



A Case Study

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Pre-cooling of fresh vegetables in low cost zero energy cool chamber at farmer's field

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ABSTRACT : An on -farm trial was conducted to work out the efficacy of the zero energy cool chamber in the field conditions as well as the efficacy of the locally grown vegetables in the villages, Malud and Belodi by Krishi Vigyan Kendra, Durg in the summer of 2010-11. Various vegetables like brinjal, okra, cluster bean and tomato were studied and significant findings have been recorded. The major advantage of cool chamber storage was the maintenance of fruit firmness by lowering the physiological loss in weight (PLW) and other metabolic processes. Eventually, 9 to 15 days more shelf life of brinjal, tomato, upto 90 days in potato and also increase in shelf life of other vegetables was obtained in cool chamber storage as compared to ambient condition storage. The vegetables stored in ZECC had excellent texture.

KEY WORDS : Zero energy, Cool chamber, Vegetable, Storage

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The trials were conducted to work out the efficacy of the cool chamber in the field conditions as well as the efficacy of the locally grown vegetables in the nearby villages. Various vegetables like brinjal, okra, cluster bean were studied and significant findings have been recorded. The cool chambers had a maximum efficiency during the summer season wherein the vegetables could be stored afresh for a longer period than the conventional storage (Roy and Khurdiya, 1986; Roy and Pal, 1991). The present On-farm trial was conducted with the following objectives to introduce and promote a low cost technology of storage (ZECC) among farmers and to decrease PHT loss as at village level as due to lack of storage they suffer post harvest loss upto 30- 35 per cent and thus consumption of vegetables and fruits is low.

RESEARCH METHODS

Work completed during O.F.T. by Krishi Vigyan Kendra, Durg:

Every aspect of the vegetable grower's attitude, awareness level and existing knowledge was taken into consideration to select the beneficiary farmers among them. Consequently area under the vegetable cultivation, pattern of farmer's participation and problem pertaining to short term storage and transportation were studied closely. This formed the basis for designing the appropriate training strategy and

accordingly proper stress on the aspects of training methodology was given. Demonstrations for group of farmers were undertaken to show the method of erection of the structure, method of storage, type of produce to be stored and method of operation of the cool chamber.

Construction of ZECC at farmer's field:

ZECC - an on-farm rural oriented low cost storage structure which operates on the principle of evaporative cooling was developed at IARI, New Delhi, using locally available raw materials such as bricks, sand, bamboo, dry grass, jute cloth etc. The chamber is an above-ground double-walled structure made up of bricks. The cavity of the double wall is filled with riverbed sand. The lid was made by using dry grass/straw on a bamboo frame. ZECC had a maximum efficiency during the summer season wherein the vegetables could be stored afresh for longer period than the conventional storage and handling methods that was practiced as handling in bulk, room storage and packing in the gunny sacks. The rise in relative humidity (90% or more) and fall in temperature (15–18°C) from the ambient condition could be achieved by watering the chamber twice a day. Performance evaluation of cool chambers at different locations was found to be satisfactory for short term maintenance of vegetables.

Diagrammatic sketch of zero energy cool chamber:

During the trial various training aids were used and the literature prepared by the KVK distributed among the farmers to depict the importance of the low cost technology as per the target set out in the trial were conducted in the selected villages 'Malud' and 'Belodi'. The reaction and feedback of the beneficiaries were recorded and studied critically during the training. The regular follow-up has helped to increase the

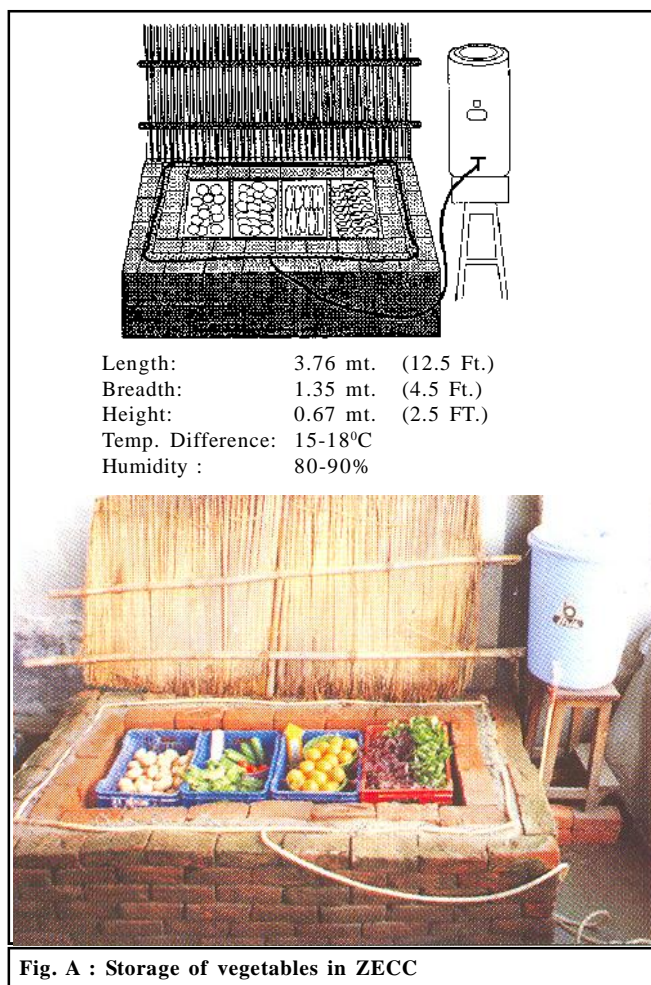


Fig. A : Storage of vegetables in ZECC

participation of the direct beneficiaries in the KVK programmes.

RESEARCH FINDINGS AND DISCUSSION

The cluster bean, brinjal and okra could be stored inside the chamber for 6, 9 and 6 days, respectively with maximum retention of marketable quality.

The shelf life of leafy vegetables like amaranth which are main summer vegetable crop of poor farmers can be increased upto 3 days which otherwise at ambient temperature cannot be stored for a single day.

It was also revealed that the other vegetables grown in the region like the chilli, tomato, potato etc. could also be stored in the cool chamber upto maximum retention of quality for 10 to 90 days inside the cool chamber as per the observations made at the farmer's field.

Impact :

The actual adoption of the technology among the farmers in the selected villages among the beneficiaries is 95 per cent.

The popularity of the cool chamber has since increased not only among the farmers but also among the extension agencies of the state as the state department of agriculture.

The impact of the trial is evident from the fact that the other fruit growers, flower and milk producers have also approached the KVK for use of the cool chamber for pre-cooling of the fruits and milk in bulk.

Salient findings/recommendations:

The vegetables as cluster bean, brinjal, okra, tomato, chilli can well be stored inside the chamber with maximum retention of quality.

Milk, Curd, cooked food, flowers and buds that have a very short storability can well be stored inside the chamber.

Can also be utilized easily for mushroom cultivation.

The zero energy cool chambers can be constructed by an unskilled person and has a very limited capacity which should be strictly be recommended for the small and marginal farmers growing vegetables on small area of land in order to facilitate them to market their produce in bulk instead of intermittent harvest and marketing. Hence, not forced to sell

Table 1 : Storage life of fresh vegetables in ZECC and at ambient temperatures:

Vegetables	Storage period	ZECC		Ambient temperatures	
		Days	Weight loss (%)	Days	Weight loss (%)
Potato	March-May	90	7.7	46	19.1
Tomato	April-May	15	4.4	7	18.6
Amaranth	May-June	3	11.0	<1	49.6
Okra	May-July	6	5.0	1	14.0
Brinjal	April-May	9	3.9	4	8.7
Cluster bean	May-June	6	2.0	3	4.6
Green chilli	April-June	10	3.8	5	9.4

at low prices.

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