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Effect on physico-chemical characteristics of cucumber and kinnow stored in evaporative cool chambers using rice husk ash as alternative material

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ABSTRACT : The physico-chemical characteristics of cucumber and kinnow stored in evaporative cool chambers were analyzed. The two evaporative cool chambers were developed based on the principle of evaporative cooling using alternative materials as river bed sand and rice husk ash. The average temperature drop of 8.6 °C and 10.7 °C was obtained in evaporative cool chamber with river bed sand (ECC RBS) and evaporative cool chamber with rice husk ash (ECC RHA) and average relative humidity increase of 53 per cent and 57 per cent to the ambient, respectively. These structures extended the shelf-life of commodity by 2 to 3 times. The cucumbers were stored in evaporative cool chambers in summer while kinnow were stored in winter season. The temperature and relative humidity were recorded inside the cool chambers and ambient condition on regular interval. Observations were recorded on different physico-chemical parameters to judge the shelf-life of cucumber and kinnow under all storage conditions. The rate of change of physico-chemical constituents in cucumber and kinnow stored in cool chamber with rice husk ash as cavity fill material was found slower than other storage conditions.

KEY WORDS : Physico-chemical characteristics, Evaporative cool chamber, Storage, cucumber, Kinnow, Rice husk ash

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Post harvested losses of fruits and vegetables can be greatly minimized by storing them at low temperature and high humidity (Wills *et al.*, 1998). Naturally, fresh produce needs low temperature and high relative humidity during storage and transportation. Loss of moisture from fresh fruits and vegetables coupled with loss of nutritional components is of significant importance towards nutritional security of harvested produce. Low temperature decreases physiological, biochemical and microbiological activities which are the main cause of quality deterioration. The respiration of fresh fruits and vegetables can be reduced by many preservation techniques like low temperature, canning, dehydration, freeze-drying, controlled atmosphere, and hypobaric and modified atmosphere (Alique *et al.*, 2003).

Refrigeration and cold storage systems often used in advanced countries for fresh produce storage may not be suitable for use in India due to their high cost and energy requirement. The low cost evaporative cool chambers maintains high relative humidity and relatively low temperature and are useful for orderly marketing and quality assurance of fresh fruits and vegetables for short term holding (Roy and Pal, 1991). Fresh fruits and vegetables harvested seasonally in large amounts from different areas are mostly stored in suitable environments until marketed and consumed. Hence, development of postharvest technologies is believed to make great contribution to improve quality and use of these crops (Singh and Yadav, 2012a).

Fresh fruits and vegetables can be preserved in various ways but evaporative cool chamber storage is an environment friendly and also low energy consuming method (Singh *et al.*, 2010). This is the cheapest and simplest method for extending shelf-life of fruits and vegetables in fresh form, because it requires least amount of energy to operate and like most of cold stores it does not need chlorofluorocarbon (Jha, 2008). The evaporatively cooled environment is suggested to be a good alternative for the small-scale peasant farmers, retailers, and wholesalers, as it require low initial and running cost compared to other cooling methods (Tigist *et al.*, 2011).

It is essential to control storage temperature and relative humidity during storage as they are the main causes of fruit and vegetable deterioration during ripening and storage. The experiment was laid out with the objective to study the storage