

**Model Bankable Project
on Floriculture(Rose & Gerbera)
Protected Cultivation-0.5 Acre**

BACKGROUND

Protected cultivation practices can be defined as a cropping technique wherein the micro climate surrounding the plant body is controlled partially or fully as per the requirement of crops grown during their period of growth. With the advancement in horticulture various types of protected cultivation practices suitable for a specific type of agro-climatic zone have emerged. Among these protective cultivation practices, poly green house, net house, shade house, plastic tunnel & mulching etc. are very useful for Odisha State. Protected cultivation under different types of structures save plants from winter and extends the cultivation session for off-season crop production.

Why Green house & Poly house Cultivation?

After the advent of green revolution, more emphasis is laid on the quality of the agricultural product along with the quantity of production to meet the ever-growing food and nutritional requirements. Both these demands can be met when the environment for the plant growth is suitably controlled. The need to protect the crops against unfavourable environmental conditions led to the development of protected agriculture. Greenhouse is the most practical method of achieving the objectives of protected agriculture, where natural environment is modified by using sound engineering principles to achieve optimum plant growth and yield. Poly house cultivation has become an important policy of Indian Agriculture. This technology can be adopted by the rural youth for more income per unit of land.

ROSE

A. INTRODUCTION

Depending on the species and varieties, roses have various uses. They may be used as cut flowers, and garden plants. They may also be used in making rose oil, rose water and gulkhand. Model project is on production of roses for use as cut flowers, which have an important place in preparation of bouquets, floral arrangements, worship, social occasions and presentation of gifts. Measured in terms of volume of trade in the international market cut roses rank first in popularity. Further, with the advancement in production and marketing of cut roses and also on account of recent economic liberalisation there has been an upsurge of interest in production of cut roses in plastic green houses in India.

B. CLIMATE

Plenty of light, humid and moderate temperature ranging from 15⁰C to 28⁰C may be considered as ideal conditions for roses in the tropical and subtropical climate of India. At temperature below 15⁰C roses can be grown, but the interval between flushes become longer. At higher temperature, say above 30⁰C, roses can be grown provided high humidity is maintained and evaporation is slowed down.

C. SOIL

Well drained soil rich in organic matter and oxygen is good for roses. Organic matter as high as 30 per cent in the top 30 cm of the growing beds is preferred by many growers. The pH of the soil should be around 6 to 6.5.

D. BED PREPARATION

Top width – 90 cm
Bottom width – 100 cm
Height – 45 cm
Path way – 50 cm

E. PLANTING DISTANCE

Plant to Plant distance: 17 cm
Row to Row distance : 45 cm

F. PLANTING MATERIAL

Rose plant used for plantation should be 2-3 month old and have minimum two dark green colour leaves. Bud union of rose plant should not be covered with soil. It should be 2-3 cm above the ground level. The sprout coming out of the union should face towards the path at the time of plantation. Rose plants are planted in a zigzag method on the bed.

G. TYPES OF ROSES AND VARIETIES

The major types of roses which are commercially important are as under:-

- **Hybrid Tea Roses** : These have large flowers (4 cm.) long stems (125 cm). Yield varies from 100-200 stems/sqm. Hybrid Teas fetch higher price than other types. A few well-known varieties of this group are SONIA, VIVALDI, TINEKE, MELODY, DARLING and ONLY LOVE.

- **Floribunda Roses** : These have small flowers (2.5 cm) and shorter stems (less than 60 cm), but yield much higher than other types. Examples of this type are FRISCO, MERCEDES, JAGUAR, KISS and FLORENCE.
- **Spray Roses** : A single stem of this type may carry 5-6 flowers, but stem yield per sqm is low. Important varieties belonging to the type are EVELIEN, JOY and NIKITA.

H. MANURES AND FERTILIZERS

Organic manures are required to be added so that top 30 cm of the soil has 30% organic matter content. Application of nutrients should be based on analysis of soil and plant. In the present model the cost has been estimated based on 250 fertigation days and 1.2g dose of fertilizers per day per sq. meter.

I. CULTURAL PRACTICES

For proper growth of rose plant and high production special cultural practices are to be carried out as follows:

i). Initial plant development / mother shoot bending: If the young plant is allowed to flower immediately after planting there is serious risk that the important structural frame work of the plant will be impaired. The various types of plants require different treatment. First flower is pinched after one month from the date of plantation so that 2 to 3 eyes bud will sprout on main branch to grow as branches and these branches in turn will form buds. When the plant attains this stage of growth, the mother shoot is to be bent towards the direction of path. This cultural operation in rose plants is done to initiate bottom break ground shoot. The maximum leaf area is required to build up a strong root system. The mother shoot is bent nearer to the bud joint.

ii). Plant structure development: To develop more growing points and plant structure development plays an important role. After planting ground shoot will start growing from crown of plant. The weak ground shoots should be bent at ground level, for forming a basic and strong frame work of plant structure for production throughout their life cycle. the strong ground shoots should be cut at 5th five pair of leaves after four and half months from the date of plantation. The medium ground shoots should be cut at 2nd or 3rd five of leaves.

iii). Bending in roses: Bending helps in maintaining enough leaf area on the plants. The maximum leaf area is required to build up a strong root system. Leaves are important for producing carbohydrates. The mass of leaves is also known as the lungs of the plant. The growing suckers should be removed in order to check new growth on the bended stem. The buds should be removed from the bended stem in order to check the incidence of thrips and bud rot (botrytis). Only weak and blind shoots are selected for bending. Bending breaks apical dominance of the plant. It is continuous process and hence carried out throughout the life cycle. Bending should be such that the most of the stems lay below horizontal. In summer season it is generally advised not to go for bending as it provides favourable condition for mite's incidence.

Bending is done on 1st or 2nd five pair of leaves. One can also grow roses in green house without bending by keeping some blind shoots on plants in standing position for extra photosynthesis and uptake of water nutrients. While bending the stems, the care should be taken that the stem will not break and the leaves will not touch the soil on the bed.

iv). Disbudding: Standard varieties are those with one flower on each stem. But as nearly all varieties produce some side buds below the center bud. these side buds have to be removed. The removal of these buds is known as disbudding. It should not be done too early or too late. If done too early it may harm leaves and if done too late then large wounds in the upper leaf axil

can take place. When bud attain pea-size and shows slight colour then it is right time to do disbudding. For most spray varieties, the center crown bud is to be removed. Disbudding is generally done on weak stem so that it can convert itself to thick stem and in future cuts can be taken. Thick stem produce strong sprouts whereas thin stem gives out weak sprouts

v). **Pinching:** Removal of unwanted vegetative growth from the axil of leaf below the terminal bud is called pinching. This helps to get good quality flowers and buds and avoids wastage of energy in the development of auxiliary bud if done at right stage and right time. It leads to apical dominance.

vi). **Wild shoot (root stock) removal:** Wild shoots are the unwanted growth that takes place at the union on the root stock. They should be removed at the earliest as these will deplete nutrients and checks growth and development of plant. They should not be cut but removed from its union by pressing it with thumb in order to check its further sprouting.

vii). **Support of the plants**

The support system consists of bamboo / GI pipes / 'L' angles inserted on both sides of bed at the start and end of the bed. Posts are placed at intervals of 3m on both sides of the bed, along the sides of bed, fastened at the posts at 30 cm – 40 cm intervals are 14 gauge GI wires or plastic string to support the plant. Between the wires across the bed, thin strings can be tied to keep the width of the bed constant. Support system makes intercultural operation easy and protects the buds from being damaged by not allowing the stems bend into the path.

viii). **Pruning:** Stems are cut back leaving 4-5 nodes on the basic stock frame, removing all weak shoots and redirecting the wayward ones. This may be practised in a phased manner so that flowering takes place from September to March. Generally, flowering takes place 45 days after pruning.

J. IRRIGATION

Rose plant require a lot of water, at least 6mm/day i.e. 60cum/ha/day. A drainage line may be laid below the beds for disposal of excess water.

K. PEST and DISEASES

The principal diseases of rose are

- i. Downy Mildew
- ii. Powdery Mildew
- iii. Botrytis
- iv. Pruning Dieback
- v. Black leaf Spot

Major insect pests of the rose are

- i. Red Spider Mite
- ii. Leaf Roller
- iii. Aphids
- iv. Thrips
- v. White Fly

Control

The preventive spray programme with a volume of 1500 litres/spray at an average interval of once in a week is suggested. The chemicals could be as under.

- Dithane M-45 0.6 gm/litre
- Metasystox 1.25 ml/litre
- Karathane 1.00 ml/litre

L. HARVESTING

Roses should attain the right stage for harvesting. If cut too early, flowers miss reserve food and therefore, may not develop into full flowers. If cut too late, longevity diminishes. As such, roses should be cut just as the buds are opening, after the sepals have almost fully curled up and the colour is fully visible. In small flowered varieties and Floribundas, the flowers are cut just when they begin to open the cluster. The cutting may be done in the evening or early morning with long stem. The lower end of cut stems are immediately placed in clean plastic buckets containing a clean solution of 500 ppm citric acid or in chrysal - RVB. Thereafter, the buckets containing cut roses are brought to the grading and packing Shed/Hall.

Harvesting Stages

S.No	Particulars	Place of cutting	Month from date of plantation
1	Ground shoot cutting	At 5th five pair of leaves from bottom of plant	3 to 3.5
2	First harvesting	2nd or 3rd five pair of leaves from first cut	4.5 to 5
3	Second / Regular harvesting	2nd or 3rd five pair of leaves from first cut	6th month onwards daily harvesting

The rose should be cut with the help of sharp cut and hold secateurs. Ground shoot cutting should be done on 5th five pair of leaf then one or two eye buds sprout from lower leaves below the cut. These sprouts will grow into flowers in the period of 35 to 50 days. This varies from variety to variety. Later on the first harvest should be taken on 2nd or 3rd five pair of the leaves above the first cut. During summer season or when there is less leaf area on plant it is always advisable to take cut on 3rd five pair of leaves above the first cut. Always bend thin stems and take cut on 3rd five pair of leaves above the first cut. Always bend thin stems and take cut on thick stems to get strong shoots.

The regular harvesting is done on 2nd five pair of leaves. Sometimes under cutting is also practiced as it is an important technique to keep rose plants at reasonable height. Harvesting cut should be sharp and inclined direction for avoiding the deposition of water or spray solution. When the temperature is low in the green house harvesting is done only once i.e. during early morning hours. When there is high day temperature it is necessary to take second harvesting in later afternoon.

Cut stages of roses play an important role in harvesting. Cut stages of roses for export is stage **0** and **1** whereas cut stage is **2** and **3** for domestic market.

M. YIELD

Average yield of roses is 30 to 35 stem/ plant per year.

N. GRADING

Flowers should be graded into different classes according to their qualities. Grading is done on a mechanical grader or by hand grading tables or work stations.

O. PACKAGING

Packing comprises three steps: bunching, wrapping and packing.

The heads of roses are evened up and their stem tied with a rubber band into bunches in 10s, 20s, 25s, or 50s depending on the ultimate market. They are cut so that all the stems are of the same length. The bunches are placed in preservative solution and may be shifted to the cold store.

They are brought back to the packing hall and the buds are wrapped and bunches are sleeved in transport polyethylene. The wrap is a 15-20 cm. wide plastic strip which acts as a cushion for the buds.

Many different cardboard boxes are used for packing. For long term transport it is best to use telescopic style boxes made of corrugated fibreboard. The size could be 100 cm x 45 cm x 22 cm. There may be 400 to 1000 stems per box and weight may vary from 14 to 18 kg/box. Depending on the market, the box is either filled with one variety, one grade, or mixed colour one grade.

P. ESTIMATED COST, MEANS OF FINANCE AND FINANCIAL ANALYSIS

The details of estimated cost, means of finance, economics and financial viability is worked out for Naturally Ventilated Polyhouse as follows.

Model Project for Rose under Naturally Ventilated Polyhouse
Unit size = 1000 sq.mt.

A Estimated Unit Cost and Means of Finance								
Sr No.	Items	Rate (Rs.)	Unit	Estimated Cost (Rs)	Subsidy (%)	Subsidy Amount (Rs.)	Beneficiarie's Contribution 10%	Bank Loan (Rs.)
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)=10% of (e)	(i)=(e)-(g+h)
1	Polyhouse (including thermal screen)	935	per sq.m	935000	65	607750	93500	233750
2	Micro irrigation system (Drip)	125	per sq.m	125000	90	112500	12500	0
3	Planting Material (7 Plants/m ² i.e. total 7000 plants)	15	per plant	105000	50	52500	10500	42000
4	Land Preparation (as per table A)	20	per sq.m	20000	0	0	2000	18000
5	Recurring Expenses - excluding cost of planting material (for the 1st year)	As per Table B		208820	0	0	20882	187938
	Total			1393820		772750	139382	481688
B Economics (Year wise Income & Expenditure)								
Sr No.	Item/ Year →	1	2	3	4	5	6	7
1	Income from sale of produce (as per Table C)	624260	624260	624260	624260	624260	624260	624260
2	Recurring cost (Table B)	313820	208820	208820	292820	208820	208820	208820
3	Gross profit (1-2)	310440	415440	415440	331440	415440	415440	415440
	Loan Repayment							
4	Principal	0	80281	80281	80281	80281	80281	80281
5	Interest @ 14% p.a.	67436	67436	56197	44958	33718	22479	11240
6	Total Loan Repayments (4+5)	67436	147717	136478	125239	113999	102760	91521
7	Income after repayment of Principal & Interest (3-6)	243004	267723	278962	206201	301441	312680	323919
8	Less Depreciation @10% on depreciated value of fixed assets	106000	95400	85860	77274	69547	62592	56333
9	Net Profit (7-8)	137004	172323	193102	128927	231894	250088	267586
C NPW, BC Ratio, IRR and DSCR								
		As per Table D						
i	NPW @ 15 %	493442						
ii	BC ratio	1.26						
iii	IRR	47%						
iv	DSCR	1.9						
Assumptions								
(i)	Rates for the items viz. Polyhouse, Micro irrigation system (drip) and land preparation are taken as prescribed under National Horticulture Board (NHB) guidelines / Department of Horticulture, Haryana guidelines							
(ii)	Cost of Planting Material	Rs. 15/- per sapling (The life of rose plant is 07 years. Hence cost of planting material is considred only for 1st year.						
(iii)	Recurring Cost	Assumptions are given in Table B						
(iv)	Production of Rose	182000/unit/ year						
(v)	Sale Price per stem (cut flower)	Rs. 3.5						
(vi)	Term Loan repayment Period	7 Years (including grace period of 1 year)						
(vii)	Interest on Term Loan	14% p.a.						
(viii)	Depreciation on fixed assets	@ 10% p.a. on reducing balance						
(ix)	Insurance premium for structure	@ 5% of depreciated value of structure (may vary from insurance company to company)						

Table - A Land Preparation Cost		
Sr. No	Particular	Amount
1	Pasteurized Compost & Neem cake @ Rs. 10/m ²	10000
2	Chemical Fertilizer and Micro Nutrients (@ Rs. 5/m ²)	5000
3	Fumigation /Bed preparation cost (@ Rs. 5/m ²)	5000
	Total	20000

Table - B Year wise Breakup of Recurring Cost		
		Amount In Rupees
Sr No.	Item/ Year →	From Year 1 to 7
2	Fertigation cost (Table B-I)	18540
3	Spraying cost (Table B-II)	15450
4	Packaging cost (Table B-III)	11400
5	Grading expenses (lumpsum)	10000
6	Trasportation cost (Table B-IV)	13680
7	Irrigation cost (flat @Rs.500/month for 08 month)	4000
8	Electricity cost (flat @Rs.500/month for 08 month)	4000
9	Labour cost (Table B-V)	78750
10	Insurance @ 5 % on depreciated value of polyhouse & Micro Irrigation System *	53000
	Total recurring cost **	208820

Table B- I Fertilizer cost		
Sr. No	Particular	Amount/Quantity
1	Fertilizers dose (Kg/day)	1.2
2	Avg. rate of fert. Rs/kg	60
3	Fertigation days	250
4	Fertigation cost	18000
5	Contingency @ 3% of Fertigation cost	540
	Total fertigation cost (Rs.)	18540

Table B- II Spraying cost		
Sr. No	Particular	Amount/Quantity
1	Spraying cost/day	200
2	Spraying days	75
3	Spraying cost	15000
4	Contingency @ 3% of spraying cost	450
	Total Spraying cost (Rs.)	15450

Table B- III Packaging cost		
Sr. No	Particular	Amount/Quantity
1	Rate/box	50
2	Total packaging cost/box	50
3	Total No. of cut folwers (Nos)	182000
4	Capacity/box in Nos	800
5	Total no. of boxes	228
6	Total packaging cost (Rs.)	11400

Table B- IV Trasportation cost		
Sr. No	Particular	Amount/Quantity
1	Transport charges per box	60.0
2	Total no. of boxes to be transported/year	228
	Total trasportaion cost (Rs.)	13680

Table B- V Labour cost		
Sr. No	Particular	Amount/Quantity
1	Total man-days	350
2	Avg salary/day/head	225
3	Total wages (Rs.)	78750

* Insurance premium may vary from insurance company to company
During 4th year Rs 84000 has been estimated towards polyhouse film replacement cost, in addition to recurring cost mentioned above. (Required film area is 2.1 times of 1000 m² i.e. 2100m² x Rs.40/m² = Rs. 84000/-.)
** The life of Rose plant is 07 years. Hence cost of planting material (@ Rs.15/plant for 7000 plant i.e. 105000) is considered for 1st year.

Table C		
Production and Income		
Sr. No	Particular	Amount/Quantity
1	Plant Population @ 7plant/m ²	7000
2	Total Production @ 26 cut flowers/plant	182000
3	Less : Loss of produce (2%)	3640
4	Produce available for sale (Nos)	178360
5	Income from sale of produce @ Rs. 3.5/cut flower	624260

Table D								
NPW, Benefit Cost Ratio, Internal Rate of Return and DSCR								
Sr No.	Item/ Year →	1	2	3	4	5	6	7
1	Capital Cost	1060000	0	0	84000	0	0	0
2	Recurring Cost (including land preparation cost for 1st year)	333820	208820	208820	208820	208820	208820	208820
3	Total cost (1+2)	1393820	208820	208820	292820	208820	208820	208820
4	Total Income from Sale of produce	624260	624260	624260	624260	624260	624260	624260
5	Net benefit (4-3)	-769560	415440	415440	331440	415440	415440	415440
6	Discount factor @ 15%	0.870	0.756	0.658	0.572	0.497	0.432	0.376
7	Discounted cost (3 x 6)	1212623	157868	137404	167493	103784	90210	78516
8	Total discounted cost	1869382						
9	Discounted benefit (5 x 4)	543106	471941	410763	357077	310257	269680	234722
10	Total Discounted Benefit	2362824						
	NPW @ 15 %	493442						
	BC ratio	1.26						
	IRR	47%						
11	DSCR Calculation							
I	Net profit	137004	172323	193102	128927	231894	250088	267586
II	Total repayments towards Principal and Interest on Term Loan	67436	147717	136478	125239	113999	102760	91521
III	DSCR (I/II)	2.031615161	1.1665753	1.4148947	1.0294477	2.034175738	2.43370961	2.9237661
	Average DSCR	1.9						

During 4th year Rs. 84000/- are estimated towards polyhouse film replacement cost, in addition to recurring cost mentioned in Table - B. (Required film area is 2.1 times of 1000 m² i.e. 2100m² x Rs.40/m² = Rs. 84000/-)

Table E							
Repayment Schedule -Model Project for Rose under Naturally Ventilated Polyhouse							
Repayment period = 7 years							
Annual repayment installment of Principal @ Rs.80281							
Years	Bank Loan o/s at the beginning of the year (a)	Repayment of Principal (b)	Bank Loan o/s at the end of the year (c) = (a-b)	Payment of Interest @ 14% (d)	Total Outgo (e) = (b+d)	Surplus Available for repayment (f)	Surplus available after repayment (g) = (e-f)
1	481688	0	481688	67436	67436	310440	243004
2	481688	80281	401407	67436	147717	415440	267723
3	401407	80281	321126	56197	136478	415440	278962
4	321126	80281	240845	44958	125239	331440	206201
5	240845	80281	160564	33718	113999	415440	301441
6	160564	80281	80283	22479	102760	415440	312680
7	80283	80281	2	11240	91521	415440	323919

GERBERA

A. INTRODUCTION

Gerbera is a very attractive, commercial cut flower successfully grown under different conditions in several areas of the world as well as in India and meeting the requirements of various markets. This flower is originated in Asia and South Africa. *Gerbera jamesonii* has been developed through cross breeding program.

B. CLIMATE

Bright sunshine accelerates the growth and quality of the flowers, however, in summer this flower needs diffused sunlight. Gerbera plants grown in locations with insufficient light will not bloom well.

C. SOIL

Red lateritic soils are good for Gerbera cultivation as it is having all the essential qualities that an ideal soil should have. After fumigation with formaldehyde, the raised beds are prepared on which Gerbera plants are planted.

D. BED PREPARATION

Top width – 60 cm

Bottom width – 70

cm Height – 45 cm

Path way - 40 cm

E. PLANTING DISTANCE

Plant to Plant distance: 30 cm

Row to Row distance : 40 cm

F. PLANTING MATERIAL

Plant should not be less than three months old. At the time of planting the tissue culture, plant should have atleast 4 to 5 leaves. Gerberas are planted on raised bed in two rows formation. Zigzag plantation system is mostly preferred. While planting 65% portion of root ball should be kept below ground and rest of the portion i.e. 35% should be kept above the ground for better air circulation in the root zones.

G. VARIETIES

There are many multi coloured varieties of Gerbera developed through tissue culture.

H. MANURES AND FERTILIZERS

Organic manures are required to be added so that top 30 cm of the soil has 30% organic matter content. Application of nutrients should be based on analysis of soil and plant. In the present model the cost has been estimated based on 250 fertigation days and 1.2g dose of fertilizers per day per sq. meter.

I. CULTURAL PRACTICES

i). Weeding & raking of soil: Weeds take the nutrients of the plants and affect the production. Hence, they should be removed from the bed. Due to daily irrigation, the surface of the gerbera bed becomes hard hence raking of soil is done with the help of a raker. It increases soil aeration in the root zone of the plant. This operation should be done regularly, may be twice in a month.

ii). Disbudding: Removal of inferior quality flowers at the initial stage after plantation is called disbudding. The normal production of gerbera plants starts after 75-90 days from the date of plantation. Production of flowers starts 45 days after plantation but initial production is of inferior quality, hence these flowers should be removed from the base of the flowers stalk. this helps in making the plant strong and healthy.

iii). Removal of old leaves: Sanitation helps in keeping the disease and pest infestation below the economic threshold level. The old, dry, infested leaves should be removed from the plant and burnt outside the green house or dumped in to a compost pit. This practice allows producing good, healthy new leaves and better aeration in the crop.

J. IRRIGATION

Gerbera plant require a lot of water, at least 6mm/day i.e. 60cum/ha/day. A drainage line may be laid below the beds for disposal of excess water.

K. PEST and DISEASES

The principal diseases of rose are

- i. Pythium
- ii. Sclerotinia
- iii. White rust
- iv. Rhizoctonia
- v. Fusarium

Major insect pests of the rose are

- i. Red Spider Mite
- ii. Aphids
- iii. Thrips
- iv. White Fly

Control:

The preventive spray programme with a volume of 1500 litres/spray at an average interval of once in a week is suggested.

The chemicals could be as under.

- Dithane M-45 0.6 gm/litre
- Metasystox 1.25 ml/litre
- Karathane 1.00 ml/litre

M. HARVESTING

The first flowers may be harvested after 75-90 days after planting. Flowers of most of the varieties (single types) are ready to be picked when 2-3 whirls of stamens have entirely been developed. Some varieties are picked little riper, especially the double types. Skilled labours are required for harvesting of gerbera cut flowers. After harvesting the flowers should be kept in bucket containing clean water. Flowers are very delicate hence they should be carefully handled otherwise can be damaged and their quality gets deteriorated. For harvesting gerbera no secateurs are required and are done by naked hands.

N. YIELD

Average yield of roses is 30 to 35 stem/ plant per year.

O. GRADING

Flowers should be graded into different classes according to their qualities. Grading is done on a mechanical grader or by hand grading tables or work stations.

P. PACKAGING

Packing comprises three steps: bunching, wrapping and packing.

Many different cardboard boxes are used for packing. For long term transport it is best to use telescopic style boxes made of corrugated fibreboard. The size could be 100 cm x 45 cm x 22 cm. There may be 400 to 1000 stems per box and weight may vary from 14 to 18 kg/box.

Depending on the market, the box is either filled with one variety, one grade, or mixed colour one grade.

Q. ESTIMATED COST, MEANS OF FINANCE AND FINANCIAL ANALYSIS

The details of estimated cost, means of finance, economics and financial viability is worked out for Naturally Ventilated Polyhouse and Walk in Tunnel Polyhouse separately as follows.

Model Project for Gerbera under Naturally Ventilated Polyhouse
Unit size = 1000 sq.mt.

A Estimated Unit Cost and Means of Finance								
Sr No.	Items	Rate (Rs.)	Unit	Estimated Cost (Rs.)	Subsidy (%)	Subsidy Amount (Rs.)	Beneficiarie's Contribution 10%	Bank Loan (Rs.)
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)=10% of (e)	(i)=(e)-(g+h)
1	Polyhouse (including thermal screen)	935	per sq.m	935000	65	607750	93500	233750
2	Micro irrigation system (Drip)	125	per sq.m	125000	90	112500	12500	0
3	Planting Material (6 Plants/m ² i.e. total 6000 plants)	30	per plant	180000	50	90000	18000	72000
4	Land Preparation (as per table A)	20	per sq.m	20000	0	0	2000	18000
5	Recurring Expenses - excluding cost of planting material (for the 1st year)	As per Table B		206240	0	0	20624	185616
	Total			1466240		810250	146624	509366
B Economics (Year wise Income & Expenditure)								
Sr No.	Item/ Year →	1	2	3	4	5	6	7
1	Income from sale of produce (as per Table C)	735000	735000	735000	735000	735000	735000	735000
2	Recurring cost (Table B)	386240	206240	386240	290240	206240	386240	206240
3	Gross profit (1-2)	348760	528760	348760	444760	528760	348760	528760
	Loan Repayment							
4	Principal	0	84894	84894	84894	84894	84894	84894
5	Interest @ 14% p.a.	71311	71311	59426	47541	35656	23771	11885
6	Total Loan Repayments (4+5)	71311	156205	144320	132435	120550	108665	96779
7	Income after repayment of Principal & Interest (3-6)	277449	372555	204440	312325	408210	240095	431981
8	Less Depreciation @10% on depreciated value of fixed assets	106000	95400	85860	77274	69547	62592	56333
9	Net Profit (7-8)	171449	277155	118580	235051	338663	177503	375648
C NPW, BC Ratio, IRR and DSCR								
		As per Table D						
i	NPW @ 15 %	660909						
ii	BC ratio	1.31						
iii	IRR	59%						
iv	DSCR	2.2						
Assumptions								
(i)	Rates for the items viz. Polyhouse, Micro irrigation system (drip) and land preparation are taken as prescribed under National Horticulture Board (NHB) guidelines / Department of Horticulture, Haryana guidelines							
(ii)	Cost of Planting Material	Rs. 30/- per seedling (The life of Gerbera plant is 30 months. Hence cost of planting material is considered for 1st and 3rd year.						
(iii)	Recurring Cost	Assumptions are given in Table B						
(iv)	Production of Gerbera	150000/unit/ year						
(v)	Sale Price per stem (cut flower)	Rs. 5						
(vi)	Term Loan repayment Period	7 Years (including grace period of 1 year)						
(vii)	Interest on Term Loan	14% p.a.						
(viii)	Depreciation on fixed assets	@ 10% p.a. on reducing balance						
(ix)	Insurance premium for structure	@ 5% of depreciated value of structure (may vary from insurance company to company)						

Table - A Land Preparation Cost		
Sr. No	Particular	Amount
1	Pasteurized Compost & Neem cake @ Rs. 10/m ²	10000
2	Chemical Fertilizer and Micro Nutrients (@ Rs. 5/m ²)	5000
3	Fumigation /Bed preparation cost (@ Rs. 5/m ²)	5000
	Total	20000

Table - B Year wise Breakup of Recurring Cost		
		Amount In Rupees
Sr No.	Item/ Year →	From Year 1 to 7
2	Fertigation cost (Table B-I)	18540
3	Spraying cost (Table B-II)	15450
4	Packaging cost (Table B-III)	10000
5	Grading expenses (lumpsum)	10000
6	Trasportation cost (Table B-IV)	12500
7	Irrigation cost (flat @Rs.500/month for 08 month)	4000
8	Electricity cost (flat @Rs.500/month for 08 month)	4000
9	Labour cost (Table B-V)	78750
10	Insurance @ 5 % on depreciated value of polyhouse & Micro Irrigation System *	53000
	Total recurring cost **	206240

Table B- I Fertilizer cost		
Sr. No	Particular	Amount/Quantity
1	Fertilizres dose (Kg/day)	1.2
2	Avg. rate of fert. Rs/kg	60
3	Fertigation days	250
4	Fertigation cost	18000
5	Contingency @ 3% of Fertigation cost	540
	Total fertigation cost(Rs.)	18540

Table B- II Spraying cost		
Sr. No	Particular	Amount/Quantity
1	Spraying cost/day	200
2	Spraying days	75
3	Spraying cost	15000
4	Contingency @ 3% of spraying cost	450
	Total Spraying cost (Rs.)	15450

Table B- III Packaging cost		
Sr. No	Particular	Amount/Quantity
1	Rate/box	40
2	Total packaging cost/box	40
3	Total No. of cut folwers (Nos)	150000
4	Capacity/box in Nos	600
5	Total no. of boxes	250
6	Total packaging cost (Rs.)	10000

Table B- IV Trasportation cost		
Sr. No	Particular	Amount/Quantity
1	Transport charges per box	50.0
2	Total no. of boxes to be transported/year	250
	Total trasportaion cost (Rs.)	12500

Table B- V Labour cost		
Sr. No	Particular	Amount/Quantity
1	Total man-days	350
2	Avg salary/day/head	225
3	Total wages (Rs.)	78750

* Insurance premium may vary from insurance company to company
 During 4th year Rs 84000 has been estimated towards polyhouse film replacement cost, in addition to recurring cost mentioned above. (Required film area is 2.1 times of 1000 m² i.e. 2100m² x Rs.40/m² = Rs. 84000/-.)
 ** The life of Gerbera plant is 30 months. Hence cost of planting material (@ Rs.30/plant for 6000 plant i.e. 180000) is considered for 1st, 3rd and 6th year.

Production and Income		
Sr. No	Particular	Amount/Quantity
1	Plant Population @ 6 plant/m ²	6000
2	Total Production @ 25 cut flowers/plant	150000
3	Less : Loss of produce (2%)	3000
4	Produce available for sale (Nos)	147000
5	Income from sale of produce @ Rs. 5/cut flower	735000

NPW, Benefit Cost Ratio, Internal Rate of Return and DSCR								
Sr No.	Item/ Year →	1	2	3	4	5	6	7
1	Capital Cost	1060000	0	0	84000	0	0	0
2	Recurring Cost (including land preparation cost for 1st year)	406240	206240	386240	206240	206240	386240	206240
3	Total cost (1+2)	1466240	206240	386240	290240	206240	386240	206240
4	Total Income from Sale of produce	735000	735000	735000	735000	735000	735000	735000
5	Net benefit (4-3)	-731240	528760	348760	444760	528760	348760	528760
6	Discount factor @ 15%	0.870	0.756	0.658	0.572	0.497	0.432	0.376
7	Discounted cost (3 x 6)	1275629	155917	254146	166017	102501	166856	77546
8	Total discounted cost	2121066						
9	Discounted benefit (5 x 4)	639450	555660	483630	420420	365295	317520	276360
10	Total Discounted Benefit	2781975						
	NPW @ 15 %	660909						
	BC ratio	1.31						
	IRR	59%						
11	DSCR Calculation							
I	Net profit	171449	277155	118580	235051	338663	177503	375648
II	Total repayments towards Principal and Interest on Term Loan	71311	156205	144320	132435	120550	108665	96779
III	DSCR (I/II)	2.404243385	1.774303	0.8216463	1.77484049	2.809315637	1.63348824	3.8815032
	Average DSCR	2.2						

During 4th year Rs. 84000/- are estimated towards polyhouse film replacement cost, in addition to recurring cost mentioned in Table - B. (Required film area is 2.1 times of 1000 m² i.e. 2100m² x Rs.40/m² = Rs. 84000/-.)

Repayment Schedule -Model Project for Gerbera under Naturally Ventilated Polyhouse							
Repayment period = 7 years							
Annual repayment installment of Principal @ Rs. 84894							
Years	Bank Loan o/s at the beginning of the year (a)	Repayment of Principal (b)	Bank Loan o/s at the end of the year (c) = (a-b)	Payment of Interest @ 14% (d)	Total Outgo (e) = (b+d)	Surplus Available for repayment (f)	Surplus available after repayment (g) = (e-f)
1	509366	0	509366	71311	71311	348760	277449
2	509366	84894	424472	71311	156205	528760	372555
3	424472	84894	339578	59426	144320	348760	204440
4	339578	84894	254684	47541	132435	444760	312325
5	254684	84894	169790	35656	120550	528760	408210
6	169790	84894	84896	23771	108665	528760	420095
7	84896	84894	2	11885	96779	348760	251981