



JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)

An International Scholarly Open Access, Peer-reviewed, Refereed Journal

ESTABLISHMENT OF COLD STORAGE AND WAREHOUSES FOR FRUITS AND VEGETABLES IN INDIA.

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Abstract :

Presents summaries of current storage requirements of fresh fruits, vegetables, cut flowers, and other horticultural crops. However, this highly expanded version also includes information on quality characteristics, maturity indices, grading, packaging, precooling, retail display, chilling sensitivity, ethylene production and sensitivity, respiration rates, physiological disorders, postharvest pathology, quarantine issues, and suitability as fresh-cut product. A large number of fruits and vegetables were added, as well as sections on food safety, nutritional quality, texture, and fresh-cut produce.

Key words :

One of the leading reliable names in industrial world for providing the most comprehensive technical consulting services. We adopt a system at ica approach to provide the strong fundamental support needed for the effective delivery of services to our Clients' in India & abroad cold storage, controlled atmosphere storage, cut flowers, ethylene, flavor, food safety, fresh-cut, fresh produce, fruit softening, heat load, 1-methylcyclopropene, microbial safety, minimally processed, modified-atmosphere packaging, potted plants, nutritional quality, nuts, orchids, packaging film, perishable, postharvest biology, precooling, respiration, sensory evaluation, shelf-life, texture.

1. Introduction

The purpose of storing plant material is to lengthen the time it can be stored and marketed prior to consumption or other use. In doing so, it is critical to provide an environment that minimizes deterioration and maintains microbial safety and quality. Cold storage is the one widely practiced method for bulk handling of the perishables between production and marketing processing. It is one of the methods of reserving perishable commodities in fresh and whole some state for a longer period by controlling temperature and humidity with in the storage system. Maintaining adequately low temperature is critical, as otherwise it will cause chilling injury to the produce. Also, relative humidity of the storeroom should be kept as high as 80-90% for most of the perishables, below (or) above which his detrimental effect on the keeping quality of the produce. Most fruits

and vegetables have a very limited life after harvest if held at normal harvesting temperatures. Postharvest cooling rapidly removes field heat, allowing longer storage periods. In addition to helping maintain quality, postharvest cooling also provides marketing flexibility by allowing the grower to sell produce at the most appropriate time. Having cooling and storage facilities makes it unnecessary to market the produce immediately after harvest. This can be an advantage to growers who supply restaurants and grocery stores or to small growers who want to assemble truckload lots for shipment. Postharvest cooling is essential to delivering produce of the highest possible quality to the consumer

2. Objectives

Based on their thermal compatibility the produce are classified into

1. Most vegetable and Fruit produce, not sensitive to cold (0-4°C)

E.g. Apple, grape, carrot and onion

2. Vegetable and Fruit produce moderately sensitive to cold (4-8°C)

E.g. Mango, orange, potato and tomato (ripened)

3. Vegetable and Fruit produce sensitive to cold (>8°C)

E.g. Pineapple, banana, pumpkin and bhendi

Based on the purpose the present day cold stores are classified into following groups:

1. Bulk cold stores: Generally, for storage of a single commodity which mostly operates on a seasonal basis

E.g.: stores for potatoes, chilies, apples etc.

2. Multi purpose cold stores: It is designed for storage of variety of commodities, which operate practically, throughout the year.

3. Small cold stores: It is designed with pre cooling facilities. For fresh fruits and vegetables, mainly for export oriented items like grapes etc.

4. Frozen food stores: It is designed for with (or) without processing and freezing facilities for fish, meat, poultry, dairy products and processed fruits and vegetables.

5. Mini units /walk in cold stores: It is located at distribution center etc.

6. Controlled atmosphere (CA) stores: It is mainly designed for certain fruits and vegetables.

DESIGN OF BOX FOR STORAGE OF THE PRODUCE:

Volume of the product = Total Weight of the Produce / Bulk Density of Produce

$$= 1,00,000 \text{ kg} / 850 \text{ kgm}^{-3}$$

$$= 117.64 \text{ m}^3$$

Assumed size of each box = **0.554 x 0.304 x 0.228m**

Therefore **volume** of each box = **0.0383 m³**

Bulk density of the hard wood used for the storing the tamarind = **850 kgm⁻³**

Weight of produce in each box = (Volume of each box) (B.D of Hard wood)

$$= 0.0363 \text{ m}^3 \times 850 \text{ kgm}^{-3}$$

$$= 30 \text{ kg/box}$$

Total number of boxes = Total weight of the Produce

Weight of the produce in each box

$$= 100,000 \text{ kg} / 30 \text{ kg}$$

$$= 3226 \text{ boxes}$$

$$\text{Thickness of each box} = 0.004 \times 0.004 \times 0.008 \text{ m}$$

$$\text{Actual volume of wood used per box} = 0.0020 \text{ m}^3/\text{box}$$

$$\begin{aligned} \text{Total volume of boxes} &= (\text{volume of each box}) (\text{total number of boxes}) \\ &= 0.002 \times 3226 \\ &= 6.452 \text{ m}^3 \end{aligned}$$

$$\begin{aligned} \text{Total volume of boxes and produce} &= (\text{Total volume of tamarind} + \text{box volume}) \\ &= 117.64 + 6.452 \\ &= 124.092 \text{ m}^3 \end{aligned}$$

INTERNAL DIMENSIONS OF THE COLD STORAGE:

The efficiency of the cold storage as well as for easy handling and movement of the produce during loading and unloading of the tamarind can be improved by stacking the boxes or containers in proper way. The boxes can be stacked in row and columns on the Standard pallets as given in the general considerations. Proper stacking helps in uniform cooling of the produce, also spacing should be considered for the movement of air and handling equipments. Assumed dimensions based on the total capacity of the tamarind to be stored, are given below:

$$\text{Length} = 13.972 \text{ m}$$

$$\text{Breadth} = 7.648 \text{ m}$$

$$\text{Height} = 4.42 \text{ m}$$

$$\begin{aligned} \text{Total internal volume} &= (13.972 \times 7.648 \times 4.42) \text{ m} \\ &= 472.3 \text{ m}^3 \end{aligned}$$

$$\begin{aligned} \text{Free volume available inside the Cold storage} &= (\text{Product volume} - \text{Internal volume}) \\ &= 472.3 \text{ m}^3 - 124.4 \text{ m}^3 \\ &= 348.3 \text{ m}^3 \end{aligned}$$

$$\begin{aligned} \text{Inner dimensions} &= 13.972 \times 7.648 \times 4.42 \\ &5.0 \end{aligned}$$

$$\begin{aligned} \text{VOLUME} &= 472.3 \text{ m}^3 \\ &8.648 \\ &14.972 \end{aligned}$$

EXTERNAL DIMENSIONS OF THE COLD STORAGE:

$$1. \text{ Length} = 13.972 \text{ m} + (0.5 \times 2) \text{ m (walls)} = 14.972 \text{ m}$$

$$2. \text{ Breadth} = 7.648 \text{ m} + (0.5 \times 2) \text{ m (walls)} = 8.648 \text{ m}$$

$$3. \text{ Height} = 4.42 \text{ m} + 0.6 \text{ m (floor \& ceiling)} = 5.0 \text{ m}$$

$$4. \text{ Total external volume} = 647.38 \text{ m}^3$$

$$5. \text{ Outer dimensions} = 14.972 \times 8.648 \times 5.0 \text{ m}^3$$

$$\begin{aligned} 6. \text{ Total building volume} &= (\text{External volume} - \text{Internal volume}) \\ &= 647.38 - 472.3 \\ &= 175 \text{ m}^3 \end{aligned}$$

3. Research Methodology

Cold storage can be combined with storage in an environment with added of carbon dioxide, sulfur dioxide, etc. according to the nature of product to be preserved. The cold storage of dried/dehydrated vegetables in order to maintain vitamin C, storage temperature can be varied with storage time and can be at 0°-10°C for a storage time of more than one year, with a relative humidity of 80-95 %.

The cold storage of perishables has advanced noticeably in recent years, leading to better maintenance of organoleptic qualities, reduced spoilage, and longer shelf lives.

These advances have resulted from joint action by physiologists to determine the requirements of fruit and vegetables, and by refrigerating specialists to design and run refrigerating machines accordingly.

Most fruits and vegetables have a very limited life after harvest if held at normal harvesting temperatures. Postharvest cooling rapidly removes field heat, allowing longer storage periods. Proper postharvest cooling can:

- a. Reduce respiratory activity and degradation by enzymes;
- b. Reduce internal water loss and wilting;
- c. Slow or inhibit the growth of decay-producing microorganisms;
- d. Reduce the production of the natural ripening agent, ethylene.

Care should be taken to store only, those kinds, which does not show in compatibility of storage, when storing multi produce in the same room. For example, apple can be stored with grapes, oranges, peaches, and plums and not with banana. However with potato and cabbage slight danger of cross actions can occur. Contrary to this, grape is compatible to all other vegetables except cabbage. To resolve the incompatibility during cold storage, foodstuffs are grouped into three temperature ranges.

Sample

- Allana Cold Storage Ltd.
- Anjaneya Cold Storage Ltd.
- Asvini Fisheries Pvt. Ltd.
- Hindusthan Ice & Cold Storage Co. Ltd.
- Ideal Ice & Cold Storage Co. Ltd.
- Indagro Foods Ltd.
- Karnavati Cold Storage Ltd.
- KarnimataCold Storage Ltd.
- Kisan Cold Storage & RefrigerationService Ltd.
- Nav Bharat Refrigeration & Inds .Ltd.
- Prabhu Hira Ice & Cold Storage Ltd.
- Ram'S Assorted Cold Storage Ltd..
- Universal Cold Storage Pvt .Ltd.

4. Result and discussion

How to Start Cold Storage Business Project

Excellent opportunity for investing, business planning, investment perspectives, Detailed Project Report, Profile, Business Plan, Industry Trends, Market Research, Survey, Feasibility Study, Investment Opportunities, Cost and Revenue, Plant Economics, Working Capital Requirement, Plant Layout, Cost of Project, Projected Balance Sheets, Profitability Ratios, Break Even Analysis. This item, when needed, can be taken from the cold storage and can be made available to consumers very easily. Cold storage is a vital link between the production and consumption of perishable products. Apart from the conservation of perishables, the cold storage also help in increasing the marketing period of

These commodities and ensure availability to the consumer over along period. It is also clear that the cold storage facility available in various states of the country reveals wide variation.

A new entrepreneur can well venture in to this field by installing a project of cold storage to save the fruits and vegetables from wastage.

Cold Storages is essential for extending the shelf life, period of marketing, avoiding glut, post-harvest losses reducing transport bottle necks during peak period of production and maintenance of quality of produce. It is, therefore, necessary that cold storages are to be constructed in major producing as well as consuming centres.

The development of cold storages in the country has an important role in reducing the wastages of the perishable commodities and providing remunerative prices to the growers and to make available farm products to the consumers at competitive and affordable prices.

The marketing of Cold Storage follows the local existing distribution net work i.e. Storage of fruits & vegetables as well as other commodities such as fruit pulps and pharmaceuticals by middlemen (Artis), exporters, food processors, and pharmaceutical companies. These organizations or peoples to re their commodities in cold storages, for future sales in the local market at better prices or for exports.

5. Conclusion :

There is vast scope for the need for cold storage and warehouses in Agriculture sector and allied enterprises and corporate industrial sector and in also trade, Public-sector Companies, government Undertakings, Individual Entrepreneurs, NRI's, Foreign Investors, Educational Institutions, Industry / trade associations

6. Sectors We Cover

Bio-fertilizers And Biotechnology
 Breakfast Snacks And Cereal Food
 Cereal Processing
 Coconut And Coconut Based Products
 Cold Storage For Fruits & Vegetables
 Dairy/Milk Processing
 Essential Oils, Oils & Fats And Allied
 Food, Bakery, Agro Processing
 Fruits & Vegetables Processing
 Ferro Alloys Based Projects
 Fertilizers & Biofertilizers
 Ginger & Ginger Based Projects
 Jute & Jute Based Products
 Maize Processing(Wet Milling) & Maize Based Projects
 Organic Farming, Neem Products Etc.
 Paints, Pigments, Varnish & Lacquer
 Paper And Paper Board, Paper Recycling Projects
 Printing Inks
 Packaging Based Projects
 Perfumes, Cosmetics And Flavours
 Power Generation Based Projects & Renewable Energy Based Projects
 Pharmaceuticals And Drugs
 Plantations, Farming And Cultivations
 Potato And Potato Based Projects
 Rubber And Rubber Products
 Stationary Products
 Spices And Snacks Food
 Textiles And Readymade Garments