

Testing and Evaluation of Double Layer Evaporative Cooler for Vegetables Preservation

Chamal, B.M., *Prabhakaran, M., and Thusahanthi, A.

Department of Agricultural Engineering, University of Jaffna, Sri Lanka

*Corresponding email: aenpraba@gmail.com

Agriculture is a major part of income in Sri Lanka. In whole country is facing a problematic issue on preservation agriculture produce. There are many factors cause in post-harvest losses. To minimize such losses proper post-harvesting practices, should be maintained. Introduction of cost effective method for storage of vegetables is necessary to maintain freshness until produce reaches the destination market. The double layer cool chambers were designed and tested for cooling effectiveness separately using clay bricks, anthill clay, sawdust and charcoal. The sawdust and charcoal zero energy double layer cool chambers were made to develop suitable conditions for storage, enhance the time duration and minimize the weight loss of vegetables. The evaporative cooling principle was followed under cooling chamber system. Saw dust and charcoal were filled separately in to the layers and saturated with water circulated from top to bottom. Temperature and relative humidity inside and outside of chamber were measured in hourly intervals in day time. The samples of *Amaranthus* spp., brinjal and carrot were selected for evaluation and placed inside the cool chambers, with wrapped and unwrapped conditions. Weight loss was measured at hourly intervals to check the effectiveness of the design. Physiological weight loss for all selected vegetables was low for samples placed charcoal media cool-chamber than the sawdust media cool-chamber than outside. For the testing of cooler design the regression analysis was implied to fit the relationship between log mean temperature ratio against time duration of cooling in sawdust media cool-chamber and charcoal-media cool-chamber. The cooling rate (CR) was expressed by slope of the equation respectively. The regression vale was explained the efficiency of cooling. The relationship derived to charcoal media cool-chamber was $y = -0.015x + 0.063$ with regression value of 0.978 and saw dust media cool-chamber $y = -0.033x + 0.079$ with regression value of 0.856. The cooling rate and efficiency of cooling was high in charcoal as filling media within double layer coolers. Since the regression value was more than 80 %, in the both design-cooling rate and efficiency of cooling was highly satisfied. Charcoal chamber and sawdust cool-chamber are satisfied the requirement of evaporative cooler.

Keywords: Double layer cool chamber, Evaporative cooler, Zero energy cooler