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Zero energy cool chamber

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Introduction

A refrigerator substitute is a zero-energy cool chamber (ZECC). It can be employed as a storage area on farms for cut and standard flowers, leafy and tuber vegetables, and fruits to increase their shelf life. One of India's biggest difficulties is how to store fresh horticulture produce after harvest. Fruits and vegetables have a very short shelf life and are more likely to rot because of their higher water content. Furthermore, they continue to ripen even after harvest because they are living organisms. Reducing the temperature while storing produce will help prevent it from rotting. In addition to being expensive and energy-intensive, refrigerated storage also requires a sizable initial financial outlay.Thus, the concept of a zero energy cool chamber was born. Brick, sand, bamboo, khus-khus/straw, gunny bags, and other materials are simple to use in the construction of the zero energy cool chamber. The chamber can keep the temperature 10 to 15^{o}C lower than the ambient temperature and can maintain a relative humidity of more than 90%. To prevent severe frost in northern zones, it is more effective during the dry season as well as in the winter.

Construction

Decide on an upland with a local water supply, then Make a 165 cm x 115 cm brick floor. The double wall should be built up to a height of 67.5 cm, leaving a 7.5 cm-wide gap. Fill the room with water and then use water to soak the fine river sand. Use this moist sand to fill the 7.5 cm gap between the twin walls as a covering. Create a frame for the top cover out of bamboo (160 cm × 120 cm), straw, or other dry materials. Create an attachment or shed over the chamber to shield it from the sun's rays or rain. Keep the sand, bricks, and top cover of the chamber wet with water at all times. Water for that, twice daily with plastic pipes and micro tubes connected to an overhead water supply in order to obtain the correct temperature and relative humidity. Keep the fruits and vegetables in perforated plastic crates latter in this room. Put a thin plastic polyethylene sheet over these cartons. Once every three to four years,

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the cool chamber should be replaced with new bricks, reusing the old bricks for other projects.

Points to remember

The ZECC's initial cost and the amount of heat that may be transferred through conduction are influenced by the material selection. Both the rate of evaporation and whether or not the water evaporates at all depend on the relative humidity. The dewpoint temperature's ability to generate condensation and the viability of the chamber depend on the humidity. The dimensions will alter the amount of heat that is transferred to the water, the amount of food that can be kept, and the initial cost. Your profit and operating budget increase as you stockpile more food. How much heat needs to be pushed out will depend on the desired interior temperature. The inside temperature will also determine how useful and how much fruit you might sell. When and for what seasons the ZECC can operate properly will depend on the ambient temperature (depending on location). Use the information provided to optimise the ZECC as much as you can and build a self-sufficient system.

Conclusions

The purpose of this study was to evaluate the quality and storage potential of vegetables (pointed gourd and okra) under ZECC, freeze, and room storage settings. We came to the conclusion that keeping vegetables in ZECC increases their quality and ability to be stored up until the fifth day. Therefore, we came to the conclusion that ZECC can be used for vegetable storage, including gourds.