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Center for Smart Agriculture

Protected floriculture



Module 3: Production technologies followed for
Protected cultivation of different flowers
Session 17: Protected cultivation of Carnation



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INTRODUCTION

Common name: Carnation

Scientific name: *Dianthus spp.*

Family: Caryophyllaceae

Chromosome no: $2n=30$





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IMPORTANCE AND USES

- Cut flowers
- Border crop
- Rock gardens
- Perfumes
- Volatile oil





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POPULAR CARNATION CULTIVARS

Dona, Pink Dona, Malaga, White Dona, Rony,
Rhodos, Lipstick, Empire, Romana, White Tendra,
Corleone, Design, Natila, Dark Tempo, Bagatel
silvery pink, Solar, Cobra, Pendency, Lorella, Cabaret,
Tanga, Sonsara, Dakar, Liberty, Solar, Green Lady,
Tempo, Varna, Sun Shine and Charment



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PINK DONA



TUNDRA



WHITE TUNDRA



DARK TEMPO



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Production Technology of Carnation



Soil preparation



Soil Fumigation



Bed Preparation



Rooted cuttings



Planting



Pinching



Netting



Disbudding



Fertigation



Harvesting stage



Harvesting



Stripping



Bunching



Packing



Packaging



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ENVIRONMENTAL FACTORS

- Light: Photoperiod (long days over 16 hours)
- Intensity: (100 watts bulb spaced at 10.5 m at 1.5 m height)

TEMPERATURE

- Night (winter: 10-11⁰C, spring: 12.7⁰C and summer: 13-15.4⁰C) and day (18-23⁰C)
- Ventilation: Free circulation of air
- Relative humidity: 50-60%.
- CO₂: 500-1500 ppm



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SOIL AND GROWING MEDIUM

- Light texture loam or sandy loam soil which is well drained and aerated.
- Soil pH: 6-7.

PLANTING TIME:

- N.I. plains: Sep.-Oct.
- Low hills: Sep.-Nov.
- Mid hills: Jan.-Feb.
- High hills: Mar.-April
- Staggered planting at 15 days interval ensure regular supply of cut flowers.



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PROPAGATION

- Terminal stem cuttings (8-10 cm long with 4-6 leaf pairs)
- Micro-propagation

PLANTING DENSITY AND SPACING

- Ordinary: 25-32 plants/m²
- High : 40 plants/m²
- Standards: 20 x 20 cm



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Rooting of cuttings in protrays



Rooted cuttings



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SPRAY OPTIMUM NUTRITION

- N: 5.4%, P: 0.31%, K: 3.8%.
- For Standards: FYM: 5 kg, N: 30g, P: 20g, K: 10g/m²
- For Spray: FYM: 5 kg, N: 40g, P: 20g, K: 10g/m²
- Now commercially nutrition is given through fertigation.



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Soil moisture and irrigation:

- Optimum soil moisture is 300-500 cm tension.
- Irrigation is done through drip irrigation with three lines in five rows in a bed.
- Daily water requirement varies with the outside temperature from 2 to 3 litres/m².
- Water soluble fertilizers are also given along with irrigation.
- During vegetative phase irrigation through sprinkler/mister/ fogger is beneficial.



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Pinching:

- In pinching terminal growing shoot about 2-3 cm long is removed to overcome apical dominance and to promote side branching when the plants are at 6-8 leaf pair stage.





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Pinching types:

- Single
- Pinch and half
- Pinch plus pull pinch
- Double



Single Pinch



Full flush after single pinch



Full flush after pinch & half



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De-shooting:

- When the side shoots after pinching are 3-5 cm long then retain 3-5 shoots per plant in standard cultivars.
- When the side shoots after pinching are 3-5 cm long then retain 6-10 shoots per plant in spray cultivars.





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Staking:

- Wire mesh, plastic nets, string or bamboo canes are used to support plants.
- Wire mesh or plastic nets having inner size of 10-15 cm squares are placed on the ground in three layers, which are erected at 20, 35 and 50 cm above the ground level with the growing plants.
- String or rope is erected in three rows at the same distance along the rows.





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Disbudding:

- Disbudding is the removal of visible (5-10 mm diameter) undesirable buds.
- In standard cultivars terminal bud is retained and all the lateral buds are removed.
- In spray cultivars terminal bud is removed and lateral buds are retained.





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WEEDING

- Three-four hand weeding.
- Chemicals viz., oxidiazon and napropamide @ 2.2 and 4.5 kg a.i. per hectare are good in greenhouse.
- In open fluchloralin (basalin) and pendimethalin (stomp) @ 1.0 a.i. per hectare each are effective.



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Stages of flower harvesting:

- **Standard cultivars-** for local market are harvested when flowers are half opened or at painting brush or outer petal is perpendicular to stem.
- while for distant market cross is developed on buds and colour is visible.
- **Spray cultivars** are harvested for local market when two flowers have opened and others have shown colour, while for distant market when 50% flowers have shown colour.



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HARVESTING



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COMMON GRADES IN INDIA

- A: over 45 cm
- B: 30-45 cm
- C: less than 30 cm





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PACKAGING

- In bundles of 10,12, 20 or 25.
- In corrugated card board boxes of 120 x 60 x 30 cm (L x W x H) accommodates about 800-1000 cut flowers of carnation.
- Wrap flower bunches in cellophane sleeves.





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Grading and packing in carnation



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DISEASES

- Wilt (*Fusarium oxysporum f. sp. dianthi*)
- Foot- rot (*Phytophthora, Pythium, Rhizoctonia solani, Sclerotinia sclerotiarum*)
- Stem rot (*Fusarium roseum*)
- Flower bud rot (*Alternaria dianthi*)



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Contd...

- Bacterial wilt (*Pseudomonas caryophylli*)
- Rust (*Uromyces caryophyllinus* or *U. dianthi*)
- Flower blight (*Botrytis cinerea*)
- Fairy ring spot (*Heterosporium echinulatum*)
- Viral diseases

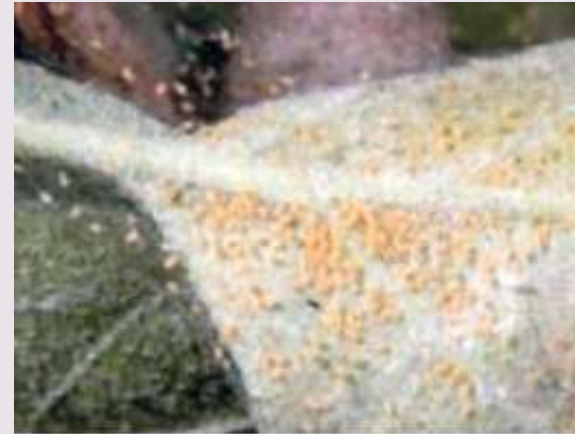


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INSECT-PESTS

- Red spider mites
- Thrips
- Nematodes
- Aphids
- Helicoverpa/
Heliothis/Spodoptera
caterpillars



Mite colony



Aphid



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PHYSIOLOGICAL DISORDERS

- Calyx splitting
- Grassiness
- Sleepiness
- Splitting at nodes and bushiness



Calyx splitting



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Tinting in carnation:

A concentrated liquid or powder colour is mixed in small amount of warm pure water (37°C) and stems are placed in it. The colour develops in different patterns on the petals after 10-24 hours.





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YIELD

200-300 flower stems/m²/year.





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Thank you