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An Evaporative Cooler for the Storage of Fresh Fruits and Vegetables

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Abstract: *An evaporative cooler for the storage of fruits and vegetables was designed, built and tested. The system is an economical and efficient method used for the reduction of temperature and increase in the relative humidity for the storage of produce by applying the principles of the evaporative of water. The cooler comprised of two extraction fans, a cooling pad media, a plate-fin heat exchanger, a water tank, a storage and a cooling chamber. The optimal operational parameters were determined by operating the cooler for 180 minutes using three pad media (cedar, teak and coconut fiber), with three fan extraction speeds (4 m/s, 6 m/s and 8 m/s) at two periods of day (morning and afternoon) and the saturation effectiveness of the evaporative pad and temperature differences between ambient conditions and the cooler were measured. The mean saturation effectiveness was 64.42% (cedar), 63.56% (teak) and 53.47% (coconut fiber). The mean values for the temperature difference were 5.00 K (cedar), 4.63 K (teak) and 3.60 K (coconut fiber), showing that cedar was the best material for operating the cooler. The best fan speed was 8 m/s while the cooler operated better in the morning (9.00 a.m.to 12 noon). The evaporative cooler operated at 8 m/s fan speed using the cedar shavings pad was then used to store tomatoes over a 14 day period alongside two other storage methods (refrigeration and ambient conditions). The mean penetration depth of tomatoes was 13.43 mm, 13.82 mm and 18.26 mm for the refrigerator, evaporative cooler and the ambient conditions respectively. The pH and the total solubility solids of the tomatoes stored with the evaporative cooler were the lowest showing that while the refrigerator was the best in terms of maintaining the skin firmness, the evaporative cooler was the best storage method in terms of preserving the acidity of the tomatoes as well as their total solubility solids.*

Keywords: *Evaporative, Cooler, Saturation, Effectiveness, pH, Tomatoes*