened fruits harvested at 30 % yellow stage and maximum values were recorded at naturally ripened fruits harvested at colour break stage.

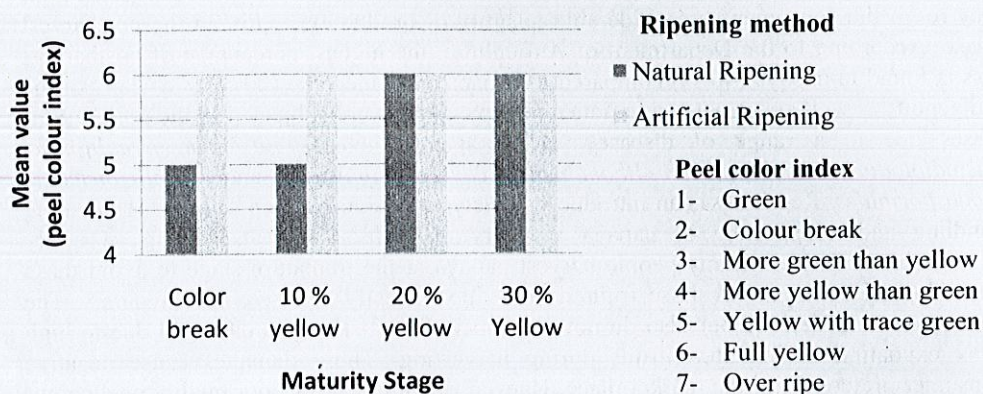


Figure 1: Peel colour of Red Lady papaya fruits harvested at different maturity stages under two different ripening methods

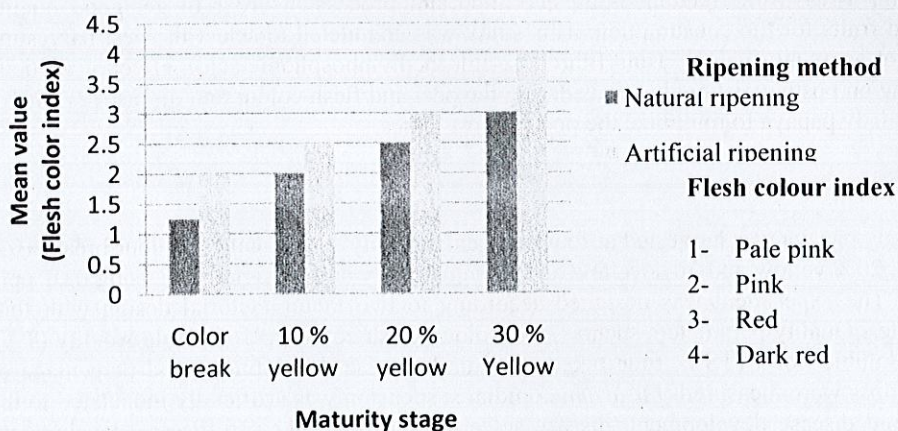


Figure 2: Flesh color of Red Lady papaya fruits harvested at different maturity stages under two different ripening methods

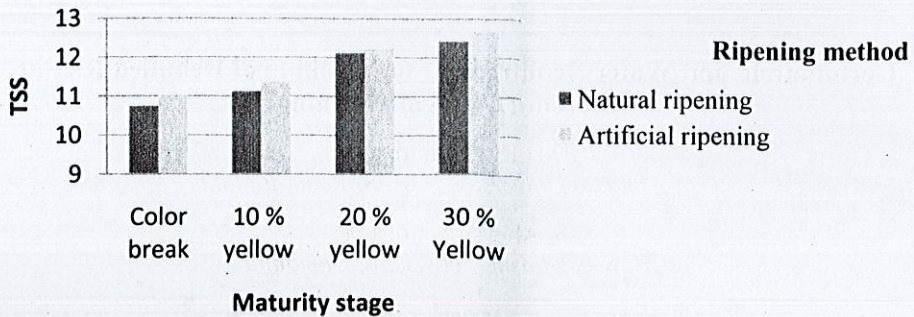


Figure 3: TSS of Red Lady papaya harvested at four maturity stages under two ripening methods

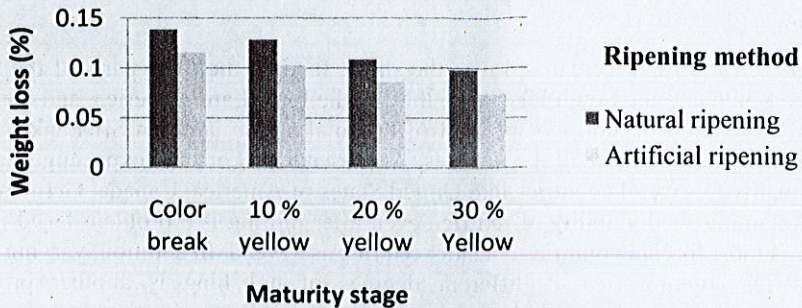


Figure 4: Percentage of weight loss of Red Lady papaya harvest at four maturity stages at table ripening stage

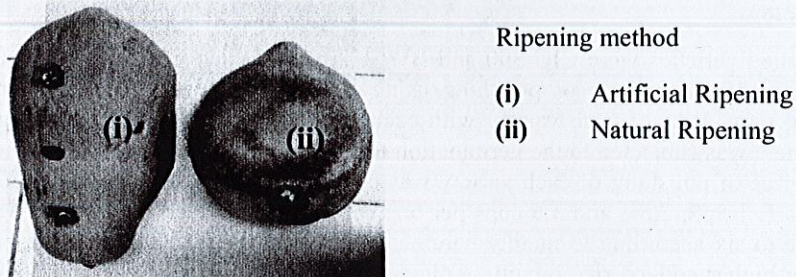


Plate 1: *Fusarium* disease severity at 30 % yellow maturity stage

Conclusion

According to the above results, 30 % yellow maturity stage is more suitable for artificial ripening to minimize the postharvest losses and to increase the peel and flesh colour development of Red Lady papaya.

References

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