Climate Change

PRESENTATION

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Climate change: Role of horticulture for sustainability

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Climate change

Role of horticulture for sustainability

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Climate change ??

- Increase in Temperature
- Increase in co2 level
- Frost free long growing season
- Change in rain Patten
- More drought and heat waves
- Extreme weather
- Cyclone & high tide
- Rise in sea level & melting of Ice

Gujarat scenario

- Climate : Arid & Semi Arid (58%) , Mild tropical
- About 50 % land is cultivable
- Erratic and irregular rain fall (CV is about 40 %)
- Long coastal area
- 55 % area is unirrigated / rain-fed
- Over dependency on Ground water (66%) for irrigation
- Drought and dry spell; every third year
- Flood and water stagnation
- Varieties of Crops

Unstable production and Farm income

Cropping pattern of Gujarat

Area in lakh hectares, Production in Lakh MT

Year 2015-16

Commodity	Area	Production
Cereals	26.16	72.35
Pulses	5.81	5.01
Total Food Grains	31.97	77.36
Oil Seeds	26.15	39.12
Cotton (000' BALES)	27.19	91.15
Sugarcane (gul)	1.85	13.30
Fruit	4.01	85.05
Vegetable	6.26	126.83
Spices	4.85	8.33

50 % of Farm production from horticultural

Irrigation Resources

Usage in (%)	World	Europe	Africa	India
Agriculture & Horticulture	69	33	88	82
Industry	23	54	5	12
Domestic use	8	13	7	6

Sources wise irrigation in Gujarat	
Source	Gross Irrigated area In Lakh Ha.
Canal	11.10
Water Tank	1.62
Tube well	18.93
Well	12.35
Other Source	3.40
Total	47.39

66 % irrigation from under ground sources

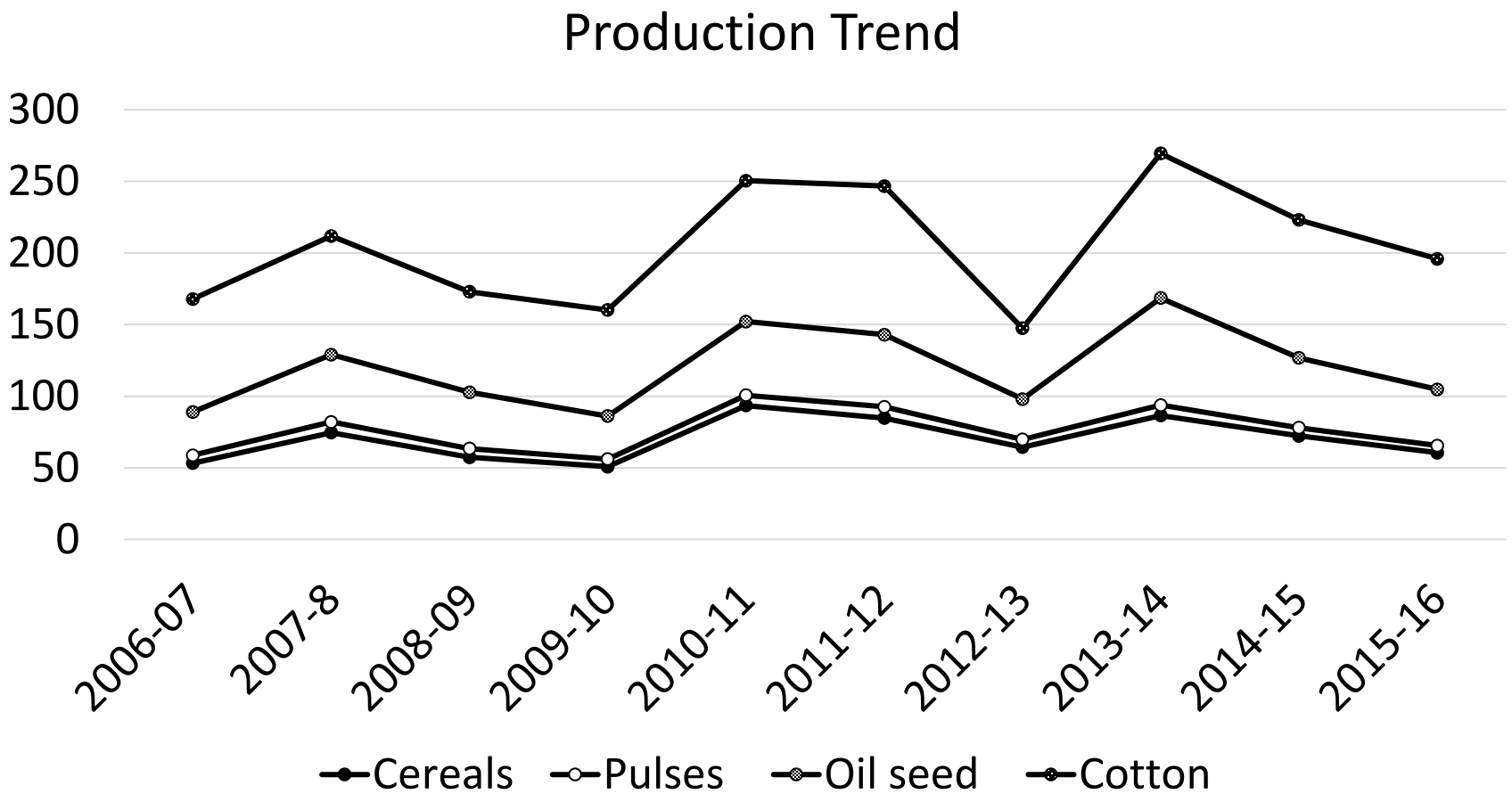
Possible effect of climate change on Gujarat Agriculture

- Long growing season; more vegetative growth
- Increase Temperature and Humidity
  - Possibility of new tropical crops
- Increase salinity and salinity ingress
  - Required tolerant crops
- Increase water stagnation in low laying area
- More erratic rain ; Flood and Drought
- Higher Disease and pest (Mainly sucking pests)
- Low frost& Chilling ; Expansion of spices area
- Ground water depletion.

Changes in cropping pattern & Practices

Unstable production

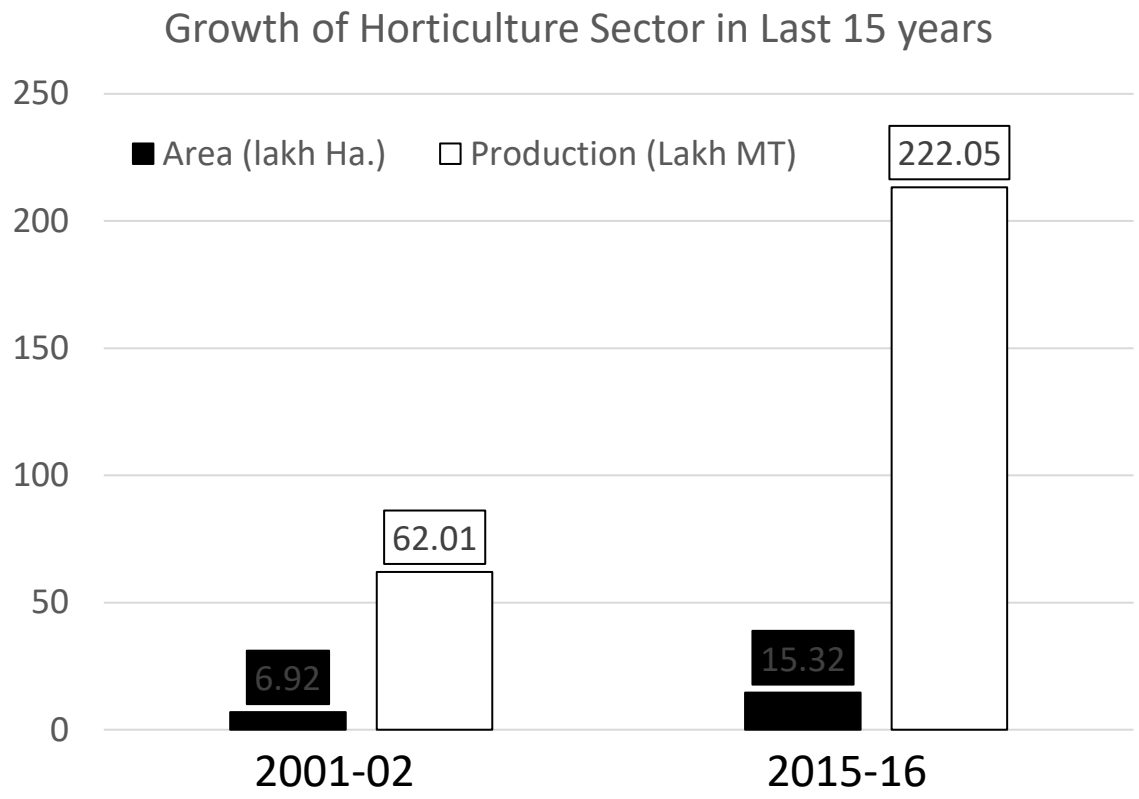
Production in lakh MT /cotton Lakh bales



Future scenario of Agriculture

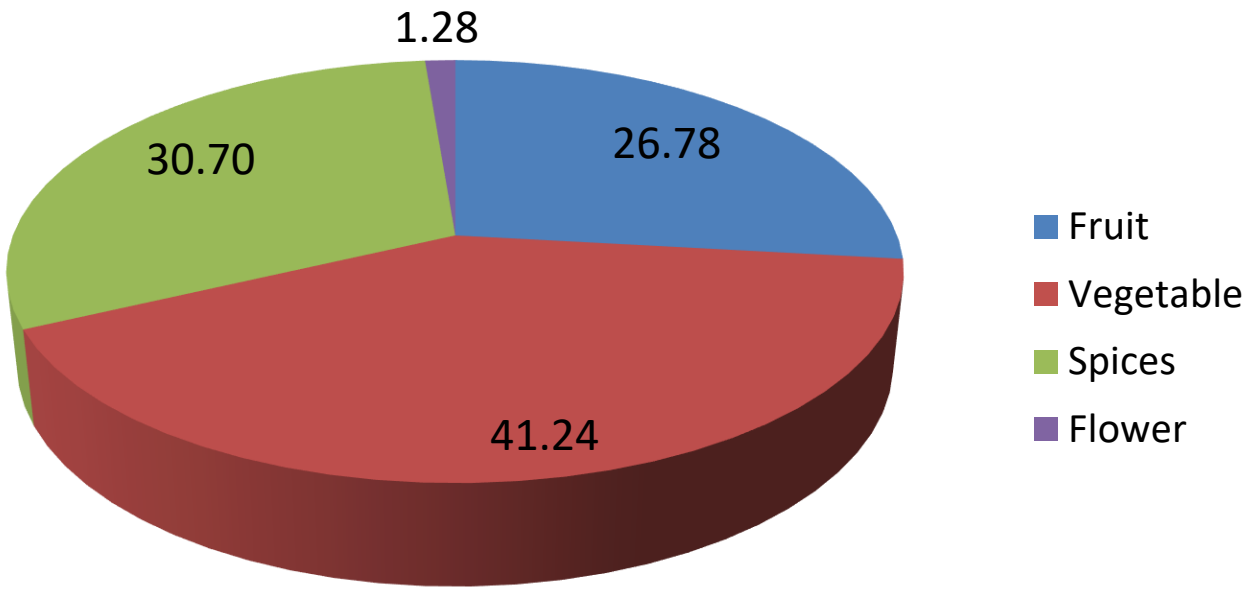
- Increase in demand of food
- Pressure on land
  - Per area more crop
- Quality consciousness
- Higher Cost of input
- Manpower shortage
- Problematic soil
- Depleted of irrigation sources
  - Majority of Irrigation is from ground water

Horticulture Sector of Gujarat



- **Production increase three fold in last 15 years**
- **Contributes 6% of total production of country**
- **14 % area covered in state**
- **Contributes 50% of farm production of state**

Area Distribution of Horticulture Crops (Year 2015-16)



Horticulture; Climate smart crops

- Wide range of crops
  - Suitable for Arid to Tropical climate & herbs to tree
- Higher productivity
- Very short to perennial life span
- Stress tolerant crops and varieties
- Potentiality for export
- Process-able commodities
- Irrigation efficient crops
- Generate more employment
- Beekeeping and Mashroom cultivation
- Market driven production

Tolerant variety

Crop	Variety	Tolerant
Pomegranate	Ruby	Drought
Anona	Arka Sahan	Drought
Fig	Deanna	Drought
Mango	Bappakai/13-1	Salinity
Lime	Rangpur lime/Cleopatra Mandarin	Salinity

Stressed Tolerance

Sr. No	Vegetables
Drought	Chilli, Melon, Tomato, Onion
Heat	Peas, Tomato,Beans,Capsicum
Salinity	Melons, Pea,Onion
Flooding	Tomato, Onion, Chilli

Water Requirement of Horticulture crops

Food stuff	Water consumption, liters	Quantity in Liter
Rice	1 kg	2,497
Cotton	1 kg	2,495
Apple	1 kg	822
Banana	1 kg	790
Potatoes	1 kg	287
Cabbage	1 kg	237
Tomato	1 kg	214
Tomato in Green house	1Kg	>100

Major Responsive crops; in TEN YEARS

Area in Lakh Ha. , Production in lakh M.T.

SR.NO	CROP	Year 2006-07		Year 2015-16		Gain	
		Area	Prod.	Area	Prod.	Area	Prod.
1	MANGO	1.02	8.34	1.53	12.42	0.51	4.08
2	BANANA	0.53	29.13	0.65	41.86	0.11	12.73
3	POMEGRANATE	0.05	0.50	0.19	2.78	0.14	2.28
4	ONION	0.52	12.42	0.53	13.56	0.01	1.13
5	POTATO	0.50	13.40	1.12	35.49	0.63	22.10
6	TOMATO	0.29	6.76	0.46	13.19	0.18	6.43
7	CUCURBITS	0.41	4.08	0.84	13.27	0.43	9.19
8	CUMIN	2.59	1.53	2.95	3.01	0.36	1.48
9	CORIANDER	0.11	0.20	0.89	1.39	0.78	1.19
	Total	6.02	76.36	9.16	136.97	3.15	60.61

Horticulture development Model

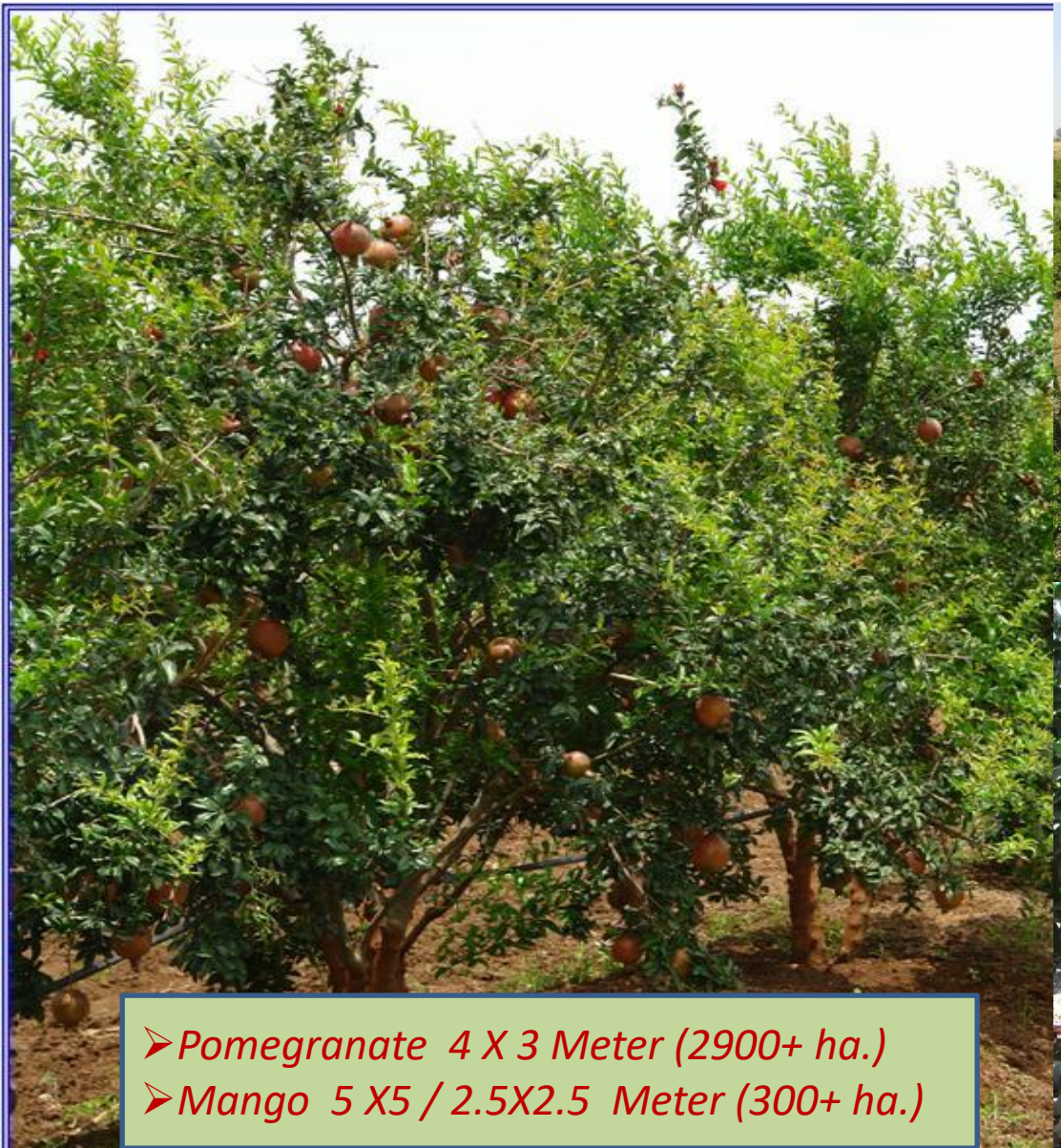
- **Cluster based Development**
- **Support for**
  - Technology adoption
  - Infrastructure Development
- **End to End Approach**
- Planting material
- Production enhancement
- Post harvest management
- Market

Climate smart technologies

- Resistant and Tolerant crops and root stalk
- Tissue cultured plants
- Micro irrigation system
- Mulching
- Protected cultivation
- Rejuvenation
- High density & Canopy management
- Indeterminate Varieties: frequent picking
- Support of post harvest handling and marketing

Hi-Density plantation

Initiatives



- *Pomegranate 4 X 3 Meter (2900+ ha.)*
- *Mango 5 X5 / 2.5X2.5 Meter (300+ ha.)*

Protected cultivation

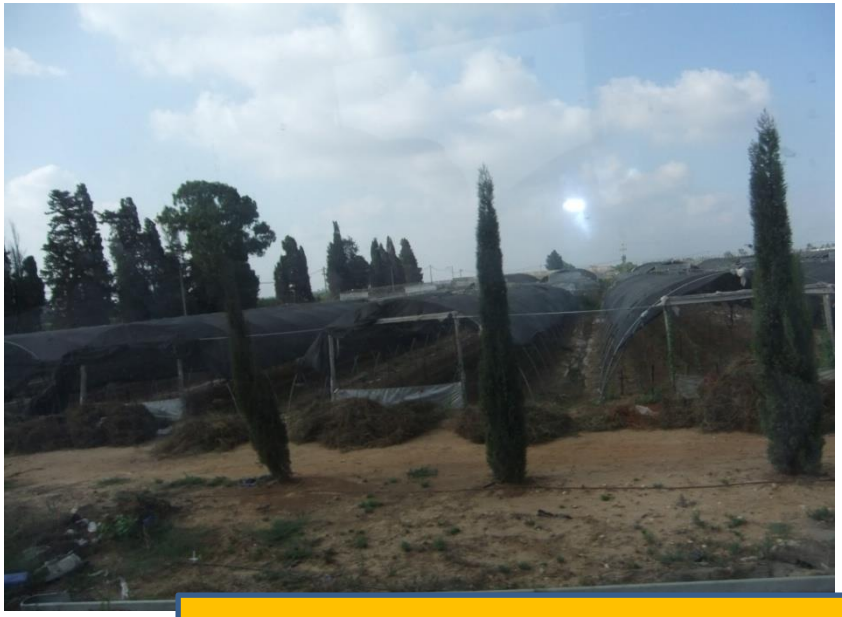
- Per unit Highest yield
- Less effect of climate
- Soilless cultivation
- Disease –Pest free
- Less effect of Environment
- Irrigation & Input saving
- Assured production
- Highest quality
- GAP and Sanitation

Hi-tech Plug Nurseries

New initiatives

- 6- Hi-tech Plug Nurseries Established
  - Capacity 60 lakh seedlings/annum
- 103 Accredited Fruit Nurseries
- 19 DBT accredited Tissue cultured Units

Grafting of vegetable seedling on nematodes/ soil disease / salt resistance root stock



Low cost structures of protected cultivation

Increase production with Bee keeping

Summer vegetable in poly-tunnel

Crop under insect net <> Outer temp. 40^0 C.

Soil less Culture

Gerbera

Rose

Scope : Narmada command area

In Identified Taluka :

- Good water
- Saline and alkaline soil
- Arid Climate

- **Farmers willingness**
- **Limited investment capacity**

Alternate ?

- **Promotion of Shade net in poor soil**
- **(Cocoa pit /soil less culture)**

Scope : Large scale cultivation in saline soil

NAGEV DESSERT –ISRAEL

- **1000 HA UNDER PROTECTED CULTIVATION , 60-70% OF THE VEGETABLE IN ISRAEL**
- **85-90% OF THE TOTAL EXPORT**

Kutch ?

Development on GIDC pattern :

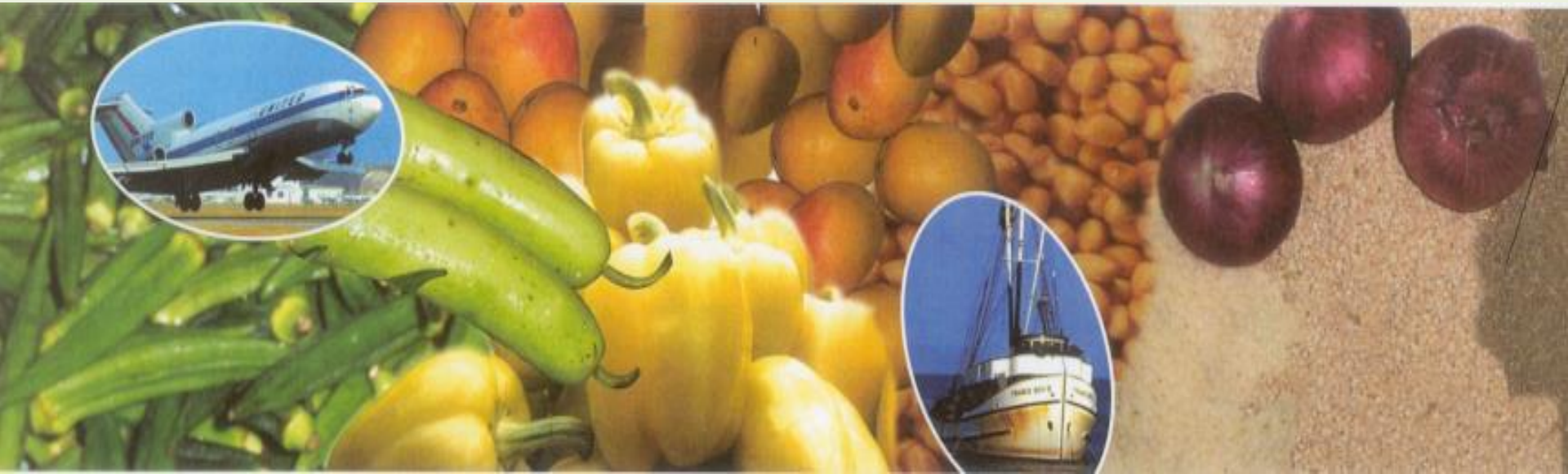
- 100-500 ha.
- Treated Sewage water / Soil less culture
- Development and distribution to farmers

Post harvest Management support

- **Reduce losses** - Cold Storage and CA cold storage- – 481 (NHM- 144 Unit)
- **Carbide free-** Ripening Chambers – 42
- **Value addition-** Minimum processing & Frozen
- **On farm value addition –**
  - Grading sorting units- 167 /
  - **On farm Pack** houses- 500+
- **Long distance Transport -** Cold chain
  - Pack House - Air cargo facility
  - Cold storage
  - Pre-cooling Units – 11 (NHM)
  - Refrigerated Van – 9 (NHM)

Export support for horticulture

- Formation of crop clusters
- Extension and technology support
- Farm registration
- Quarantine Inspection
- GAP /Organic certification
- Pack house - Post harvest infrastructure including cold chain
- Wholesale/ Terminal market
- Air freight / Sea freight



Future need

- Residue free Clean cultivation
- Packaging and cold chain
- Terminal and wholesale markets
- Farmers Market & FPO

Farmers- Mango Market –Ahmedabad

Terminal market – Rangis- France

THANK YOU