



# Good Agricultural Practices for Climate Smart Agriculture – Protected Cultivation

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# Divergent Spectra of Agritech Adoption in India

## Common Factors of Low Productivity

### To counter

- Small holdings
- Low productivity
- Lack of Education/knowledge
- Lack of irrigation/Rainfed farming
- low mechanization
- Climate Dependent
- Negligible flow of institutional credit
- Poor Access to Technology
- Unprofessional Approach
- Unorganized marketing
- Low Risk Taking ability
- Export linkage almost nil

### Lower end of technology

## Commercial/Progressive/Climate Smart Agriculture

### To take advantage of

- Small but Professionally managed Farms
- Higher Productivity
- Access to Education/Knowledge /Technology
- Buying Power/High Investment
- Access to Inputs/high mechanization
- Climate Modulation/Climate Savvy/Smart
- Credit/Subsidy Availability
- Entrepreneurial Approach
- Organized marketing
- High Risk Taking Ability
- Considerable export

### Higher end of technology



# Status & Advantages of Protected Cultivation

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Current Area in India ~ approximately 200,000 acres

## Advantages include

- Protection- biotic & abiotic stresses
- High productivity (5-10X) over open field cultivation
- High quality & continuous availability
- Off-season production
- Minimized use of pesticides
- Amenable for organic & safe cultivation
- Adoptable as agri- entrepreneurship – optimizing natural resources
- Income & employment generation
- Suitable for peri-urban areas



# Protected Structures

## Greenhouses

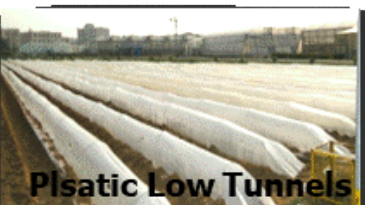
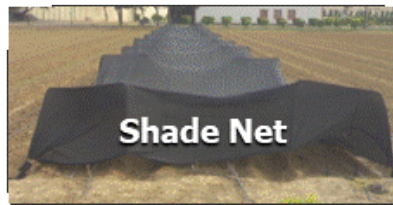
- a) Climate controlled
- b) Semi-climate controlled
- c) Naturally ventilated

## Net-houses:

- a) Insect-proof nets
- b) Shade nets

## Other Temporary Structures

- a) Walk-in-tunnels
- b) Plastic Low tunnels
- c) Plastic mulches
- d) Rain Shelters
- e) Trenches for cold areas





# Key Challenges Faced by Protected Cultivation in India

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- **Selection of the Type of Structures** – Region/crops/quality
- **Training and Technical Competence** – Production technology, mainly pest, water & nutrition management
- **Testing Facilities** – Soil, pest and input samples
- **Quality Inputs** – Rationale/availability/reliability
- **Market** – Availability/rates/sense/access/export
- **Sensitivity to Envi. Hazards** – Awareness, Regulation, Standards





# Major Issues in GH Pest Management

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- Greenhouse Design
- Access to Production Technology
- Healthy Planting Material – Varietal Selection, Soilless Nursery, Grafting
- Soil Management
  - ✓ Floriculture – mainly tissue culture based planting material
  - ✓ Vegetables – mainly soil-less nursery
- Plant Protection
  - ✓ Soil Management – Fumigation, Biopesticides
  - ✓ Crop Protection – Biological Control, IPM, GAP
- Parallel Engagements – FSMS /ISO22000, Certification systems Allied issues -Post-COVID-19 market



# Good Agricultural Practices

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GAPs are agricultural practices that take care of profitability of producers, health and biosafety of consumers and non-target life, sustainability of environment, acceptability of society and compliances of standards/procedures/laws of the land, by adopting traceable parameters and records and auditable actions, thus, comprising of a responsible and responsive production system in its entirety.

~Naved Sabir, 2024

## Four Pillars of GAP

- Economic Viability
- Environmental Sustainability
- Social Acceptability
- Food Quality and safety



# Major Principles of GAP

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1. Traceability
2. Record keeping and self inspection
3. Varieties and rootstocks
4. Site history and site management
5. Soil and substrate management
6. Fertilizer use
7. Irrigation/ Fertigation
8. Crop protection
9. Harvesting
10. Produce handling
11. Waste & pollution management, recycling & re-use
12. Worker health, safety and welfare
13. Environment issues
14. Complaint form

**IndiaGAP implemented 2011 –  
but mostly export units**

**GAPs are indeed unitary exercises towards SDGs**



# Climate Smart Agriculture in India

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1. Controlled Environment/Precision Farming
2. Data-Driven Decision Making -Big Data Analytics
3. Automation/Machinery (Robots/Drones/Microdrones)
4. Sensor Technologies, IoT and AI (all integrated in systems approach)
5. Sustainable Agriculture Practices (GAP/IPM/Safe/Organic)
6. Market Opportunities



# GAPs for Climate Smart Agriculture in India

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## 1. Energy Efficient, Cost-Effective Structures

- More and Better use of Renewable Energy, Optimized use of lights

## 2. Greenhouse Clusters for Sustainability

- Equitable Compensation with Green Areas (e.g. afforestation)

## 3. Traceability

- Facilitation for Parameters/Standards, Packing etc. towards GAP

## 4. Promotion of IoT, Sensor Technology, AI, Drones etc.

- First and foremost strategy for Hill and Other Vulnerable Areas

## 5. Sustainable Agriculture Practices (GAP/IPM/Safe/Organic)

- Strengthening of Biological Control Mechanisms
- Compensation for Green Molecules
- Carbon Credit, Water Credit, Bonus for Water Harvesting/Conservation
- Vigil on Quality, Non-Compliances on Pesticide Residues/Biosafety Issues

## 6. Market Opportunities –

- Strengthening Farmer Producer Organizations, Export Autonomy for Clusters, Alignment of Producers with Market Standards, FSMS, ISO etc

