



**PROJECT REPORT**  
**ON**  
**COOLCHAMBER 10MT**

## PROJECT REPORT ON COOL CHAMBER 10 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 10 MT capacity where the storing of surplus quantities may vary from 100 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 to 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 14'-0"x10'-0"x10'-0" for 10 MT capacity cool chambers. 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<sup>0</sup>C to 6<sup>0</sup> C will be maintained inside the chamber. The ambient temperature will be 40<sup>0</sup> C. The total refrigerant capacity will be 30,000 BTU/hr for 10MT capacity cool chamber

## **Power Supply**

Electric load will be 5.9 KW for 10 MT. Power supply will be 230 Volt/3Ph/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 out 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.

### BASIC DESIGN 10MT COLD ROOM

Sl. No.	Description	Specifications
1.	Room dimension	14ft (L) x 10ft (B)x 10ft(H)
2..	Room temperature	+ 4 <sup>0</sup> C (± 2 <sup>0</sup> C)
3.	Humidity	85 - 90% RH
4.	Ambience Temperature	43 <sup>0</sup> C
5.	Material to be stored	Fresh vegetables and fruits
6.	Product quantity	10 MT
7.	Product Incoming Rate	33% (3300 kg per day)
8.	Product entry Temperature	28-35 <sup>0</sup> C
9.	Pull down time	24 hrs / Batch
10.	Insulation	60mm PUF with 0.5mm pre painted CRCA Sheet as external finish and internal finish
11.	Floor	60mm thick PUF slab over kota and PCC
12.	Hinge door	34"x 78" – 1No.
13.	Refrigeration unit capacity	30000 Btu/hr @ 4 <sup>0</sup> C Room temperature & 43 <sup>0</sup> C Ambient temperatures
14.	No of units	15000 Btu / hr x 2 nos.
15.	Refrigerant	R-22 / R404A
16	Compressor	Reciprocating

### CALCULATION OF THE REFRIGERATING POWER

Sl. No.	Particulars	Specifications
1	Capacity	10 MT
2	Cold room temperature	4 °C ( $\pm$ 2 °C)
3	Outside moisture	50 %
4	Type	Pre-fabricated room with floor
5	External Room Dimension	14ft x 10ft x 10ft
6	Insulation	Poly-urethane foam panel (PUF)
7	Insulating outtrace	60mm thick
8	Turn over	Long storage
9	Man powers	2 nos.
10	Lighting	178 watt
11	Motor power	225 watt
12	Motor running period	2 – 24 hrs
13	Duration	2 – 24 hrs (Lighting)
14	Product	Fruits & Vegetables
15	Process	Fresh product storage
16	Product entering temperature	28 °C
17	Product leaving temperature	4 °C ( $\pm$ 2 °C)
18	Daily turnover	33 %
19	Processed period	24 hrs
20	Product quantity	10,000 kg
21	Density	181 kg/m <sup>3</sup>
22	Running compressor	18-24 hrs

#### Calculation Results:

Sl. No.	Particulars	Specifications
1	Ambient losses	28734 watt/24 hrs
2	Infiltration due to use	11970 watt/24 hrs
3	Motor load	5396 watts/24 hrs
4	Product load	42363 watt/24 hrs
5	Personal load	1013 watt/24 hrs
6	Lighting load	356 watt/24 hrs
7	Refrigeration capacity	89832 watt/24 hrs
8	Refrigeration power for unit	5040 watt

## PROFIT ANALYSIS

### COOL CHAMBER (10MT CAPACITY)

Products storage Capacity =100 Qtls

#### Option-1

If the product stored on rented basis, the rent charge is Rs.0.30 kg / day (maximum 300 days storage in a year)

Collected revenue will be = Rs.10000 x 0.30 x 300 = Rs.9,00,000 per year

#### Option-2

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

Products stored on rented basis = 7 MT

Revenue will be collected Rs. 0.30 / kg / day = Rs.7000 x 0.30 x 300 = Rs.6,30,000/-

B- Products will be stored by own trading = 3 MT (8 rotation in a year)

Average profit of mixed vegetables = Rs.5 / kg

Profit for 3 MT vegetable = 3000 x 5 x 8 = Rs.1,20,000/-

**Total profit will be A +B = Rs.6,30,000/- + Rs.1,20,000/= Rs.7,50,000/-**

Farmer will store the product as per permutation & combination (Rs.0.30/kg/day)

**N.B - Expenditure will be deducted**

## ANALYSIS OF COST OF 10MT COOLCHAMBER

Sl. No.	Description	Specifications
1	Chamber size	10MT
2	Dimension	14' x 10' x 10'
3	Cost of machinery	Rs.4,65,000/-
4	Civil cost 192sqft @600/sqft	Rs.1,15,200/-
5	Electrification, Stabiliser	Rs.70,000/-
6	Insurance	Rs.10,000/-
7	Cost of Generator, Accessories, Plastic crates	Rs.3,90,000/-
8	Misc.	Rs.3,550/-
9	Tax, Installation etc	Rs.1,16,250/-
	<b>Total</b>	<b>Rs.11.70 lakh</b>

N.B: Estimate is indicative only for reference. 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.

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