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Designing and testing of low cost cooling devices for storage of vegetables in summer

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ABSTRACT

Based on the principle of evaporative cooling five low cost cooling devices were designed using low cost and easily available materials which could be utilized by the rural masses and economically backward class. Five different models of 40 cm x 40 cm x 60 cm size and the storage capacity of 96 liters were made. The vegetables selected for storage in the devices were lady's finger, cluster beans, spinach, each 350 gms and coriander leaves 50 gms. The experiment was carried out for subsequent seven day during summer season. The other observation regarding temperature, relative humidity and physiological characteristics of the stored vegetables were assessed by the selected panel members using score card by applying 5 point scale. Average temperature drop inside the devices was to the extent of 10°C to 12°C than that of room temperature. The lowest minimum temperature was noted in B model. Maximum relative humidity was high in all models, higher being in B model. Ranging from 81% to 91%. Average physiological weight losses were observed minimum in B model in all vegetables on third day the losses were 1.42 to 10 per cent in spinach. Moisture losses were observed in model A.E. and minimum in model B in all selected vegetables. Average vitamin 'C' losses were maximum in model E followed by A comparatively per cent losses were minimum in B, C, D, model. Physical characteristics maximum score of color, texture, aroma and overall freshness in model B. Based on the ranking of mean score B model (Exterior materials gunny bag with coal) secured first rank for all the characteristics. Indicating best performance in the storage of selected vegetables in peak summer. Statistical analysis proved highly significant different in all the models.

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Vegetables are one of the important groups of balanced diet. They are rich sources of many nutrients such as calcium, iron, carotene, and vitamin 'C' which are essential for growth and maintenance of normal health. Vegetables are highly perishable in nature and soon after their harvest, they start loosing their freshness. Shriveling of fresh vegetables owing to high temperature and low humidity is a feature commonly observed particularly in northern part of the country during summer (Roy and Khuridiya1982). Central Village Pottery institute Kanpur (U.P.) had developed a cheap fridge better known as Janata refrigerator (Grameen Sheetak) (Anonymous 1979). It is made up of clay and was very inexpensive. It was suggested to facilitate storage of fruits, vegetables milk, egg etc.

(Roy and Khuridya, 1986) A low cost cooling chamber developed and studied that the inside temperature of cool chamber was reduced from 43° C out side temperature to 23° C while relative humidity increased from 33 to 95 per cent during peak summer. In these chambers, the shelf life of leafy vegetables was increased 3 days to 6 days when kept outside. Maini *et al.* (1984) found that physiological weight loss for potatoes in the desert cooling system at 24.28°C temp and 90% relative humidity was half as much as at ambient temperature of 36.41°C. After storage of five weeks a loss of 3.3 per cent was observed in cool storage compared with 18.6 per cent at room temperature and 9.3 per cent in the desert cooled storage. Taking all above points into consideration there are numerous problems in vegetable storage of rural masses. The main constraints lie with availability of vegetables in weekly market. The storage of vegetables is very difficult in summer season. Based on the principle of evaporative cooling five low cost cooling devices were designed using low cost and easily available materials which could be utilized by the rural masses and economically backward class at College of Home Science M.A.U., Parbhani. The present investigation was carried out to - Design and fabrication of low cost cooling devices, to test these cooling devices for vegetable storage- temperature and humidity, weight losses, physiological characteristics and moisture content, Vitamin'C' content and to identify best cooling device among those selected.