



PROJECT REPORT ON COOL CHAMBER 5 MT

INTRODUCTION

India is the largest producer of fruits and vegetables in the world scenario but the availability of fruits and vegetables per capita is significantly low because of Post Harvest losses which account for about 25% to 30% of production. Further, the quality of sizeable quantity of produces also deteriorates the moment it reaches the consumer. This happens because of perishable nature of the products. If consumption is not getting stabilized, the farmers switch over to other crops instead of going for one crop in the subsequent year, and cycle continues. Our farmers continue to remain poor even though they take risk to cultivate high value fruits and vegetables year after year. Introduction of Cold storage / Cold room facility will help them in removing the risk of distress sale and simultaneously will ensure better returns. The annual production of fruits and vegetables in the country accounts for 18 to 20% of our agriculture output. Varied agro climatic conditions and better availability of scientific package of practices, there is a vast scope for increasing the production. The lack of cold storage / cold room facilities is one of the main bottlenecks in tapping the potential. In Orissa the cold storage facilities are very less. The cold storages, which are available in the State, are mostly to store single commodity like potato, which results in poor capacity utilization. Introduction of cold storage/cold chain facilities in the State can prove to be a boon for the horticulture farmers.

REQUIREMENT OF COOLING SYSTEM :

In Orissa seventy percent population depend on Agriculture. Upliftment of those categories can improve the overall status of the State. Comparing the developed States of our country, the economic condition of farmers of our State is miserable. The economic condition of most of the people is poor out of the total farmers about 47 to 48 percent of people cultivate cabbage, beans, onion, sweet potato, Brinjal, pea etc which has a very limited period. Similarly the fruits have also limited life after harvest. Post Harvest cooling rapidly removes field heat, reduces respiratory activity, reduce internal water, wilting, slow the growth of micro organism and reduces the production of natural ripening agent i.e. ethylene. Post Harvest cooling also provides marketing flexibility by allowing the grower to sell produce at the most appropriate time. Unavailability cooling and storage facilities makes it necessary to market the produce immediately after harvest and may result in distress sale. This can be an advantageous to growers who supply products restaurants and grocery stores or to small growers who wait to assemble truck load for transportation to other place. Post Harvest cooling can be an effective tool to deliver highest qualitative produce to the consumer. Intervention through Post Harvest cooling will help the farmers to store their produces and market them at the opportune time.

NECESSITY OF COLD ROOM IN ORISSA :

The financial condition of the farmers does not permit to establish a cold storage having capacity of 5000 MT which is meant to store 50,000 quintals of the products in the cold storage which require crores of Rupees to establish it. The concept of cold room

is to store vegetables, fruits and flowers for shorter duration for which a small and marginal farmer can store products for shorter period and sell it without deterioration of the product. Farmers will also get appropriate value of the product. It will reduce the distress sale. The farmers can establish cold rooms having 5 MT capacity where the storing of surplus quantities may vary from 50 quintals . Since the investment of such cold room is low a farmer can easily establish a cold room to store his surplus products..

CONCEPT OF THE PROJECT

Capacity utilization

The capacity utilization in cold storage for fruits and vegetables is generally about 70% which is due to short storage life of the produce and availability of produce for storage throughout the year. Generally cold storage operates for 300 days in a year.

The cold storage space of the proposed project shall be primarily used for storing fruits and vegetables for short duration storage of around 1-4 weeks. Such cold storage facility would enable them for bargain for a better price of their produce at the bi-weekly /weekly wholesale markets.

INCOME: Income can be generated from cold rooms in the manner as follows:

- (a) Income of the project shall be by the way of rent paid by hirers of cold storage space on a daily charge basis. It is proposed that space rent shall be Rs.0.30 p per Kg per day.
- (b) Income of the project shall be by way of procurement and trading of vegetables and fruits.
- (c) Income of the project can be made by both the above way i.e. by way of 50% by own trading and 50% by rent basis.

Loading & Unloading:

Loading of commodities in the cold chamber and subsequent unloading from cold chambers shall be by contract labourers, the charges for which will be realized from the hirers of space.

Salary & wages:

One operator can operate the cold room who can be paid an amount of Rs.5,000/- per month.

Chamber size:

Size of the chamber will be of 10'-0"x 8'-0"x 8'-0" for 5 MT capacity cool chamber The storage racks shall be made of M.S. channels and angles.

Insulation

60 mm thick PUF panel shall be provided for insulating the cold room walls and ceiling. 80 mm EPS slab, PCC & KOTA stone will be provided for floor insulation. For strengthening the insulation, chicken wire mesh will be provided with it.

Cooling Unit

R-22/ R 404A refrigerant will be used for the cooling unit. Room temperature of 2°C to 6°C will be maintained inside the chamber. The ambient temperature will be 40°C. The total refrigerant capacity will be 20,000 BTU/hr for 5MT capacity cool chamber

Power Supply

Electric load will be 3.99 KW for 5 MT. Power supply will be 230 Volt/1Ph/50 HZ.

Electrical Work:

Electrical work shall include main power distribution switch board, feeder switches for cooling units, capacitors, power distribution cables, electric lighting, earthing of equipment.

Stand by Generator:

Provision has to be made for stand by Generator set to meet the power requirement during load-shedding/power cuts. The generator shall have an auto starting device to start it in case of failure of electric supply.

METHODS OF STORAGE FOR FRUITS & VEGETABLES

Refrigeration (cold store) – The ideal environmental condition for storage of fresh fruits and vegetables is the lowest temperature which does not cause chilling injury to the product. Hence, temperature control in cold storage is very important. In mechanical refrigeration, the refrigerated Gas (e.g. Ammonia, Freon etc.) takes out the heat from the chamber/store as it expands. The expanded gas is then compressed and the heat removed from the compressed gas by means of running water or circulation air over the tubes containing the hot gas. The gas is liquefied and the cycle is repeated. With such system accurate temperature control is maintained.

Specification of Cool Chamber/Cold Room

The storage life of fruits and vegetables even at low temperatures in general varies between 2 to 4 weeks excepting for a few commodities like apples, oranges, potatoes, cabbage etc. In case of cold room Long term storage is not envisaged and duration of storage is likely to be 1 to 4 weeks.

Objective of the Scheme:

- (i) To establish the small capacity of cool chamber / cold room in vegetable mandi / markets or in the field of farmers growing vegetables/fruits.
- (ii) To store the surplus amount of vegetables in daily market for selling the products later.
- (iii) To reduce the distress sale of the vegetables in the market.
- (iv) To develop the cold chain facility in the concerned area
- (v) To augment in case of farmers/small beneficiaries.

Strategy:

To fulfill the above objectives, following strategy will be adopted.

- i) Most appropriate system will be provided to reduce the distress sale of vegetables.
- ii) Farmers will get profit by selling the vegetables in the market in subsequent days.
- iii) Capacity building of farmers and field functionaries will be taken up through training and demonstrations with active participation of refrigerated company.
- iv) Information and communication technology will be deployed extensively for ensuring transparency in the implementation process and effective monitoring of the scheme.

Pattern of Assistance:

- a) Subsidy @ 40% of the cost with maximum limitation will be provided under PHM of NHM.
- b) The balance 60 percent amount is to be borne by the beneficiary.

The implement agency would have the following functions:

- (a) To disburse financial assistance to the beneficiary as per the guide lines of PHM scheme.
- (b) To furnish utilization certificate and monthly progress reports.
- (c) To disburse financial assistance after the date of installation of machinery.

BASIS OF DESIGN FOR COOL CHAMBER 5 MT

Sl no.	Description	Specification
1	Room Dimension	10ft ^(L) x 8ft ^(B) x 8ft ^(H) (Internal)
2	Room temperature	4 ⁰ (± 2 °C)
3	Humidity	85 to 90% RH
4	Ambient Temperature	43 ⁰ C
5	Material to be stored	Fresh fruits & vegetables
6	Product unit	5 MT
7	Product incoming rate	33% (1650 kg per day)
8	Product entry temperature	28-35 ⁰ C
9	Pull down times	24hrs/Batch
10	Insulation	60 mm PUF with 0.5 mm pre painted CRCA sheet as external finish & internal finish
11	FLOOR	60 mm thick PUF slab over kota & PCC
12	Hinge door	34'' x 78''= 1nos
13	Refrigeration unit (capacity)	24000 btu / hr @ 4 ⁰ C, Room Temp & 43 ⁰ C ambient temp.
14	No of units	10,000 btu / hr x 2 nos.
15	Refrigerant	R-22 / R404A
16	Compressor	Reciprocating

COST OF 5 MT OF COOL CHAMBER

Sl. No.	Description	Remarks
1	Cool chamber size	5MT
2	Dimension (Internal)	10ft x 8ft x 8ft
3	Cost of machinery	Rs.3,70,000/-
4	Civil cost 120 sqft @ 600/- per sqft	Rs.72,000/-
5	Cost of generator, insurance, electrical accessories, plastic crates, tax	Rs.3,40000/-
6	Misc	Rs.8,000/-
	Total	Rs.7.90 lakhs

N.B-The cost is indicative one, which is a reference only

CALCULATION OF THE REFRIGERATING POWER

Sl. No.	Particulars	Specifications
1	Capacity	5 MT
2	Outside temperature	43 °C
3	Cold room temperature	4 °C (± 2 °C)
4	Outside moisture	50 %
5	Type	Pre-fabricated room with floor
6	Internal room dimension	10ft x 8ft x 8ft
7	Insulation	Poly-urethane foam
8	Insulating surface	60mm thick
9	Turn over	Long storage
10	Man powers	2 nos.
11	Light	160 watt
12	Motor power	225 watt
13	Motor running period	24hrs/ day
14	Product	Fruits & Vegetables
15	Process	Fresh product storage
16	Product entering temperature	28 °C
17	Product leaving temperature	4 °C (± 2 °C)
18	Daily turnover	33 %
19	Process period	24 hrs
20	Density	145 kg/cum
21	Running compressor	18h/day

CALCULATION RESULTS

Sl. No.	Particulars	Specifications
1	Ambient losses	15438 watt/24hr
2	Infiltration due to use	8030 watt/24hr
3	Lighting load	320 watt/24hr
4	Motor load	5396 watts/24hr
5	Product load	40981 watt/24hr
6	Personal load	1013 watt/24hr
7	Total Load	71178 watt/24hr
8	Unit per hr	3994 watt

PROFIT ANALYSIS

COOL CHAMBER (5 MT CAPACITY)

Products storage capacity = 50qtls

Option -1

If the product stored on rented basis

The rent charge is Rs. 0.30/day/kg (maximum 300 days storage in a year)

Collected revenue will be = $\text{Rs.}5000 \times 0.30 \times 300 = \text{Rs.} 4,50,000/-$ per year.

Option -2

A- If the products stored or rented basis as well as by own trading.

Products stored on rented basis - 3 MT

Revenue will be collected $\text{Rs.}0.30 / \text{kg} / \text{day} = \text{Rs.}3000 \times 0.30 \times 300 =$
 $\text{Rs.}2,70,000/-$

B. Products will be stored by own trading = 2 MT (8 rotation in a year)

Average profit of mixed vegetable = $\text{Rs.}5/\text{kg}$

Profit for 2 MT = $\text{Rs.} 2000 \times 5 \times 8 = \text{Rs.}80,000/-$

Total profit will be $A + B = \text{Rs.}2,70,000/- + \text{Rs.}80,000/- = \text{Rs.}3,50,000/-$

Farmers will store the products as per permutation and combination

Rent charges = $\text{Rs.} 0.30 / \text{kg} / \text{day}$

N.B-The Annual expenditure will be deducted from the profit. The beneficiary may go for different combination for profit as per field condition and storing requirement.
