

# Protected Horticulture

## HORT-606

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# Introduction

It is the intensive cultivation of vegetables crops under protective structures (GH, PH, low tunnels, hot beds ----- mulch) having many objectives:

- 1- High quality and quantity.
- 2- Off season production.
- 3- Elongation of growing season (early and or delay).
- 4- Higher profit as consequence.

This is possible, since we are able to manage:

1. Providing the protective plants with proper Env. Conditions (Temp. ↓or↑, R.H.↑or↓, light intensity ↓or↑ and CO<sub>2</sub> ↓or↑).
2. Providing the plants with proper Nutritional requirements.
3. Providing the plants with well prepared soil, free from diseases, using resistant CSV's or free from diseases, or using sterilized growing media or fertilizer solution in soil less cultivation.

This sector is differing from open field system in techniques to be applied but with similar basics.

### Points of differences are:

1. Production cost is much more → more Efficient use of land (vertical extend and increase plant population as much as possible.) → increase production → increase profit. But in the same time much more risks (diseases, pollination problem fertilizers shortage as a result of monoculture and intensive cultivation system, heating and cooling problem, ventilation, light intensity).
2. These risks, make the sector under continuous check using developed equipment that enable resolving any problems in relatively short time as the presence of irrigation system, fertilization one, heating, cooling ventilation as well as presence of professionals to control pests problem effectively.
3. All these are costing factors which need a real capital to be employed and experienced farmers which are able to face and resolve any sudden problems in the field or in the market.

- 4-In any time and as a result of high cost of production → farmers are ready to use any further idea to increase their profits or to save their crops from any sudden problem. This leads in many cases to unwise utilization of the factors (to increase production or to overcome the problem) leading to possibility of very high pollution than in case of open field cultivation.
- 5-To certain extent, you can control time of production according to the market demand.
- 6-Keeping continuous quality of the product for long period of season. This standard quality is deeply related to the level of production factors effectuated and type of protective structures and their efficiency in controlling the variations in environmental condition including covering materials.

# Tunnel Farming with Drip Fertigation: A Source of Productivity Enhancement



# Tunnel Farming

- **What is Tunnel Farming**
  - Growing crops in protected environment under plastic cover





# Types of Tunnels

## Three Types of Tunnel

1. Low Tunnel
2. Walk in Tunnel
3. High Tunnel



# Tunnel Farming

- Off season and early crop can be grown
- Temperature can be controlled to a limited extent
- Irrigation and fertigation can be managed
- Pest and diseases can be managed properly
- High yield and better crop can be grown
- High price in the market





# Tunnel Farming

- **Limitations**

- Environmental conditions can not be completely controlled
- Due high humidity incidence of pest and diseases will be high
- It can be used in winter only as in summer additional shade or cooling is required
- High initial cost and intensive care

# Tunnel Farming

Crop	Optimum Day temperature	Optimum Night temperature
Cucumber	21-24°C	18-20°C
Tomato	18-24°C	15-18°C
Sweet pepper	18-24°C	15-18°C

# Tunnel Farming

- **Factors affecting yield and profits**
  - Soil and climate
  - Crop variety
  - Irrigation
  - Fertilizer application
  - Control of pest and Diseases
  - Harvesting and marketing

# Tunnel Farming

- Irrigation and Fertilizer application
- Irrigation Methods
  - Flood
  - Sprinklers
  - Drip



# High Efficiency irrigation Systems



**Drip Irrigation System**



**Sprinkler Irrigation System**



# Automated High Efficiency Systems

## Green House

### Crop Management Technologies



# Tunnel Farming with Drip

- Efficient use of water
- Less incidence of pest and diseases
- Efficient use of fertilizers
- Less weeds
- Ease of farm operations
- Uniform growth and size of produce
- Higher production and profitability



# Tunnel Farming (12ftx180ftx30ft)

## Cucumber cultivation cost eco

Item	Quantity	Rate	Amount
Land preparation			6000
Supporting net	12 pieces	4 Rs/kg	8640
Fertilizer			
Pot. Sulphate	½ bag	2500	1250
SSP	1.6 bags	1800	2880
Amm. Sulphate	1 bag	600	600
Urea	10 Kg	600	120
Soluble fertilizer	10 kg	125 Rs/Kg	1250
Pesticides+fung.	12 sprays	150	1800
FYM	1 cart	2000 Rs/cart	2000
Seed	2500 pieces	3 Rs/piece	7500
Polythene	72 Kg(12 sheets)	250Rs/kg	18000
Polythene mulch	7 Kg	300 Rs/kg	2100
Labour	1 person for acre	6000 /month	6000
01-Mar-16	Dr. Muhammad Rashid Saheen	<b>Total</b>	<b>58140</b>





# Cucumber Cultivation in Tunnel

# Tunnel Farming

## Cucumber cultivation cost eco

### Expected Returns with Flood

- Plant Population in Tunnel = 2160 No
- Yield Per Plant = 5 Kg
- Total Yield = 10,800Kg
- Market value (15 Rs/ Kg avg.) = 162,000 PKR
- Total Expenses (58,140+11,000) = 69,140 PKR
- Net Income = 92,860 PKR



# Tunnel Farming

## Cucumber cultivation cost eco.

### Expected Returns with Drip

- Plant Population in Tunnel = 2,160 No
- Yield per Plant 50% more = 7 Kg
- Total Yield = 15,120 Kg
- Market Value (15 Rs/Kg avg.) = 226,800 PKR
- Total Expenses  
(58,140+11,000+1600) = 70,740 PKR
- Net Income = 156,060 PKR



# Tomato Cultivation in Tunnel

# Tunnel Farming

## Tomato cultivation cost eco.

- **Expected Returns with Flood**
- Plant Population in Tunnel = 1,620 No
- Yield Per Plant = 5 Kg
- Total Yield = 8,100Kg
- Market value (15 Rs/ Kg avg.) = 121,500 PKR
- Total Expenses (56,640+11,000)= 67,640 PKR
- Net Income = 53,860 PKR

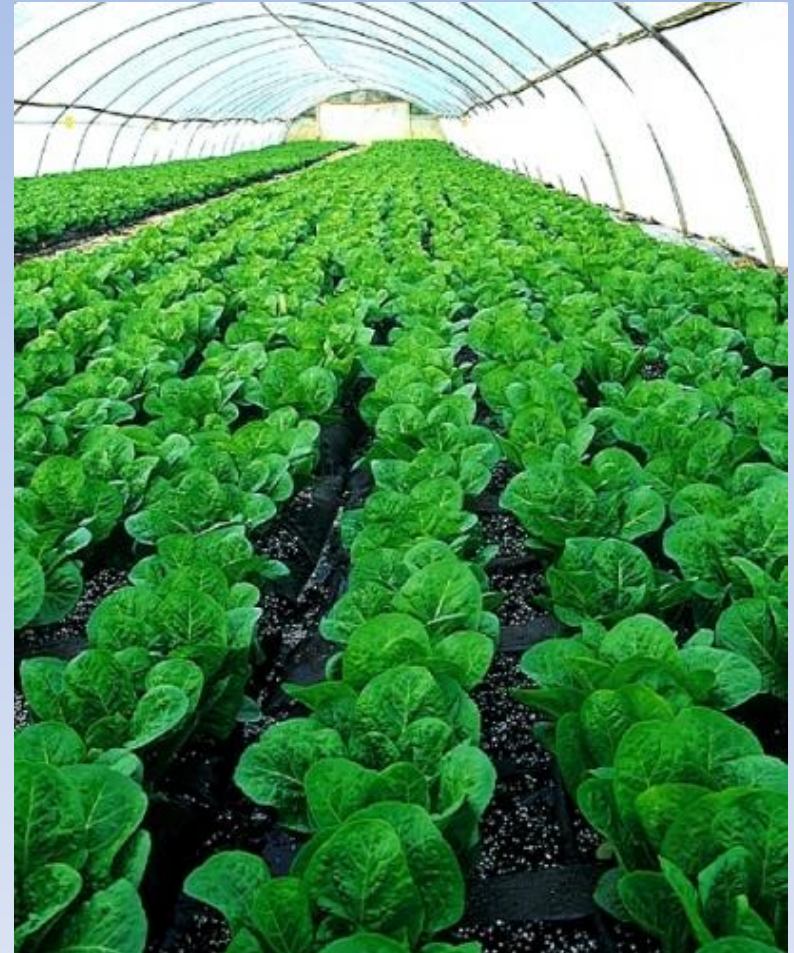
# Tunnel Farming

## Tomato cultivation cost eco.

### Expected Returns with Drip

- Plant Population in Tunnel = 1,620 No
- Yield Per Plant = 7 Kg
- Total Yield = 11,340 Kg
- Market value (15 Rs/ Kg avg.) = 170,100 PKR
- Total Expenses  
 $(56,640 + 11,000 + 1600) = 69,240$  PKR
- Net Income = 100,860 PKR

# Tunnel Farming





# Components of High Efficiency Irrigation System

## Control Head

1. Pumping Unit
2. Filtration Unit
3. Fertilizer Venturi
4. Control valves

## Pipe Network

1. PVC Main line
2. PVC Sub main line
3. Control valve
4. Flush valve
5. Other fittings

## Emitting System

1. Plain lateral  
Integral driplines  
Online emitters
2. System Accessories

# Application of Different Product

# Foggers



# Coolnet

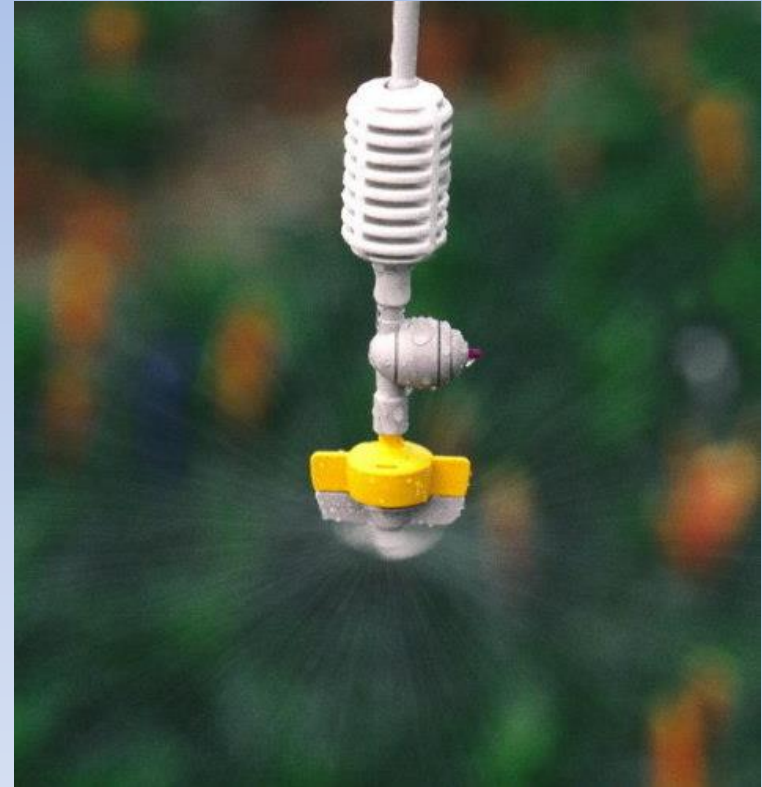


# Gyronet





# Spinnet



# Fertigation Equipment





# Air Circulator



Thanks and Q&A

