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STUDIES ON RIPENING PROCEDURES FOR PERISHABLE COMMODITIES INTENDED FOR THE DOMESTIC MARKET IN SRI LANKA

By

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Thesis submitted to the University of Sri Jayawardenepura for the award of the degree of Master of Philosophy in Food Science and Technology on

10th May 2002

AFFECTIONATELY DEDICATED TO

My Husband Eshan

and

My Son Avantha

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List of Papers Presented and Publications

1. A scientific paper titled "The Effect of Selected Ripening Agents on Papaya" was presented at Post Harvest 2000 on the opening day at the 4th International Conference on Post Harvest Science held on 27th March 2000 in Jerusalem, Israel. This paper has been published in the Acta Horticulture June 2001. (Number 553, Volume 1)

2. Poster presentation on "The Effect of Selected Ripening Agents on Physico-chemical Properties of Banana" was carried out at the Annual Sessions SLAAS at Peradeniya on the 30th November 2000.

3. A scientific paper titled "Influence of Ethylene Gas on Mango (variety Karuthakolomban)" was presented at the Annual Sessions SLAAS Peradeniya on 01st December 2000.

4. A scientific paper tilted "Development of Red colour of Harvested Tomato" was presented at the Annual Sessions of SLAAS Moratuwa on the 30th November 2001.

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STUDIES ON RIPENING PROCEDURES FOR PERISHABLE COMMODITIES INTENDED FOR THE DOMESTIC MARKET IN SRI LANKA

By Fenella M.E Jayawickreme

ABSTRACT

Post harvest losses in Sri Lanka are estimated to be approximately 40-60%. Mechanical injury during transportation has been identified as one of the major causes of these losses. Loss due to mechanical injury could be reduced if fruits are transported while they are firm in texture and therefore less vulnerable to rough handling during these operations. Ripening could then be induced after transportation and prior to distribution by the whole-saler. This study was conducted in order to regularize and introduce improved handling procedures in Sri Lanka and thereby reducing postharvest loss due to mechanical injury. At present growers pick fruits at various stages of maturity while traders ripen fruits by smoking and the use of Calcium carbide.

The commodities identified for this study are Banana, Papaya, Mango and Tomato. Ripening was observed to be hastened when banana, papaya and mango were exposed to ethylene gas, while tomatoes proved to be not sensitive to this treatment. As ethylene gas in cylinders is not available in Sri Lanka and the import of the gas would not be cost effective for use by traders, an alternate method was adopted where Ethrel (2-chloroethyl phosphonic acid) and NaOH were combined to release the required ethylene gas.

The studies revealed that a dosage of 100ppm -150ppm of ethylene gas or 0.8 mL ethrel and 0.4 g NaOH would ripen bananas of 'Embul 'variety, in a volume of 288 L in 48 hours. The study also revealed that Embul bananas required only 18 hours of exposure time to ethylene. However, papaya (variety 'Rathna') and mango (variety 'Karuthakolomban') were exposed to ethylene for 24 hours to induce the ripening process. Both papaya and mango would be ready for consumption after four to five days after exposing to ethylene gas. To induce the ripening process in papayas (on a volume of

288L), the fruits should be exposed to 200ppm to 300ppm ethylene gas or 1.65 mL ethrel and 0.8g NaOH. Studies revealed that, to ripen mangoes on the same volume, an ethylene gas concentration of 250 ppm or 1.65 mL ethrel and 0.8g NaOH would be suitable.

A comparison study of ripening agents (ethylene gas, ethrel and calcium carbide), proved ethrel as the most suitable ripening agent to ripen bananas, papayas and mangoes. Temperature studies on these commodities indicated that the high ambient temperatures, (28±2° C) prevailing in Sri Lanka are suitable to ripen papaya and mango using ripening agents. No adverse effects on bananas of Embul (Sour) variety were observed at this temperature. However bananas ripened at 22°C were observed to be better in cosmetic appearance and quality.

With the tested domestic varieties of tomatoes, a temperature of 22±2°C induced better development of red colour, while higher ambient temperatures in Sri Lanka retarded the process, due to the conversion of lycopene to β-carotene at high temperatures. A red light (650-700nm) treatment at ambient temperature (28±2°C)on tomatoes harvested at colour turning stage resulted in development of more redness in them. The light treatment induces the formation of lycopene via the activated phytochrome. A storage study on tomato indicated that, mature green tomatoes were more suitable for long-term storage (approximately one month) while breaker stage tomato could be stored up to 2 weeks at 12°C.