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Food Preservation Is The Key To Food Crisis

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Abstract:

Statistics show that much of post harvest loss of fruits and vegetables in developing countries is due to the lack of proper storage facilities, while refrigerators mentioned to be best method of preserving fruits and vegetables still this solution is not practical in our society since they are expensive to buy as well as running. But they say "necessity is the mother of invention" therefore we come up solution which will address the need for local refrigeration (Charcoal Refrigerator) as a method of preserving fruits and vegetables at zero costs for running. This project aims in demonstrating importance of food preservation in fighting food shortage(food crisis), promoting food security also to help fruits and vegetable vendors to increase their income by increasing shelf life of their products at zero costs for operation.

Method:

A prototype charcoal cooler was constructed. The materials used, and detailed construction instructions are as follows:

MATERIALS	USED
WOODS	To make the frame of the cooler
CHICKEN WIRE MESH	To seal and holding the charcoal walls
NAILS & SCREWS	For carpentry activities
CHARCOAL	To build the porous structure/wall
SOLID BOARD	To build the base and roof of the cooler
PLASTIC PIPE	For dripping water to the walls
TIES	To hold pipe on fixed position
BUCKET/CONTAINER (20L)	To store water
TOOLS(HAMMER,SAW,SCISSORS)	For carpentry activities

HOW TO BUILD THE DEVICE

Choose dimensions (L x W x H) and cut wood accordingly to the dimensions.(The device requires 2 pieces of each length and width and 8 pieces of heights).

4 U-shaped frames with the thick part of timber forming the thickness of the frame was created as shown on figure 1

Wire mesh was nailed on both sides of the frames, 3 frames were joined to make a 3D U-shaped frame as shown on figer 2 & 3

A board was measured and fitted at the bottom of the cooler.

The remaining U frame was attached with hinges to form the door of the cooler

The cavities formed by wire mesh was filled with charcoal and it was evenly dispersed throughout the cavities

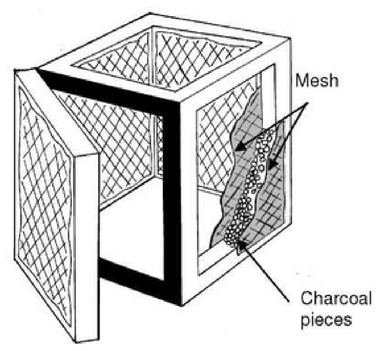
Finally the pipe was layered on top of the cooler and fixed by using ties, the poked sides of the pipe must point downwards into the filled charcoal cavities and the free end of the pipe was attached to the elevated base of the bucket.

Results:

Mode Of Action Of The Device

A charcoal cooler uses the principal of evaporative cooling to maintain a cool interior temperature for refrigeration ad food preservation. When water evaporates it draws energy from its surroundings which produces a considerable cooling effect. Evaporative cooling occurs when air, that is not too humid, passes over a wet sur face; the faster the rate of evaporation the greater the cooling.

Two simple experiments(temperature response test & fruits/vegetables response test) were carried out so as to measure the efficiency of the cooler and temperature change inside the cooler respectively compared with the surrounding conditions.



	TEMPERATURE (°C)	
	HOT DAY	COOL DAY
Evaporative cooler	5 - 10	5 - 8
Outside the cooler	27 - 30	18 - 25

TIME	Evaporative cooler	Outside the cooler	
	temp (°C)	temp (°C)	humidity (%)
1st Week	20	27	58
2nd Week	20	29	51
3rd Week	18	28	56
4th Week	20	26	49

PRODUCE	Shelf life outside the cooler	Shelf life within a cooler
Bananas	5 days	20 days
Avocados	3 days	14 days
Cucumbers	5 days	15 days
Tomatoes	3 days	21 days
Okra	4 days	15 days
Cabbage	5 days	21 days
Spinach	2 days	21 days
local vegetables	4 days	20 days

Conclusions:

In hot climates and areas where electricity is unavailable refrigeration of food is a developmental need, Thus preservation of crops through refrigeration can help with hunger and starvation in most of developing countries by keeping food fresh longer. The SDG #2 (zero hunger) can be archived if we'll ensure food security through practical and affordable means of preserving food.

Also we figured out during our study "If the air flow will be improved it 'll also improve efficiency of the device". Therefore we recommend the installation of Wind driven ventilator on the roof of the cooler this will help to reduce temperature within the cooler to the maximum level(wind driven ventilator is free energy ventilator since its operated by wind energy which is free).

Finally this project doesn't only provide solution for affordable means of preserving food also it can be used as a business idea for improving income of fruits and vegetables vendors around the streets whom have been incurred great loss due lack of proper infrastructure for their businesses.

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