

DEVELOPMENT OF POSTHARVEST QUALITY MANAGEMENT OF LOCAL DESSERT BANANAS

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Introduction

Banana is one of the fifteen fruits that has been identified in the National Agricultural Policy for the development of the fruit industry. Areas under banana cultivation in Peninsular Malaysia have increased from 23,226 to 38,678 hectares in 1985 and 1994 respectively. The country's production of bananas has also increased tremendously, from 191,847 metric tonne in 1985 to 372,700 metric tonne in 1994. Bananas, like any other fruits are highly perishable and must be handled properly in order to maintain their postharvest quality. Some of the postharvest handling problems can be overcome at the preharvest stage. Information on the optimum harvesting indices and detailed physiological changes during fruit development, postharvest storage and handling are essential for the development of an efficient postharvest handling system. The objective of this study was to determine the optimum harvesting indices and postharvest storage conditions for the local dessert bananas.

Materials and Methods

Studies on the physico-chemical (weight, length, girth, pulp to peel ratio, pH, titratable acidity, total soluble solids, sugar, pectin and tannin contents) changes of three local dessert banana varieties (P. Mas, Berangan and Rastali) during their growth and maturity stages were carried out. The effects of different postharvest heat treatments in reducing chilling injury of Pisang Mas during storage at low temperature ($14 \pm 1^\circ\text{C}$, 65 – 85%RH) were also investigated. Pisang Mas of commercial maturity obtained from FAMA Tangkak, Johor were subjected to different heat treatments, including exposure to hot air at various temperatures (30, 40 and 50°C) for 3 hours and dipping in hot water at 50°C for 2 minutes prior to low temperature storage (LTS). The changes in the physico-chemical characteristics during storage were examined by monitoring fruit texture, pulp and peel colour, pH, titratable acidity, and ascorbic acid content. Chilling injury symptoms were observed subjectively with a score ranging from 0 to 3.

Results and Discussion

It was found that the weight of both P. Mas and P. Rastali increased continuously during their growing and maturity stages (Abdul Rahman et al. 1998). However, for P. Berangan, the weight remained constant once it has reached the maturity stage. Unlike P. Rastali (remained constant), the pulp: peel ratio of P. Mas and P. Berangan increased during

their growth and maturity stages. The total soluble solids (TSS) and sugar contents of these three varieties of local dessert bananas increased continuously during growth and maturation. While the length, girth, titratable acidity (TA), ascorbic acid and pectin content of these 3 varieties increased, their texture, and tannin contents decreased during the growth stage. Results obtained also indicate that for all the 3 varieties, both the starch content and pH changes can be suitable maturity indices since both parameters increased rapidly at the early stages of maturity followed by a decrease thereafter. Physical appearance and length, pulp: peel ratio and tannic acid content, and fruit weight and length can be used as maturity indices for P. Mas, P. Restali and P. Berangan respectively. However, for all the 3 varieties, TSS, TA, ascorbic acid and sugar contents are not suitable to be used as maturity indices. The heat treatments selected in this study were based on the results of our earlier work (Febrimeli et al. 1997). Results of the present study, indicated that untreated P. Mas fruits had a significantly ($p < 0.05$) higher manifestation of chilling injury compared with the treated fruits (Febrimeli et al. 1998). Although chilling injury was also evident in all the treated fruits, the extent was found to be much less in fruits exposed to hot air at 30°C . Fruit firmness and ascorbic acid contents were found to be significantly ($p < 0.05$) high in treated fruits as compared to the control fruits. In contrast to pH, TA increased slightly during storage. Results obtained in this study also indicate that subjecting P. Mas fruits to different postharvest heat treatments prior to LTS could not significantly extend the shelf life as compared to the control fruits. Nevertheless, subjecting the fruits to hot air at 30°C for 3 hours before LTS could significantly ($p < 0.05$) reduced manifestation of chilling injury.

Conclusions

In contrast to TSS, TA, ascorbic acid and sugar contents, starch content and pH changes are found to be suitable maturity indices for P. Mas, P. Berangan and P. Restali. Although exposure to different heat treatments prior to LTS could not significantly extend the shelf life of P. Mas, manifestation of chilling injury could be reduced significantly when fruits are exposed to hot air at 30°C for 3 hours before LTS.

References

- Abdul Rahman, R., Osman, A., and Mohd Hidzir, M.R. 1998. Physico-chemical changes of three local dessert bananas (P. Mas, P. Rastali and P. Berangan) during fruit growth and maturation. First National Banana Seminar.
- Febrimeli, D., Osman A., Abdul Rahman R., and Mohamed S. 1997. Preliminary study on effects of storage temperatures and heat treatments to extend storage life of banana (*Musa sapientum* var. Mas). Paper presented at National Conference on Food Industry, Technology and Opportunities Hotel Nikko Kuala Lumpur. 5-7 May 1997.
- Febrimeli, D., Osman, A., Abdul Rahman, R. and Mohamed, S. 1998. The effect of different postharvest heat treatments in reducing chilling injury of Pisang Mas (*Musa sapientum* var Mas) during storage at low temperature. *Malaysian Applied Biology*. 27 (Suppl.): 59-62.