Pre-Feasibility Study

OFF-SEASON VEGETABLES FARMING
(Walk in Tunnel)

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October, 2007

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Document No.	PREF-67
Revision	2
Prepared by	SMEDA-Punjab
Approved by	Provisional Chief- Punjab
Revision Date	October, 2007
Issued by	Library Officer

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1 INTRODUCTION

1.1 General

Vegetables are rich source of vitamins, carbohydrates, salts and proteins. With increased health awareness in the general public and changing dietary patterns, vegetables are now becoming an integral part of average household's daily meals. In addition, high population growth rate has also given rise to high demand in basic dietary vegetables. Increased health awareness, high population growth rate, changing dietary patterns of increasingly affluent middle class and availability of packaged vegetables, has therefore generated a year round high demand for vegetables in the country in general and in major city centers in particular. However, our farmers have yet not been able to encash this opportunity and still follow traditional sowing and picking patterns. This results in highly volatile vegetable supply market wherein the market is flooded with seasonal vegetables irrespective of demand presence on one hand and very high priced vegetables in off-season on the other. Lack of developed vegetable processing and storage facility robs our farmers from their due share of profit margins. In natural season local vegetables flood the markets substantially bringing down the prices.

In the absence of storage infrastructure and vegetable processing industry in the country, off-season vegetables farming is the only viable option that can add value to the farmer produce. The term plasticulture is used to describe the broad and general use of plastics in agriculture. Plasticulture can extend the growing season and improve crop health and growth.

1.2 Project Brief

The proposed project is designed as a medium size off-season vegetable farming unit, spreading over a land area of 9 acres. Off-season vegetables, such as, tomatoes, cucumber, brinjal, hot pepper, sweet peppers and watermelon can be cultivated viably using walk in tunnel technology. However for our convenience we have restricted our study for three crops only Tomato, Capsicum and Cucumber.

The land can be utilized for green farming[1] during the idle period to maintain the fertility of soil. Apart from green farming, the land can also be utilized for growing seasonal vegetables like potato, carrot, onion, garlic and cabbage etc., in the idle period, but this may effect the fertility of the land, resulting in reduction of yield of off-season vegetables. Therefore it is recommended that only off-season vegetables should be grown on the proposed land, with a well chalked out sowing pattern.

The estimated yield potential of the farm varies according to the selected type of vegetable. For this project a mix of three proposed vegetables is listed below. For this vegetable mix it is estimated that a 9-acre farm unit will yield a total of 307,500 Kg per annum.

[1] *Green farming is done to maintain the fertility of the land with the help of any legume crop. When the crop is matured it is then incorporated in soil with the help of a Rotavator.*

Table 1-1: Total Production Capacity on the basis of walk in tunnel technology

Vegetables	Area (Acres)	Production Quantity in (Kgs)/ Acre	Total Production Quantity
Tomatoes	3	37,500	112,500
Cucumber	3	50,000	150,000
Capsicum	3	15,000	45,000

1.3 Opportunity Rationale

There is a huge demand for fresh vegetables in the local as well as international markets, which includes Europe, Middle East, and Far Eastern markets but due to their perishable nature it is difficult to export this commodity. The facility of growing off-season vegetables also allows for growing non-conventional varieties and vegetables, which are in high demand in the international market.

The importance of vegetables cannot be denied due to their nutritional value as these provide proteins, carbohydrates & salts that are essential ingredients for the growth of human body. Vegetables are used in raw form as salad or cooked food according to the taste, which provide a balanced diet and keep human being healthy. A large number of world population now prefer vegetables in their daily diet due to the awareness that vegetables provide better source of energy and nourishment to the body.

The essential nutritional ingredients of some of the vegetables are shown in Table 1-2, below: -

Table 1-2 :Nutritional ingredients in a weight of 100 Gram

Vegetable Name	Calories	Proteins Gram	Fats Gram	Carbohydrates Gram	Ascorbic acid
Potato	71.6	1.7	0.1	16.0	14.1
Turnip	30.0	0.9	0.2	6.2	24.7
Carrot	39.6	1.1	0.3	8.2	5.3
Cauli Flower	13.9	1.1	0.1	2.2	31.1
Cabbage	19.8	1.0	0.2	3.9	38.1
Peas	45.4	3.0	0.2	8.0	11.9
Tomato	20.0	0.9	0.3	3.5	20.5
Onion	45.8	0.9	0.2	9.7	8.4
Spinach	23.8	1.0	0.0	60.4	5.1
Brinjal	20.3	1.9	0.2	2.6	48.2
Lettuce	12.6	0.8	0.1	2.0	12.6

Mostly the vegetables grown in the world are local to their land and countries however other varieties and types have also been introduced from across different

continents/countries, which are now grown and consumed in the local diet. Almost all types and varieties of known vegetables are grown in Pakistan.

Vegetables can be cultivated in off-season, with the induction of an artificial technique like tunnel technology, in which temperature and moisture is controlled for specific growth of vegetables. The production of vegetables all around the year enables the growers to fully utilize their resources and supplement income from vegetable growing as compared to other normal agricultural crops.

As the landholding powers of farmers are decreasing, they need to increase the productivity of their available land, off-season vegetable farming is a measure through which they can attain higher profit margins from the crop.

1.4 Advantages

Benefits from year-round production include year-round income, retention of old customers, gain in new customers, and higher prices at times of the year when other local growers (who have only unprotected field crops) do not have produce. Other potential benefits of season extension technologies are higher yields and better quality. In summers for off season vegetables cultivation high quality indeterminate seed is easily available in markets. This indeterminate seed grows upwards with provided support similar to pumpkin, instead of spreading on ground Therefore Tunnel farming has increased the production of plants in even smaller areas, which is turned out to be profitable.

Small farmers with small cultivating area can get benefits from plastic tunnel farming and can increase their income.

In plastic tunnel farming, problems due to less supply of water are alleviating by using drip system irrigation.

In addition, with year-round production you can provide extended or year-round employment for skilled employees whom you might otherwise lose to other jobs at the end of the outdoor growing season. Disadvantages include no break in the yearly work schedule, increased management demands, higher production costs, and plastic disposal problems.

1.5 Viable Economic Farm Size

The proposed project is based on a land holding of 9 acres; however the distance of the farm from the market will determine the feasible size of the project. Near large markets like Lahore, projects with smaller land holdings can be a viable option, but large land holdings are recommended for projects that are planned away from large markets.

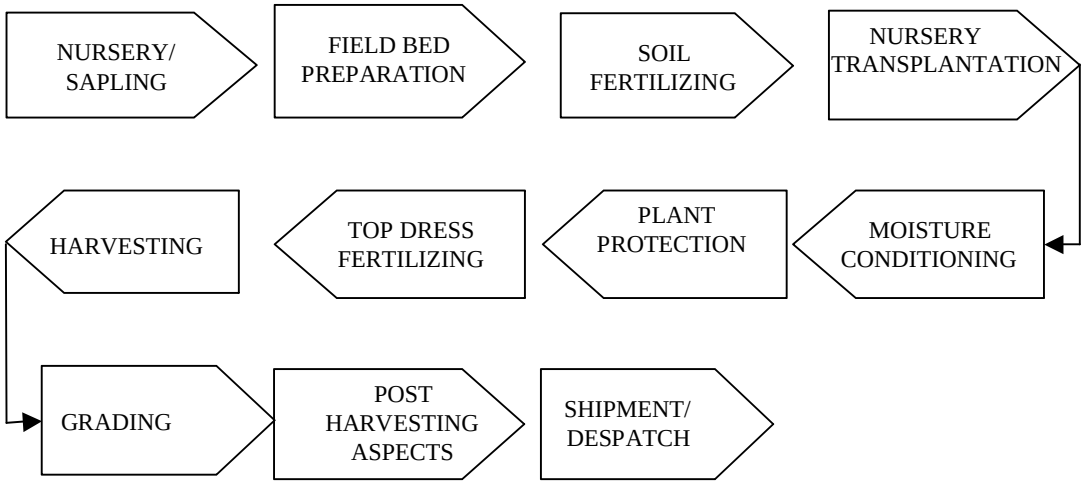
1.6 Project Cost

The proposed project of Off-Season vegetables farming needs capital investment of about Rs. 1.985 million. This includes machinery and equipment. The land utilized for cultivation is recommended to be leased. In addition to this, a sum of Rs. 0.254

million is also required as working capital. The total project cost amounts to Rs. 2.239 million.

1.7 Process Flow Chart

Figure 1-1: Production flow of off- season vegetables



1.8 Production Flow of off-season vegetables

The production flow varies slightly for different vegetables. The following production flow is based on the production of tomatoes:

i. Sowing of seeds in a separate plot of land for nursery.
ii. Preparation of seed beds in the field for cultivation of vegetables.
iii. Using fertilizer in the soil to maintain its fertility.
iv. Transplantation of nursery in the soil or sowing of seeds directly in the soil.
v. Maintaining level of moisture in the soil.
vi. Protection from the pests, diseases and other wild growths by using pesticides/sprays of chemicals, and trimming.
vii. Using fertilizer of different varieties for the smooth growth of plantation.
viii. Picking/harvesting at various times as per nature/requirement of the plantation.
ix. Grading of crop on the basis of quality and other standards.
x. Application of post harvesting technology for picking/plucking, packing and storing the vegetables in order to fetch the maximum price.
xi. Transportation to the sale points in local or export markets.

2 CURRENT INDUSTRY STRUCTURE

The main commodities in food and beverages which showed an increase in their prices during August 2007 over July, 2007 are as under:-

Table 2-1 Percentage Increase in Prices during 2007[2]

Commodities	Percentage Increase	Commodities	Percentage Increase
Tomatoes	43.74%	Milk products	2.39%
Chicken farm	29.08%	Spices	2.00%
Onions	17.94%	Potatoes	1.92%
Pulse masoor	7.81%	Vegetable ghee	1.83%
Vegetables	6.53%	Sugar	1.76%
Mustard oil	3.86%	Cereals	1.42%
Cooking oil	3.65%	Pulse gram	1.39%
Milk powder	3.61%	Bakery & confectionery	1.36%
Maid	2.53%	Rice	1.07%
Betel leaves & nuts	2.49%	Milk fresh	1.00%

2.1 Off season vegetable growers

At present, the tunnel technology is being used at the following places/farms.

i. Mian Shadi Agri Farm, Mamonkangan, district Faisalabad
ii. Haji Sons, Chiniot, Jhang
iii. Ayub Agricultural Research Center, Faisalabad
iv. National Agriculture Research Center (NARC) Chak Shahzad, Islamabad
v. Mardan
vi. University of the Punjab, Lahore
vii. Sindhu Farm, Kamalia, district T.T Singh
viii. Sitara Farm, at Sitara Chemicals, Shah Kot, district Faisalabad

2.2 Vegetables Which Can Be Sown

Growing under plastic is more competitive in today's vegetable market, it gives superior yields and early spring production. Following crops are high value vegetables and has shown significant increase in earliness.

- Melons
- Tomato
- Pepper
- Cucumber
- Bitter Gourds

[2] Government of Pakistan Statistics division, Federal bureau of statistics.

- Squashes
- Eggplant
- Water melon
- Brinjal

2.3 Present Production of Vegetables

According to Pakistan Statistical yearbook 2005-06, the production of various vegetables is shown in Table 2-2 below: -

Table 2-2 Production of various vegetables during the year 2005-06

Item	Punjab "000" Tons	Sind "000" Tons	NWFP "000" Tons	Balochistan "000" Tons	Pakistan "000" Tons
Tomato	64,588	48,326	161,599	193,633	468,146
Onion	306,450	833,508	216,624	699,209	2,055,791
Garlic	2,293	10,415	21,579	2,365	57,292
Chili	9,342	108,772	979	3,797	122,890
Turmeric	31,780	86	3,701	--	35,567
Potato	1,389,591	2,576	134,237	41,478	1,567,882

2.4 Clusters of off-season vegetable production

As per the information gathered from Agriculture Department, Government of Punjab, and National Agricultural Research Center, Islamabad, following are the areas which could be identified as major existing clusters of off-season vegetable production:

Mamonkangan, Shah Kot, Faisalabad, Ayub Agricultural Research Institute, Faisalabad and Kamalia in Toba Tek Singh and, NARC Chack Shahzad, Islamabad, Swat, Tarnab, Mardan, Khairabad, Mirpur Khas and Chiniot in district Jhang.

3 TECHNICAL ANALYSIS

3.1 Plantation & Growth Essentials

There are 15 essential requirements for healthy growth of a plant. The requirement and their respective sources are provided in the following table:

Figure 3-1: Plantation growth essentials

SOURCE	REQUIREMENT
Air & Water	Carbon, Hydrogen, Oxygen, Nitrogen, Phosphorus and Potash
Land	Calcium, Magnesium, Sulpher Iron, Copper, Zinc, Boran, Molybidenium, Maganese and Chlorine

3.2 Fertilizers on Production

Using fertilizers containing Nitrogen, Phosphorus and Potash the yield of the crop can be maximized.

Appropriate quality and quantity of fertilizer plays a great role in the production and quality of vegetables.

3.3 Sowing & Picking period of off-season vegetables

Following are sowing and picking periods of selected off-season vegetables in their respective normal growing seasons:

Table 3-1: Sowing and Picking period for the selected off-season vegetables

Vegetables	Sowing Period	Picking Period
Tomato	▪ October (Nursery) ▪ November (transplantation)	▪ February-May
Brinjal	▪ October (Nursery) ▪ November (transplantation)	▪ February-May
Squashes	▪ End of October to 1st week of November (direct seeding)	▪ End of December to April
Cucumber	▪ End of October to end of December (direct seeding)	▪ Mid January to May
Sweet pepper/ Hot pepper	▪ Mid of September to 1st week of October ▪ End of October to 1st week of November (Transplantation)	▪ End of January to September

3.4 Off-season cultivation methods

There are number of ways and methods to cultivate vegetables in off-seasons. Some of the methods are explained as under: -

3.4.1 Natural method by selection of appropriate area

The off-season vegetables are grown in the areas where the climatic conditions are moderate for both normal as well as for off-seasons. Winter vegetables are grown in summer on hilly/semi hilly areas where climatic conditions are favorable for a particular vegetable. Like wise summer vegetables are grown in winter season in the valleys and across the sea areas.

The production cost of vegetables under above conditions is very high due to transportation of crop to the markets. Moreover, the transportation of crop over long distance markets causes post-harvest losses. These drawbacks lead to the adoption of artificial methods of cultivation in off-season, nearer to markets to tackle heavy transportation cost and to reduce post-harvest losses.

3.4.2 Artificial Methods

Vegetables can be grown in off-season through artificial methods, the details of these methods are given below:

- **Growing Beneath the Sarkanda**[3]

This is an old method and is usually adopted near the big cities. The main vegetables grown under this method are tomato, chili, cucumber, and bottle gourd. The nursery of these vegetables is planted in October/November and a wall of Sarkanda is affixed in the direction of North South, which protect plant from cold winds and mist. This method of cultivation is not beneficial because the growth of the plant tends to be slow, as the plant does not receive required sunshine and desired humidity.

- **Building of Green Houses**

Through building green houses, the sunshine intensity is controlled. The vegetables under this method are grown mostly in the winter season. Here the temperature, humidity, carbon dioxide, ventilation of air and irrigation etc. is controlled. Green houses can be built of plain glass or of fiberglass material. The main drawback in the usage of this method is heavy capital cost.

- **Plastic Tunnel**

Cultivation by this method is gaining popularity because of low cost and easy usage. Plastic tunnels are transparent which provides required sunshine to the plants, and the plastic also plays a barrier against the cool air in winter.

[3] *Sarkanda (Saccharum spontaneum) is a tall, straight, grass, growing in clamps, having height upto 6 meters.*

3.5 Structures

Various types of structures are available to lengthen the growing season for the crop and improve overall crop health and quality. The following are just a few of the structures available, such as high tunnels, low tunnels, walk-in tunnels, and greenhouses. Structures that are used for winter production must be able to withstand heavy rainfall, snow, and wind. Structures that are used for summer production must have good ventilation. Many structures may not be suitable for year-round production.

In the construction of tunnel the major materials involved are mild steel bars and plastic sheets. Plastic sheets are used for roof covering of the tunnel shaped construction, which is built with steel bars. Bamboo lengths can also be used in some proportion with the mild steel bars. Plastic sheet is to be spread in such a manner that it enables the stoppage of cold air from outside.

The tunnel construction offers maximum crop yield, better maintenance of the fertility of land, controlled temperature and humidity, protection from wild animals and insects and better water conservation.

There are three types of tunnels, known as high, low and walk-in tunnels.

1. Low Tunnel

It is cheaper than high tunnel but creates difficulty for soil preparation, spraying and picking.

The tunnels are suitable for cucumber sown flat bed, melons, watermelons, bitter gourds, squashes, and snake gourds etc. The crop yield in this type of tunnel is however low compared to high tunnels.

Figure 3-2: Low Plastic Tunnels[4]

[4] *Curtsey: Mian Shadi Agriculture Farms Mamoonkangan, Faisalabad*

2. Walk-in Tunnels

Walk-in tunnels are lower than the high tunnels but they are gaining popularity as they provide high yield compared to low tunnels. The tunnel is suitable for growing tomatoes, cucumbers, sweet pepper and hot pepper.

Figure 3-3: Walk-in Tunnel[5]

3. High Tunnel

High tunnel facilitates easy access for soil preparation, picking and spraying due to its width and height. The crop yield is maximum in this type of tunnel. The tunnel is suitable for growing tomatoes, cucumbers and sweet peppers.

Figure 3-4: Picture of High Tunnel[6]

[5] *Curtsey: Mian Shadi Agriculture Farms Mamoonkangan, Faisalabad*
[6] *Curtsey: Mian Shadi Agriculture Farms Mamoonkangan, Faisalabad*

3.6 Recommended Tunnel

In this pre-feasibility study, cultivation is recommended with the use of walk in tunnels on the basis of its low and high production capacity. All the calculations are done on the basis of walk in tunnel technology.

The specification of high tunnel are given in the following table:

Table 3-2: : Dimensions of Walk-in Tunnel

Material Specification	Pipe material	Mild steel, zinc galvanized
	Thickness	Diameter 20 mm Thickness 1.6 mm Length 18 ft
	Iron Rod	Mild steel, round in shape Diameter 12 mm Length 2 ft
	Plastic	0.06 mm thick and 20 ft wide
Tunnel Specification	Height	Center 6 ft, Sides 2.5 ft
	Width	12 ft
	Length	190 ft
	No. of tunnels	13 per acre

The cost of such tunnel amount to Rs. 151,000 excluding the cost related to plastic used as a shield (Cover) and mulch.

3.6.1 Support Structure

Each tunnel will be 190 feet long, 6 feet high and 12 feet wide. The tunnel is built by pipe material of 20-mm diameter 18 feet length, and round shaped mild steel iron rods of 12-mm diameter and 2 feet length. Each tunnel structure will then be covered by 0.06-mm thick and 20 feet wide plastic sheet. Approximately 13 tunnels can be constructed on an acre of land.

Figure 3-5: Support structure in High tunnels

3.7 Seed and its Importance

For tunnel cultivation, F1 hybrid seed bred for tunnel use is used, because they have the ability to resist multiple diseases. These hybrid seeds cost more than the ordinary seeds. The productivity and quality of the crop is ensured from quality of these seeds. Hybrid seeds have above 90% germination capacity as compared to that of ordinary one. The ordinary seed is produced from the crop itself whereas hybrid seed is produced through a special process. For every crop, new hybrid seed needs to be purchased / sown.

The crop yield achieved from hybrid seeds is 3 to 4 times more than to the ordinary seeds and is also less prone to diseases.

3.8 Practical Tips for off-season vegetable farming

- Any person who is planning to adopt this technology should have some practical knowledge about farming.
- Land that is being utilized for off-season vegetable farming should be tested which will help in determining the quality of land for agriculture purposes.
- Farmer should ensure that the plant they are planning to grow must have the ability to self-pollinate under the plastic sheet.
- Selection of the seed is most important factor because this determines the productivity of the crop.
- Vegetables, which are in demand, should be cultivated, this will help in earning higher profit margins.
- Timing of cultivation of vegetables has to be done accurately. The farmer should have knowledge about the benefit that the early crop will offer and should gather data about the prices of these early crops.

4 LAND UTILIZATION

Table 4-1: Total Land utilization per Vegetable

Vegetables	(Acres)
Tomato (Determinate)	3
Capsicum	3
Cucumber (Parth.)	3

4.1 A Soil Preparation and Sowing

- Laser leveling or with any precise method soil should be properly leveled
- Deep ploughing and harrowing.
- Apply well decomposed FYM 10 ton per acre or green manuring is recommended at least 60 days before sowing.
- Apply basal dose chemical fertilizer one month before sowing followed by irrigation.
- Prepare soil, complete beds & mulching one week before sowing.
- Make holes 2 days before seeding.
- Irrigation field after seeding in such a way that moisture should reach the seed place.
- Next day light irrigation should be repeated to assure the proper moistures at seed place.

4.2 Mode of Land Acquisition

Agricultural land can be taken on lease or purchased for the implementation of the proposed project.

4.3 Material Availability

- Tunnel material i.e. mild steel bar, Plastic Sheet, Iron Wire, Bamboo, is available locally from different suppliers.
- Mian Shadi Agricultural Material Company, Syngenta Pakistan Ltd and haji sons are the major suppliers of hybrid seeds.
- Fertilizers of all kinds are available locally.
- Pesticides of different natures are also available locally.
- Water is available from canal or can be used from peter engine.

4.4 Expected Production and Sale price

Expected production and sale price of some vegetable is given in Table below: -

Table 4-2: Expected Production and Land Utilization

Vegetable	Land Utilization (Acres)	Production Quantity (Kgs)/ Acre	Production Quantity (Kgs)	Sale Price Rs[7]./ (Kg)
Tomatoes	3	37,500	112,500	30
Cucumber	3	50,000	150,000	16
Capsicum	3	15,000	45,000	25

The prices of vegetables in normal season are around one-third of the prices of vegetables grown in off-seasons.

5 PLANT & MACHINERY

Following plant and machinery is required for an off-season vegetable farm of 9 Acres:

Table 5-1: Tools, Equipment and Vehicles

Description	Number	Cost per Unit (in Rs)	Total Cost (in Rs)
Rotavator	1	30,000	30,000
Ridger	1	12,000	12,000
Soil Leveler/ Scraper	1	12,000	12,000
Spray Machines & Farm Tools	1	50,000	50,000
Peter Engine	1	20,000	20,000
Total cost of tools & equipment cost			**124,000**
Tractor & Cultivator	1	350,000	350,000
Total cost of vehicle			**350,000**
Total cost of tools, equipment & vehicle			**474,000**

6 HUMAN RESOURCE REQUIREMENT

6.1 Number of Staff Required

Table 6-1: Number of Staff & Officers required

Description	Number	Monthly Salary per person (Rs.)	Annual Salary (Rs)
Farm Manager	1	6,000	72,000
Labor	8	4,600	441,600
Guard	1	5500	66,000

[7] *Prices are set by targeting the proposed Off-season's expensive vegetables*

Apart from the above mentioned staff requirement part time workers for four month will be required during the picking season. Following table shows the part time staff requirement:

Table 6-2: Part-time staff requirement

Description	Number	Salary (Month) (Rs)	Annual Salary (Rs)
Labor	144	4,600	662,400

7 INFRASTRUCTURE REQUIREMENT

7.1 Total Land and Building Covered Area

Table 7-1: Land & Building Covered Area

Description	Area
Agriculture Land (Acre)	9

Table 7-2: Construction Cost for low tunnel per Acre [8]

Table 7-3

Description	No. of Units	Price per Unit	Total Cost in Rs.
Pipe Length 18 ft required	350	315	110,250
Wire 14 Guage	240	70	16,800
Nettings	100	225	22,500
Paint, Labour (Acre)	1	2,000	2,000
No. of Tuunels per Acre	*16*		
Total Cost in Rs. per Acre			**151,550**
Plastic Cost Kg/ Acre)	180	140	25,200
Plastic Mulch	40	150	6,000
Total Plastic Cost Kg/ Acre)[9]	-		**31,200**

7.2 Suitable Location for the proposed project

On the basis of weather conditions and population base, "off-season" vegetable

[8] *Mian Shadi Agricultural Material Company importers of all kind of vegetable hybrid seeds,drip and sprinkler irrigation materials,foliar and water soluble fertilisers,consultant in green house fabrication,drip and sprinkler irrigation assisting farmers community in all kind of helps required phones 0092 4610 431431, 431400, 431500 Fax 431600*
e-mail shadi@brain.net.pk

[9] *25% Salvage value after a year*

farming project can be located near the big cities on fertile land.

Big cities have adequate consumption of various vegetables. As such, the project can be located near Lahore, Faisalabad, Sahiwal, Mardan, and Quetta.

7.3 Utilities Required

- Electricity
- Diesel (for tube well operations)
- Water
- Telephone/Fax

8 PROJECT ECONOMICS

Table 8-1: Project Cost

DESCRIPTION	Cost (in Rs)
Building and Civil Works	1,363,950
Plant and Machinery	124,000
Furniture/ Fixture & Equipment	50,000
Pre-operational Expenses	97,300
Vehicles	350,000
Total Fixed Cost	**1,985,250**
Working Capital	254,514
Total	**2,239,764**

Table 8-2: Financing Plan

Financing		Rs.
Equity	50%	1,119,882
Debt	50%	1,119,882

Table 8-3: Project's Return

Project Internal Rate of Return (IRR)	64.91%
Net Present Value (NPV) (in Rs)	4,162,128
Payback Period (Years)	1.854

9 KEY SUCCESS FACTORS

The commercial viability of the project depends upon the regular and consistent supply of good quality hybrid seeds and fertilizers.

The other important aspect is the need for strong linkages with the local market and progressive vegetable exporter.

9.1 Guidelines for successful cultivation

Following principles need to be pursued for the best productivity of vegetables:

1. Use of high quality hybrid seeds.
2. Having and maintaining fertility of land within the tunnel during the period of cultivation.
3. Selection of profitable vegetables on the basis of best analysis of cost and revenues for a given season. Cost efficiency through better management.
4. Timely control of pests, diseases and exercise of preventive measures.
5. Maintenance & control of internal temperature & humidity in the tunnel.
6. Timely irrigation and fertilization.
7. Timely training and grading of plantation.
8. Expansion in customer's market.
9. Fertilization should be done at the soil bed preparation stage. The second fertilization, after 3 weeks interval the third after 6 weeks and finally during the harvesting period.
10. Post harvest includes protection from direct sunlight and speedy transport to the market.
11. Proper soil analysis for determining soil nutritional level.

10 THREATS FOR THE BUSINESS

- Crop failure in any year.
- Effect of change in the government regulations.
- Absence of crop insurance.

11 OPPORTUNITIES FOR THE BUSINESS

- Hybrid seeds that provide higher yield can lead to lower unit cost.
- Off-season cultivation of high value vegetables will fetch better price and provide continuous supply to the processing industries.
- Higher prices can be obtained by producing the right crops, at the right times and of better quality. They may also depend on negotiating skills and targeting high price buyers.

12 FINANCIAL ANALYSIS

12.1 Projected Income Statement

	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	Year-9	Year-10
Sales	**5,865,000**	**6,158,250**	**6,466,163**	**6,789,471**	**7,128,944**	**7,485,391**	**7,859,661**	**8,252,644**	**8,665,276**	**9,098,540**
COST OF GOODS SOLD										
Raw Material	788,112	803,250	843,413	885,583	929,862	976,355	1,025,173	1,076,432	1,130,253	1,186,766
Payroll (Production Staff)	1,176,000	1,060,920	1,113,966	1,169,664	1,228,148	1,289,555	1,354,033	1,421,734	1,492,821	1,567,462
Machine Maintenance	150,000	157,500	165,375	173,644	182,326	191,442	201,014	211,065	221,618	232,699
Direct Water	18,000	19,800	21,780	23,958	26,354	28,989	31,888	35,077	38,585	42,443
Plastic Cost	280,800	224,640	253,422	261,706	275,888	289,408	303,947	319,127	335,088	351,841
Total	**2,412,912**	**2,266,110**	**2,397,956**	**2,514,555**	**2,642,577**	**2,775,750**	**2,916,055**	**3,063,435**	**3,218,365**	**3,381,211**
Gross Profit	**3,452,088**	**3,892,140**	**4,068,207**	**4,274,916**	**4,486,367**	**4,709,642**	**4,943,606**	**5,189,209**	**5,446,911**	**5,717,329**
OPERATING EXPENSE										
Payroll (Admin)	66,000	69,300	72,765	76,403	80,223	84,235	88,446	92,869	97,512	102,388
Fixed electricity	42,000	46,200	50,820	55,902	61,492	67,641	74,406	81,846	90,031	99,034
Administrative Overheads	58,650	61,583	64,662	67,895	71,289	74,854	78,597	82,526	86,653	90,985
Amortization (Pre-operational Expenses)	9,730	9,730	9,730	9,730	9,730	9,730	9,730	9,730	9,730	9,730
Transport Cost	768,750	807,188	847,547	889,924	934,420	981,141	1,030,199	1,081,708	1,135,794	1,192,584
Packing Cost	461,250	484,313	508,528	533,955	560,652	588,685	618,119	649,025	681,476	715,550
Depreciation	120,598	120,598	120,598	120,598	120,598	120,598	120,598	120,598	120,598	120,598
Total	**1,526,978**	**1,598,910**	**1,674,649**	**1,754,406**	**1,838,405**	**1,926,884**	**2,020,094**	**2,118,302**	**2,221,793**	**2,330,868**
Operating Profit	**1,925,111**	**2,293,230**	**2,393,558**	**2,520,510**	**2,647,962**	**2,782,758**	**2,923,512**	**3,070,907**	**3,225,118**	**3,386,460**
NON-OPERATING EXPENSE										
Financial Charges on Long-term Loan	121,152	102,823	81,929	58,110	30,956	0	0	0	0	0
Financial Charges on Running Finance	35,632	0	0	0	0	0	0	0	0	0
Land Lease	135,000	135,000	135,000	135,000	135,000	135,000	135,000	135,000	135,000	135,000
Total	**291,783**	**237,823**	**216,929**	**193,110**	**165,956**	**135,000**	**135,000**	**135,000**	**135,000**	**135,000**
PROFIT BEFORE TAX	**1,633,327**	**2,055,407**	**2,176,629**	**2,327,400**	**2,482,006**	**2,647,758**	**2,788,512**	**2,935,907**	**3,090,118**	**3,251,460**
Tax	446,664	594,392	636,820	689,590	743,702	801,715	850,979	902,567	956,541	1,013,011
PROFIT AFTER TAX	**1,186,663**	**1,461,014**	**1,539,809**	**1,637,810**	**1,738,304**	**1,846,043**	**1,937,533**	**2,033,339**	**2,133,577**	**2,238,449**
Retained Earnings beginning of year	0	1,186,663	2,647,677	4,187,486	5,825,296	7,563,599	9,409,642	11,347,175	13,380,514	15,514,091
Retained Earnings end of year	1,186,663	2,647,677	4,187,486	5,825,296	7,563,599	9,409,642	11,347,175	13,380,514	15,514,091	17,752,540
ROE	106%	130%	137%	146%	155%	165%	173%	182%	191%	200%

12.2 Projected Cash Flow Statement

	Const Year	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	Year-9	Year-10
Operating activities											
Net profit		1,186,663	1,461,014	1,539,809	1,637,810	1,738,304	1,846,043	1,937,533	2,033,339	2,133,577	2,238,449
Amortization (Pre-operational Expenses)		9,730	9,730	9,730	9,730	9,730	9,730	9,730	9,730	9,730	9,730
Depreciation		120,598	120,598	120,598	120,598	120,598	120,598	120,598	120,598	120,598	120,598
Equipment Spare Parts Inventory	(12,500)	(625)	(656)	(689)	(724)	(760)	(798)	(838)	(879)	(923)	19,392
Accounts payable		81,256	(4,080)	3,859	4,052	4,254	4,467	4,690	4,925	5,171	4,593
Cash provided by operations	(12,500)	1,397,621	1,586,605	1,673,306	1,771,466	1,872,126	1,980,040	2,071,713	2,167,712	2,268,152	2,392,761
Financing activities											
Long term debt principal repayment		(130,916)	(149,244)	(170,138)	(193,958)	(221,112)	0	0	0	0	0
Lease Payment	(135,000)	(135,000)	(135,000)	(135,000)	(135,000)	(135,000)	(135,000)	(135,000)	(135,000)	(135,000)	0
Lease Expense		135,000	135,000	135,000	135,000	135,000	135,000	135,000	135,000	135,000	135,000
Addition to long term debt	865,368										
Running Finance Repayment		(254,514)	0	0	0	0	0	0	0	0	0
Issuance of share	1,119,882										
Cash provided by/ (used for) financing a	1,850,250	(385,430)	(149,244)	(170,138)	(193,958)	(221,112)	0	0	0	0	135,000
Total	**1,837,750**	**1,012,192**	**1,437,361**	**1,503,168**	**1,577,508**	**1,651,014**	**1,980,040**	**2,071,713**	**2,167,712**	**2,268,152**	**2,527,761**
Investing activities											
Capital expenditure	(1,985,250)	0	0	0	0	0	0	0	0	0	0
Cash (used for)/ provided by investing a	(1,985,250)	0	0	0	0	0	0	0	0	0	0
Net Cash	(147,500)	1,012,192	1,437,361	1,503,168	1,577,508	1,651,014	1,980,040	2,071,713	2,167,712	2,268,152	2,527,761
Cash balance brought forward	0	107,014	1,119,205	2,556,567	4,059,734	5,637,242	7,288,256	9,268,296	11,340,009	13,507,721	15,775,873
Cash Balance	(147,500)	1,119,205	2,556,567	4,059,734	5,637,242	7,288,256	9,268,296	11,340,009	13,507,721	15,775,873	18,303,635
Running Finance	254,514	0	0	0	0	0	0	0	0	0	0
Cash carried forward	107,014	1,119,205	2,556,567	4,059,734	5,637,242	7,288,256	9,268,296	11,340,009	13,507,721	15,775,873	18,303,635

12.3 Projected Balance Sheet

	Const Year	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	Year-9	Year-10
Current Assets											
Cash	107,014	1,119,205	2,556,567	4,059,734	5,637,242	7,288,256	9,268,296	11,340,009	13,507,721	15,775,873	18,303,635
Equipment Spare Parts Inventory	12,500	13,125	13,781	14,470	15,194	15,954	16,751	17,589	18,468	19,392	0
Pre-paid land lease	135,000	135,000	135,000	135,000	135,000	135,000	135,000	135,000	135,000	135,000	0
Total	**254,514**	**1,267,330**	**2,705,348**	**4,209,204**	**5,787,436**	**7,439,210**	**9,420,047**	**11,492,598**	**13,661,190**	**15,930,265**	**18,303,635**
Fixed Assets	1,887,950	1,887,950	1,887,950	1,887,950	1,887,950	1,887,950	1,887,950	1,887,950	1,887,950	1,887,950	1,887,950
Less: Accumulated depreciation	0	120,598	241,195	361,793	482,390	602,988	723,585	844,183	964,780	1,085,378	1,205,975
Net Fixed Assets	**1,887,950**	**1,767,353**	**1,646,755**	**1,526,158**	**1,405,560**	**1,284,963**	**1,164,365**	**1,043,768**	**923,170**	**802,573**	**681,975**
Intangible Assets											
Pre-operational Expenses	97,300	87,570	77,840	68,110	58,380	48,650	38,920	29,190	19,460	9,730	0
Total	**97,300**	**87,570**	**77,840**	**68,110**	**58,380**	**48,650**	**38,920**	**29,190**	**19,460**	**9,730**	**0**
Total Assets	**2,239,764**	**3,122,253**	**4,429,943**	**5,803,472**	**7,251,376**	**8,772,822**	**10,623,332**	**12,565,555**	**14,603,820**	**16,742,567**	**18,985,610**
Current Liabilities											
Running Finance	254,514	0	0	0	0	0	0	0	0	0	0
Accounts payable		81,256	77,176	81,035	85,087	89,341	93,808	98,498	103,423	108,594	113,187
Total	**254,514**	**81,256**	**77,176**	**81,035**	**85,087**	**89,341**	**93,808**	**98,498**	**103,423**	**108,594**	**113,187**
Long-term liabilities											
Long-term Loan	865,368	734,452	585,208	415,070	221,112	0	0	0	0	0	0
Total	**865,368**	**734,452**	**585,208**	**415,070**	**221,112**	**0**	**0**	**0**	**0**	**0**	**0**
Equity											
Paid-up Capital	1,119,882	1,119,882	1,119,882	1,119,882	1,119,882	1,119,882	1,119,882	1,119,882	1,119,882	1,119,882	1,119,882
Retained Earnings	0	1,186,663	2,647,677	4,187,486	5,825,296	7,563,599	9,409,642	11,347,175	13,380,514	15,514,091	17,752,540
Total	**1,119,882**	**2,306,544**	**3,767,559**	**5,307,367**	**6,945,177**	**8,683,481**	**10,529,524**	**12,467,057**	**14,500,396**	**16,633,973**	**18,872,422**
Total Liabilities And Equity	**2,239,764**	**3,122,253**	**4,429,943**	**5,803,472**	**7,251,376**	**8,772,822**	**10,623,332**	**12,565,555**	**14,603,820**	**16,742,567**	**18,985,610**

13 KEY ASSUMPTIONS

Table 13-1: Crop Assumptions

Crop Assumptions	Cost per Seed in Rs.	Average Seed Requirement in unit/ Acre	Av. Seed Price/ Acre	Crop Yield per Acre in Kgs	Sale Price of Crop per Kg
Tomato	1.90	15,000	28,500	37,500	30
Cucumber	1.60	15,000	24,000	50,000	16
Capsicum	1.50	15,000	22,500	15,000	25
Sale Price Growth Rate					5%

Table 13-2: Economy related Assumptions

Electricity Growth Rate	10%
Water price growth rate	10%
Wage Growth Rate	5%

Table 13-3: Cash Flow Assumptions

Accounts Payable cycle (in days)	15
Equipment & Spare Part Inventory (in months)	1

Table 13-4: Expenses Assumptions

Crop Wastage	15%
Raw Material price growth rate	5%
Administrative Overhead (%of Total Revenue)	1.0%
Water cost per Irrigation per Acre (Rs.)	200
Irrigation (No. of Months)	5
No. of times land irrigated (per month)	2
Fixed Electricity per Month	3,500
Transport Cost per Kg (in Rs)	2.50
Packing Cost per Kg (Rs)	1.50
Maintenance Cost of Tunnel Structure	2,500
Machine Maintenance (machine/month)	2,500
Machine Maintenance Growth Rate	5%
Pesticide Requirement per Acre per Year (Rs)	25,000
Fertilizer Cost per Acre per Year (Rs.)	35,000

Table 13-5 Farmyard Manure Cost

Farmyard Manure	Per Acre Cost
Tomatoes	2,889
Capsicum	2,315
Cucumber	2,500

Table 13-6: Financial Assumptions

Project Life (years)	10
Debt Ratio	50%
Equity Ratio	50%
Interest Rate on Long Term Loan	14%
Interest Rate on Short Term Loan	14%
Debt Tenure (Years)	5
Payments in a Year	1