



ROHINI
COLLEGE OF ENGINEERING & TECHNOLOGY
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(AUTONOMOUS)

Department of Agricultural Engineering

Course Name : **Protected Cultivation**
Course Code : **AI3015**
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Faculty : **Mr. ARUNPANDIAN N (Asst. Professor)**

UNIT - III

PROTECTED CULTIVATION OF FLOWER CROPS

PART 5 : POST - HARVEST HANDLING AND QUALITY MANAGEMENT

5.1 Harvesting Indices and Methods

Critical Harvest Stages:

Crop	Optimal Harvest Stage	Harvest Time	Cut Height
Rose	Petals starting to unfurl, sepals down	Early morning	Above 5-node
Gerbera	2-3 rows of disc florets opened	Morning	Base of crown
Chrysanthemum	Fully developed flowers, pollen visible	Morning	Above ground
Carnation	Paintbrush stage (½ open)	Late afternoon	Above 5th node
Anthurium	Spadix ¾ developed, spathe fully colored	Morning	Base of stem
Orchid	75-90% florets opened	Morning	Base of pseudobulb

5.2 Postharvest Treatments

Pre-cooling Methods:

- Room Cooling: 0-2°C for 2-4 hours
- Forced Air Cooling: Faster, more uniform (1-2 hours)
- Hydro-cooling: For field heat removal (especially lilies)

Pulsing Solutions:

- Sucrose: 2-10% for energy supply
- Germicides: Chlorine, Aluminium sulfate (50-200 ppm)
- Silver Thiosulfate (STS): 0.2-4 mM for ethylene sensitive flowers
- 8-HQC: Citric acid for pH control and antimicrobial action

Specific Treatments:

- Roses: Sucrose (2-6%) + germicide for 24 hours
- Carnations: STS pulse for 20 minutes at 20°C
- Chrysanthemum: 2% sucrose + 200 ppm 8-HQC overnight
- Gerbera: Clean cut, immediate hydration

5.3 Grading, Packaging and Storage

International Grading Standards:

Grade	Stem Length (cm)	Head Size/Quality	Packaging
Export/AAA	60 (rose), >50 (gerbera)	Perfect, uniform	Bunches of 10-20
Premium/AA	50-60	Minor defects	Bunches of 20
Standard/A	40-50	Acceptable quality	Bulk packing
Domestic/B	Variable	Variable quality	Loose

Packaging Systems:

- Horizontal Boxes: For heavy-headed flowers (gerbera, sunflower)
- Vertical Boxes: For straight stems (rose, carnation)
- Sleeves: Individual flower protection
- Hydration Systems: Water tubes, wet cotton, gel packs

Storage Conditions:

- Temperature: 0-4°C for most flowers, 10-12°C for tropicals
- Humidity: 90-95% RH
- Duration: 1-2 weeks for most, 3-4 weeks for chrysanthemum
- Ethylene Control: <0.1 ppm with potassium permanganate scrubbers

5.4 Supply Chain Management

Cold Chain Components:

1. Harvest → Pre-cooling (within 1 hour)
2. Grading → Treatment (2-4 hours)
3. Packaging → Cold Storage (maintained 2-4°C)
4. Transport → Distribution (refrigerated trucks)
5. Retail → Consumer (maintain cool conditions)

Quality Parameters for Export:

- Visual: Color, form, freedom from defects
- Physical: Stem strength, flower size, stem length
- Physiological: Vaselife, water relations, respiration rate
- Pathological: Freedom from pests and diseases

Vase Life Enhancement:

- Commercial Formulations: Chrysal, Floralife (sugars, acidifiers, biocides)
 - Home Remedies: Soda, aspirin, copper coins (limited efficacy)
 - Environmental Control: Cool temperatures, no ethylene, no direct sunlight.
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