

MODEL PROJECT REPORT ON 30 MT COLD ROOM

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 Odisha, 70% population depends 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. Out of the total farmers about 47 to 48 percent of people cultivate cabbage, beans, onion, sweet potato, Brinjal, pea etc for a very limited period within a particular season. 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 ODISHA:

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 30 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:-

The staging cold room is a small temperature controlled room appended to a pre-cooler so as to allow temporary holding prior to staging for onward dispatch (on to a refer truck). A pre-cooling unit along with such a cold room is necessary to enable temperature controlled post harvest handling for all high perishable crops.

In view of the fact that, existing cold stores at farm gate may need to select only individual component items to fulfill the operational need to serve as pack houses, integrated pack house/pre-cooler/cold room staging items have been kept as individual components, so that such existing cold stores can select to suit requirements for need installation. These series of components are mainly created at production areas (farm level) & will close a critical missing link in cold chain for the horticulture sector. Without this combination of components, there is no scope for domestically grown produce to safely access our existing cold stores. The integrated pack house, pre-cooler & cold room (staging) are effectively points of origin of the fresh produce cold chain.

Component Description:-

The cold room staging is an insulated & refrigerated chamber which is a necessary combination for pre-cooling unit & serves as a transient storage, while allowing the pre-cooler to be utilized for next batch load of incoming produce. The component cold room (staging) includes:-

1. An insulated room of 100 cum volume – capacity to store 30 MT.
2. Associated refrigeration equipment.
3. Staging area- adjoining enclosed area.

The design specifications of such cold rooms as similar to a cold store with the refrigeration design to suit humidity & temperature ranges for horticulture produce. Where pre-coolers are built appended to an existing cold store, the cold store itself serves this purpose.

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 staging 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.

Loading & Unloading:

Loading of commodities in the cold chamber and subsequent unloading from cold chamber shall be by contract laborers, 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.

Land

5000 Sq.ft of land is required near to road, power pole & water source.

Civil structure

The construction/arrangement of building with electrification for value addition shall be of about 660 sq.ft. area of room for working shed followed by storage & packing facilities.

Chamber size:

Size of the chamber of 25' -0" x 20' -0" x 10'-0" (External) shall be ideal for 30 MT capacity cool chambers. The storage racks shall be made of M.S. channels and angles.

Insulation

80 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 must \ 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 30,000 BTU/hr for 30MT capacity cool chamber

Power Supply

Electric load will be 5.9 KW for. 30MT. 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 electricity 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 amount is to be borne by the beneficiary.

Basic Design 30 MT Cold Room

Sl. No.	Description	Specification
1	Room Dimension	25 ft ^(L) X 20 ft ^(B) X 10 ft ^(H) (External)
2	Room Temperature	4 ° (± 2 ° C)
3	Humidity	90 to 95 % RH
4	Ambient Temperature	43 ° C
5	Material to be stored	Fresh fruits & vegetables
6	Product quantity	30 MT
7	Product incoming rate	10 % (3000 kg per day)
8	Product entry temperature	30-35 ° C
9	Pull down times	24 Hours / Batch
10	Insulation	Pre fabricated 80 mm PUF panels with 40 +/-2 kg/cum density. Inside & outside 0.5 mm PPGI sheets with cam lock for air tight construction etc.
11	Floor	80 mm thick PUF slab over kota & PCC
12	Hinge Doors	34" X 78" – 1 No.
13	Refrigeration Unit (Capacity)	30,000 btu/hr @ 4 °C room temp & 43 ° C ambient temp.
14	No. of units	15000 Btu X 2 Nos.
15	Refrigerant	R-22/R404 A
16	Compressor	Semi hermetic.
17	Compressor power consumption	2.720 KW X 3Nos.= 8.16 KW.(Total on running)
18	Fan for evaporators	Axial flow fans
19	Voltage stabilizer	Suitable voltage stabilizer will be provided
20	Digital Temp. Indicator cum controller	1 Nos.
21	Humidifier with Humidity Controller	1 Nos.
22	Coils & pipe	All coils & pipes are of copper make duly insulated
23	Refrigeration load	17 KW
24	Insulation Thickness / Type	80 mm/ Prefabricated modular type
25	Wall & Ceiling Insulation	Polyurethane foam (PUF) 80mm

26	Floor Insulation	Polyurethane foam (PUF) 80mm with inner side tar felt
27	Swing Door opening & type	Manual swing Hinged type overlapped
28	Swing door size	1 x 2 mtr clear opening
29	No. of swing door	1 Nos.(Swing)
30	Accessories	CAM Lift hardware Posi Seal closure Lock with safety release knob Magnetic gaskets
31	Nos. of lights	To suit room
32	System type	Split
33	Machine model	Any reputed model
34	Electrical supply required	440/220V/1 /3phase/50 HZ
35	Power requirement connection	25-30 H.P.
36	Condenser cooling	Air-cooled
37	Wiring	Power wiring & control wiring with ISI approved PVC insulated copper conductor with supports in PVC piping
38	Earthing	GI earthing for control panels & various motors will be given by Customer
39	Concreting & flooring inside cold room	Customer's Scope
40	Warranty	We will give you full warranty against manufacturing defect for one year of Cold Room

CALCULATION OF THE REFRIGERATION POWER FOR 30 MT COLD ROOM

Sl. No.	Particulars	Specifications
1	Capacity	30 MT
2	Cold Room Temperature	4 ° C (± 2 ° C)
3	Outside moisture	50%
4	Type	Pre-fabricated room with floor
5	External Room Dimension	25ft X 20 ft X 10 ft
6	Insulation	Poly-urethane foam Panel (PUF)
7	Insulating Surface	80mm thick
8	Turn Over	Long storage
9	Man powers	2 nos.
10	Light	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 – 30 ° C
17	Product leaving temperature	4 ° C (± 2 ° C)
18	Daily turnover	33 %
19	Processed period	24 hrs
20	Product quantity	30,000 kg
21	Density	181 Kg / cum
22	Running Compressor	18 -24 hr

Analysis of cost of 30 MT COLD ROOM

Capacity : 30 MT

Dimension (External):
25' X 20' X 10',

PROJECT COST

Sl. No	Description	Specifications
1	Technical Civil works including foundation & Shed (40ft x 25ft x 12ft)	Rs.4,50,000 (including taxes)
2	Cost of Condensing Unit, Evaporating Unit & other accessories like: Electrification, servo-stabilizer humidity controller including installation	Rs.6,50,000 (including taxes)
3	Cost of insulation for wall ceiling & floor including fitting & fixing charges.	Rs.4,00,000 (including taxes)
4	Cost of matching generator of capacity 15-20 KVA	Rs.3,50,000 (including taxes)
5	Other Accessories, Plastic crates etc.	Rs.1,00,000
6	Other unforeseen items	Rs.50,000
	Total Cost	Rs.20,00,000 /- (Rupees Twenty lakh) only

N.B:- This estimate is indicative only for reference. The actual cost of cold room will vary as per the quoted rates of machines, insulation & expenditure incurred in technical civil work.

Under MIDH (NHM), the maximum admissible cost for subsidy administration will be Rs. 15.00 lakh for 30 MT capacity. The admissible subsidy will be @ 55% for General Areas & @ 70% for Scheduled Areas.

PROFIT ANALYSIS

Cool Chamber (30 MT Capacity)

Products storage capacity = 30 MT

Option 1:

If the product is stored on rented basis

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

Revenue collected = Rs. 30000 X 0.3 X 300 = Rs.27,00,000

Option 2:

A. If the product is stored on rented basis as well as by own trading

Product stored in trade basis – 21 MT

Revenue collected @ 0.30 / Kg / day = Rs.21000 X 0.3 X 300 = Rs.18,90,000

B. Products will be stored by own trading – 9 MT (8 locations in a year)

Average profit of mixed vegetables @ Rs.5 / Kg

Total profit for 9 MT = Rs.9000 X 5 X 8 = Rs.3,60,000

Gross Profit = A+B = Rs.18,90,000+Rs.3,60,000=Rs.22,50,000

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

N.B – Expenditure will be deducted.