ABSTRACT

Post-harvest investigations towards quality improvement in hot pepper (*Capsicum frutescens*, L) and tomato (*Lycopersicon esculentum*, L)

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A "systems approach" was used to investigate changes that would enhance final produce quality and reduce losses of hot peppers and tomatoes. Two surveys of producers and traders (218) and consumers (204) were completed at 7 market outlets in County St. George, Trinidad. The major socio-economic and technological constraints leading to quality deterioration and post-harvest losses were investigated in the surveys and tested experimentally to develop a model for quality management.

Post-harvest losses varied according to type of produce, cultivar, growing season and market outlet. Dry and wet season hot pepper losses respectively were highest at export markets, 35.5 and 52.7% and lowest at wholesale markets, 4.2 and 6.3%. Corresponding tomato losses were highest at supermarkets with chain stores (SWCS), 23.9 and 34.9% and lowest at mobile markets, 8.7 and 10.6%.

Socio-economic constraints e.g. lack of post-harvest knowledge and skills, impediments to flow of information to system participants, absence of post-harvest training programmes, poor infrastructure and lack of incentives made early prediction of damage difficult. Also damage was aggravated by subjection of produce to less than ideal temperature ranges in packages, where modified atmospheres had deleterious effects on fruit quality. Poor harvesting techniques, lack of post-harvest treatments and abusive handling led to pathological damages exceeding 50% at all outlets. Nevertheless consumers still looked for freshness, quality, price, and convenience as major attributes influencing purchases. Against this background experiments were conducted using three approaches to quality enhancement i.e. post-harvest dip treatments, modified atmosphere packaging and temperature management.

Accordingly, it was demonstrated that hot peppers treated with the bactericide "Milton" and packaged in microperforated high density polyethylene bags (HDPE) stored best at 10^{0}C with the level of decay-free fruits at 96.1% after 25 days. Incipient chilling injury without visible symptoms after short storage periods at 5^{0}C was detected both by reduced bioelectrical resistance, and increased electrolyte leakage but the former measurement was more sensitive in detecting chilling injury than the latter. Changes in both measurements reflected changes in membrane permeability. The severity of chilling injury progressed more rapidly when fruits, sealed in microperforated HDPE bags and stored for 30 days at 5^{0}C

were transferred to 28-30^{0}C for 1, 3 or 5 days respectively. The detrimental effects of increasing CO_2 and C_2H_4 concentrations within packages particularly upon transfer to elevated temperatures contributed to the severity of the symptoms.

The higher resistance of the processing tomato cultivar Cascade than Calypso (non-processing cultivar) to damages in the supermarket handling system supported claims in both surveys of the preference for the former cultivar. Studies on 16 cultivars showed that the physio-chemical and sensory quality attributes of non-processing cultivars e.g. Walters, Floradel, Floradade, Star Pak and Early Set, were superior to those in the majority of processing cultivars evaluated.

Tomatoes pre-cooled immediately after harvest and pre-treated with chlorinated water prior to storage showed less heat injury, higher bioelectrical resistance, lower electrolyte leakage, more decay-free fruits, superior firmness, better colour development, increased acidity and decreased total soluble solids than untreated fruits after 18 and 36 days respectively at 20^{0}C.

The data obtained from both surveys and the solutions advanced in the experimental investigations were used to allocate values to the quality enhancement strategies in order to show how predictions of quality and market prices would lead to more intelligent management decision-making.