

Research Paper :

Comparative study of low cost evaporative cooling systems for storage of tomato

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ABSTRACT

Tomato is the most important and remunerative crop in India. It undergoes physiological changes even after harvest. These changes have pronounced effect in chemical composition, keeping quality and spoilage. The fruit quality is mainly deteriorated due to physiological activities such as respiration, transpiration and also invasion due to disease causing pathogens. Three evaporative cooling systems to store the tomatoes *viz.*, Drip cooling chamber with gunny bag walls (T_1), Drip cooling chamber with Vetiver mat walls (T_2), Charcoal cooling chamber (T_3) and room temperature storage (T_0) were constructed. Treatment T_1 showed better results followed by treatment T_2 , treatment T_3 and treatment T_0 . The shelf-life of tomato in treatment T_1 was up to 21 days followed by treatment T_2 (18 days), treatment T_3 (15 days), treatment T_0 (12 days). Thus shelf-life of tomato was increased by 9 days in treatment T_1 . Cost of evaporative cooling systems was estimated for Treatment T_1 as Rs.1,608.79 per meter cubic storage space followed by treatment T_2 as Rs.2,858.79 per meter cubic storage space, treatment T_3 as Rs.6,450 per meter cubic storage space. Considering the above all treatments, T_1 treatment *i.e.* Drip cooling chamber with gunny bag walls was best suited for storage of tomato with low cost and negligible operational cost.

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India is a developing country having tropical climate. Thus, the storage of perishable commodities like fruits and vegetables after harvest is one of the critical problems of the rural areas of the country. This large amount of spoilage of these products is observed. The only solution to avoid large amount of spoilage is low storage temperature and high relative humidity. There are two methods of creating these conditions *i.e.* either refrigeration or the evaporative cooling storage. Refrigerated storage is the best method for storing fruits and vegetables but it is associated with large amount of initial and operating cost. On the other hand, evaporative cooling chamber is based on the same principle, that it is space in which water is provided within the vicinity of the produce and outside air is blown through water saturated medium. Tomato undergoes various physiological changes even after harvest. These changes have pronounced effect in chemical composition, keeping quality and spoilage. Traditionally ECC are constructed with sand, cement and bricks with double walled structure and sand or brick bat is filled in between two walls which act as the cooling pad after application of water. Gunny bags are locally available and made from jute which has good water retaining property. Whereas, vetivar or *Khus* is a tall, perennial grass. It produces spongy, much branched root systems with fine rootlets, containing

fragrant oil which is a perfumed by itself. The dry aromatic roots are also used to make curtains, mats, fans and other fancy goods as the products emits a sweet cooling aroma for a long period when moistened. While the charcoal obtained from burnt wood also has tendency to retain applied water for long time. Keeping these points into considerations, the following objectives were decided,

– To study and compare the shelf-life of perishable commodities like tomato in different evaporative cooling systems.

– To study and compare the costing of different low cost evaporative cooling systems.

METHODOLOGY

All the important points were considered while selecting site for construction of evaporative cooling chamber.

Erection of evaporative cooling systems:

Three evaporative cooling chambers and one room temperature storage chamber were constructed. Room temperature storage was plotted in an open tray while construction of other chambers is as follows.

Drip cooler with gunny bag walls:

The drip cooler was made up of three parts – basic