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The testing of specific pre and post harvest treatments for reducing the incidence of chilling injury in pineapple-Grant No: GR/97/AG/04a

Research Institute	: Industrial Technology Institute
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SUMMARY OF THE PROJECT WORK

Scope/ Objective of Project:

The Mauritius variety pineapple is appreciated in overseas markets due to its distinct sweet flavour. Post harvest losses of this variety could be as high as 80 percent when subjected to the recommended storage environment for refrigerated sea shipment. The main cause of this loss was identified as temperature related physiological disorder referred to as black heart or endogenous brown spot or internal browning of pineapple.

The ultimate goal of this study was to extend the storage life of the Sri Lankan Mauritius pineapple to facilitate sea shipment to overseas markets using specific pre and post harvest treatments in order that the export volumes of this product may be expanded.

Previous investigations on this disorder revealed that the less popular Sri Lanka Kew variety pineapple was more resistant to chilling injury and that symptoms could be eliminated via appropriate post harvest treatments and management procedures (Wilson Wijeratnam *et al*., 1993). Thus the study included the comparison of selected factors of this variety with the Mauritius pineapple, in order to identify means of extending the storage life of the latter during low temperature storage.

Experimental Method:

Field experiments conducted according to the randomized complete block design with 4 replicate blocks and the field management practice were carried out in accordance with the recommendations of the Department of Agriculture. Fruits were harvested at 10-20% yellow stage of maturity for the storage trials carried out for testing respective treatments.

Severity and incidence of the black heart disorder and physicochemical parameters were recorded to evaluate the fruit quality before and after storage at 10°C and 85-90% Relative Humidity for 17 days followed by 2 days at ambient temperature of 28°C ± 2.

Results and Conclusions:

Waxed Kew pineapples obtained from Dompe/Gampaha locations showed superior quality with no symptoms of the disorder after low temperature storage compared to Kew fruits harvested from Bibile/Monaragala and Yakkala/Gampaha locations.

Mauritius pineapples harvested between 4.30 pm to 5.30 pm in the evening and treated with FMC Stafresh wax solution, were observed to be the least affected by low temperature storage as compared to fruits harvested between 7.30 am. to 8.30 am. in the morning.

Observations indicated that the overall calcium content in the flesh of Kew pineapple was significantly higher than that of Mauritius variety. However, lower levels of both ascorbic acid and calcium were observed in regions of the Mauritius pineapple where tissue discoloration due to the disorder occurred.

Storage at 10°C for 17 days under controlled atmosphere conditions of 7% CO_2 and 3% O_2 combined with wax treatment reduced the severity but did not totally eliminate symptoms of the disorder.

Results obtained from field trials confirmed that calcium chloride spray treatments – 1.3g per plant in three split dozes applied at 2 week intervals – could be used to reduce the incidence and the severity of black heart disorder in Mauritius pineapples. However, side dressings of CaO and $CaSO_4$ soil applications were found to be less effective in reducing the symptoms of the disorder, with less than 30% good fruits after low temperatures storage. Better field management practices, from planting to harvest and proper application of recommended fertilizer have to be practised to obtain better quality fruits.

Thus, this study also confirms previous findings of varietal variation and susceptibility to chilling injury in pineapple – viz. Mauritius variety pineapple was more susceptible to the black heart disorder as compared to the Kew variety.

Papers published on work done under the contract :

Hewajulige, I.G.N., Wilson Wijeratnam, R. S., and Abeyesekere, M., "Black Heart Disorder in relation to variation of acid levels in Sri Lankan pineapples", In proceedings of Sri Lanka Association for the Advancement of Science-56 Annual Session,27th Nov-01st Dec,2000,pp84.

Hewajulige, I.G.N., Wilson Wijeratnam, R. S., and Abeyesekere, M., "Effect of calcium chloride vacuum infiltration on storage quality of Mauritius pineapples", In proceedings of Sri Lanka Association for the Advancement of Science-56 Annual Session,27th Nov-01st Dec,2000,pp85.

R. S. Wilson Wijeratnam, I.G.N. Hewajulige, M. Abeyesekere and H.A. Samaratunge ," Correlation between calcium levels and variation in storage quality of two varieties of pineapples" Pineapple Newsletter No 6- ,April 1999.

Hewajulige, I.G.N., Wilson Wijeratnam, R. S., and Abeyesekere, M., "An Alternative to Coir Dust Mulch for Inter Cropped Pineapple Cultivation in Sri Lanka" – Paper submitted to Tropical Agricultural Research and Extension-Journal published by Faculty of Agriculture, University of Ruhuna.

Hewajulige, I.G.N., Wilson Wijeratnam, R. S., R.L.C. Wijesundera and Abeyesekere, M.," Correlation between calcium levels and variation in storage quality of two varieties of pineapples" – Paper submitted to Journal of the Science of Food and Agriculture.

Hewajulige, I.G.N., Wilson Wijeratnam, R. S., R.L.C. Wijesundera and Abeyesekere, M.," Effect of time of harvest in relation to severity of black heart disorder in Mauritius and Kew pineapples" – Paper submitted to Tropical Science Journal.

Hewajulige, I.G.N., Wilson Wijeratnam, R. S., De Silva ,M.H.P.R. Wijesundera R.L.C. and Abeyesekere, M., "Effect of Pre-harvest application of calcium on symptom development of black heart disorder in Mauritius pineapples – Paper submitted to Journal of National Science Foundation.