Summary

Mango (*Mangifera indica* Linn) produced in Thailand has been consumed fresh locally and exported, but their economic production has been limited due to a lack of high quality. The relative importance of mango quality depends upon several factors that can be categorized into physiochemicals (maturity at harvest and ripening stage), environmental (low temperature and heat treatment) and edaphic (mineral nutrition of the tree). The results showed that when ‘Nam Dok Mai’ mangoes at different ripening stages (brought about either by acetylene gas or not) were kept at either 5 or 13 °C for 45 days, the susceptibility of mango fruits to chilling injury (CI) depended on the degree of ripeness; the stage 2 fruit exhibited the longest storage life without CI. Significant differences were found in putrescine levels at different ripening stages. A decrease in level was noted when stage 1 (less-ripened) fruits were stored at 5°C, which was accompanied by chilling injury occurrence.

Both mature and immature fruits were exposed to vapor heat treatment (VHT) as a quarantine treatment, and then kept at 5, 8, 13°C and 25°C. The VHT-treated fruits showed higher polyamine contents, lower electrolyte leakage and lower incidence of disease compared to non-treated fruit. During storage at 8°C for 14-21 days, followed by 25°C for 4 days for ripening, the mature fruits still had a
good general appearance with low incidence of chilling injury and internal breakdown (IB) compared to the immature fruits.

Moreover, the observation of ultrastructural changes in the cells of the VHT-treated fruits, low temperature stored fruits showed considerable cell wall degradation and abundant starch grains present in parenchyma cells of mesocarp tissue.

Fruits were harvested from two different sites where soil mineral composition was different. Fruits harvested from the site of higher Ca/N and (Ca+Mg)/K ratios in the soil kept firmness, showed less decay and increased storage life. Ca content and (Ca+Mg)/K ratio in the fruit were very positively related with storage life. Therefore, these parameters could be good indicators for storage life. X-ray microanalysis of the distribution of mineral elements in mango fruit revealed that K element accumulated mainly in parenchyma cells of the mesocarp, while Ca was lowest in the inner mesocarp. Low Ca in the inner mesocarp in fruit could be involved in the occurrence of jelly seed. To overcome the problem of absorption of Ca by the tree from the soil and distribution of Ca within the tree, in particular, in fruits, further research is needed to find the techniques to improve availability and better distribution of Ca to these tissues.

These findings could be applied to commercial preharvest practices to maintain the high ratio of Ca/N and (Ca+Mg)/K in soil for careful postharvest management. The fully matured and more-ripened mango fruits would minimize chilling injury and
physiological disorders associated with VHT in combination with low temperature storage and enable the expansion of export of the Thai mango to long distance markets.
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Literature Cited


heat treatment at different maturity stages. MARDI Research J. 24:147-153.


Univ.of the Philippines at Los Banos College, Laguna, Philippine Council for Agr. and Resources Res.Proj. 149.


calcium cycling and fruit quality. Scientia Hortic. 44:279-291.