

DESIGN AND FABRICATION OF A PASSIVE EVAPORATIVE COOLING SYSTEM FOR FRUITS AND VEGETABLES STORAGE

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ABSTRACT

A Multipurpose passive evaporative cooler was designed, constructed and its performance evaluated by determining the adiabatic efficiency. The multi-purpose passive evaporative cooling system consists of three compartments whose outer and inner cooling chambers were made of galvanize steel. The interspace was filled with sandy loam. The cold storage system for fruits and vegetables was based on the water cooling system to cool the storage chamber. Water is supplied from the storage tank to a pipe with a gate valve attached to this pipe. As the valve is opened, water flows through the distribution pipe networks placed over the soil allow in a constant flow of water through into the soil. The water leaves the system through the outlets created underneath the housing. This process is continuous; as the water moves out, it carries along the heat present inside the cooling chamber hence lowering the temperature and at the same time increasing the relative humidity in the storage chamber. During the test period with fresh bananas, the average temperature of 24.5°C and 28.8°C were obtained for the multi-purpose evaporative cooler and the ambient respectively. Also, average relative humidity of 88.87% and 69.41% were obtained for the multi-purpose evaporative cooler and the ambient respectively. The cooling efficiency of the evaporative cooler was 55%.

Keywords: passive, cooling chamber, banana, storage, humidity.