Environment & Ecology 27 (4B) : 2074—2076, 2009
 ISSN 0970-0420

Rural Technologies for Storing Vegetables and Fruits

ANJALI CHANDRA[1], SUBHA ROY[2] AND RAVISH CHANDRA[3]

[1]*Divyayan Krishi Vigyan Kendra, Ranchi, India*
[2] *PG Department of Home Science, Food and Nutrition, T. M. Bhagalpur University, Bihar, India*
[3] *College of Agricultural Engineering, R. A. U., Pusa, Samastipur 848125, India*
E-mail : chandra _ravish2001@yahoo.co.in

Abstract

Spoilage of fruits and vegetables is a serious problem in tropical countries like India. So, the present study was undertaken to find a low cost rural technology for storing vegetables and fruits. A study was done on the basis of experiment conducted in a village Gesway of Burmu block of Ranchi district, to find out a solution for overcoming the problem of spoilage of fruits and vegetables during storage, 10 farmers of the village were selected for making cool chambers in their household for storing vegetables and fruits. All selected farmers were good vegetable growers and they also sell their products in local market. They stored their vegetables and fruits in cool chambers and in bamboo iceless refrigerators when they compared the shelf lives of vegetables and fruits with their traditional method of storing vegetables and fruits. It was found that because cool chamber stays cooler than outside environment and maintains a high relative humidity inside the chamber, shelf lives of vegetables and fruits increased a lot and spoilage of vegetables and fruits can be controlled to some extent by storing them in cool chambers.

Key words : Cool chambers, Bamboo iceless refrigerator, Shelf life, Vegetables, Fruits.

Vegetables, among horticultural crops, are one of the potential crops for meeting the food requirement of the people. Vegetables, besides being rich source of essential nutrients, can play a vital role in the financial economy of the majority of small and marginal farmers.Vegetables and fruits will play a significant role by providing scope and opportunity for employment generation through export, trade and post harvest industry developments. The country after green revolution made tremendous progress in vegetable and fruit production. Cool storage can prolong the life of fresh produce. Refrigerator can keep vegetables and fruits fresh for a longer period, but it is expensive to buy, expensive to run and maintain. There is a practical, low cost alternative for on farn vegetables and fruits storage which employs the cooling power of evaporation. It is known as zero energy cool chamber. It can be constructed by low cost easily availble materials like bricks, sand, soil, straw, gunny bags, bamboo, these cool chambers do not require a big space and also for running it no energy is needed.

India has a productivity level of vegetables around 16.18 tons/ha whereas Jharkhand has a productivity level of vegetables up to 15.35 tons/ha. In Ranchi vegetables are grown at 21,158 m tones with a yield rate of 11.57 tons/ha. Production of vegetables is surplus in this state, so it can change the economic scenario of the state, if maximum benefit can be gained from it. In Jharkhand post harvest lossess of vegetables and fruits is about 25—30% (1). The vegetables which are of highly perishable in nature are seasonal and available in plenty during the glut period. Heavy losses occur due to non-availability of sufficient storge, transport and proper processing facilities at the production point. It is essential to control the losses to provide wholesome, safe and nutritions food to the consumers. Many studies have been found on dehydration technology of vegetable storage (1—5). but it is a well known that quality of vegetables and fruits is best when it is fresh. In this study a low cost storage device has been developed for farmer storing fresh fruits and vegetables for many days and sell them when the rate of vegetables and fruit is good in market. Performance of zero energy cool chamber was tested with 10 farmers of a vegetable growing village of Ranchi district.

Methods

Experiment was carried out in winter and summer

Table 1. Shelf life of vegetables and fruits in winter season.

	Vegetables and fruits	Storage outside the chamber (days)	Storage in bamboo iceless refri-gerator (days)	Storage in zero energy cool chamber (days)
1.	Leafy vegetables (palak, methi, coriander leaves)	2	4	6-8
2.	Other vegetables (tomato, brinjal, cabbage)	3	4-5	8-10
3.	Potato	52	83	118
4.	Peas	2	5	8
5.	Papaya	3	7	10

Table 2. Shelf life of vegetables and fruits in summer season.

	Vegetables and fruits	Storage outside the chamber (days)	Storage in bamboo iceless refrigerator (days)	Storage in zero energy cool chamber (days)
1.	Leafy vegetables (palak, methi, coriander leaves)	1	2	4
2.	Other vegetables (tomato, brinjal, cabbage)	2	4	6
3.	Potato	30	50	90
4.	Mango	4	5	8

seasons with vegetable growing farmers of Gesway village of Burmu block in Ranchi district. They were storing vegetables and fruits in bamboo basket and sell their products in market but sometimes left over portion of vegetables get spoiled and they suffer loss. They were compelled to sell their products on same day at any price. To find out a solution for these problem two treatments in the experiment were tested : First was the storage of vegetables and fruits in a bamboo iceless refrigerator which was big bamboo basket with cover wrapped fully with a gunny bag and kept over a metal plate in a brick or stand. The gunny bag was made to cover the basket and kept wet always by sprinkling water over it. Second treatment was the storage of vegetables and fruits in zero energy cool chambers.

Construction of Zero Energy Cool Chamber

A raised site close to a source of water was selected. A floor was made with bricks. A double wall 70 cm high was erected leaving a cavity 7.5 cm wide between the two walls. The chamber was drenched with water. Fine river sand was soaked with water and filled in the cavity left between two walls. A cover frame of bamboo, sirki, straw or dry grass was made. A thatched roof shed over the chamber was build to shield the chamber from direct sun and rain.

Operation

Sand bricks and top cover of the chamber was always kept wet. Fruits and vegetables were stored in perforated plastic carates or trays preferably. But for shorter period, it can be stored directly in the chamber. These were covered with a polythene sheet. Arrangements were made to keep the chamber neat and clean always.

Temperature outside and inside the cool chamber was noted and also the temperature inside bamboo iceless refrigerator was observed. Relative humidity inside the cool chamber was observed. Besides taking records of temperature and relative humidity shelf-lives of vegetables and fruits which were kept in cool chamber and bamboo iceless refrigerator were observed and record for different types of vegetables and fruits was prepared which was the most important parameter of the experiment.

Results and Discussion

It was found that leafy vegetables remain fresh up to 3 days in summer when stored in cool chambers but it remained fresh for 8 to 10 days in cool chambers in winter when these were spoiled in 2 to 3 days out side the cool chamber in winter and green vegetables were spoiled in the same period in summer season. Fruits like mango remained fresh up to 8 days and papaya up to 10 days when stored in cool chambers.

But these vegetables and fruits were spoiled in few days outside the chamber and they remained fresh up to only few days (2—3 days) when stored in bamboo iceless refrigerator. Similar results for other vegetables and fruits were observed when stored out-

side the cool chamber, in bamboo iceless refrigerator and in zero energy cool chamber (Tables 1 and 2).

The zero energy cool chambers retained 10 to 15C cooler than the outside temperatures and maintained about 90% relative humidity.

This data show that shelf-lives of vegetables and fruits are affected by temperature, relative humidity, season and also by the type of storage. It also shows that there is a storage life of every vegetables and fruits which can be extended within certain limits only, for example we cannot stored leafy vegetables more than 8 days in any cool chamber.

Bamboo iceless refrigerators are good only for temporary storage of vegetables and fruits. It does not have a capacity for storing large amount of produce whereas zero energy cool chambers can store about 100 kg of farmers produce at a time.

So, it can be concluded that zero energy cool chambers are easy to build, require no mechanical or electrical energy, allow small farmers to store their produce and thus avoid costly rush selling and is convenient to use. It reduces losses due to spoilage of vegetables and fruit and so pays for itself in a short time.It is also ideal for household storage and temporary storage of curd, milk, mushrooms and storing bio-fertilizers.

References

1. Ambrose C. P. and V. V. Sreenarayanan. 1998. Stusies on dehydration of garlic. *J. Food Sci. and Tech*. 35 : 242—244.
2. Delong D. 1979. *How to dry foods*. Tucson, AZ, USA, H. P. Books. 160 pp.
3. Madarro A., J V. Carbonell, F. Pinage and J. L. Pena. 1983. Dehydration of fruits and vegetables with ambient air, results of a series of experiences. *Food Sci. and Tech.* 1 : 104—105.
4. Srivastava P. P. and N. Nath. 1985. Development of a process for drying fresh and brined cauliflower. *J. Food Sci. and Tech*. 22 : 334—339.
5. Pokharkar S. M. and S. Prasad. 1998. Mass transfer during osmotic dehydration of banana slices. *J. Food Sci. and Tech*. 35 : 336—338.