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# CARNATION

(S.N-*Dianthus caryophyllus* L.)

Carnation (*Dianthus caryophyllus* L.) belonging to the **family Caryophyllaceae.**

**Chromosome no-  $2n= 30$**

It is one of the important cut flower crops in the International flower market.

It is more preferred to other cut flowers due to its

- ✓ Large array of colours,
- ✓ Excellent keeping quality,
- ✓ Wide range of forms
- ✓ Ability to with stand long distance of transportation,

It is commonly called as **Carnation, Divine flower, Clove pink, Gilly Flower.**



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## IMPORTANCE AND USES

- ❖ One of the **top ten cut flower** crops in the International flower market.
- ❖ Apart from cut flower it is being used for bedding, pots, rock gardens, window boxes and edging.
- ❖ It gives a unique softness in the rock gardens.
- ❖ Popular in flower arrangements for decorating homes.
- ❖ Flowers also have medicinal properties.  
Used as cardio tonic.
- ❖ **It is also used for perfume extraction in France.**



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## ORIGIN:

- ♣ It is native to the Mediterranean region but its exact range is unknown due to extensive cultivation for the last 2000 years.
- ♣ Dianthus in Greek 'dios,' divine; 'anthos', flower which means '**Flower of Zeus**' or **Divine flower**.
- ♣ The cultivar 'William Sim' produced in 1938 by William Sim of USA.



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## BOTANY:

- ❑ It is a **herbaceous perennial plant** growing to 80 cm tall.
- ❑ The leaves are glaucous grayish green to blue-green, slender, up to 15 cm long.
- ❑ The Flowers are produced singly or up to five together in a cyme;
  - 3–5 cm diameter and sweetly scented;
  - colour is bright pinkish-purple, red, white, yellow and green.
- ❑ Carnations will grow from 2" to 3 feet high, most garden varieties grow 10 to 20 inches tall.
- ❑ They bloom mainly during cool times of the year, especially early winter.



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# TYPES OF CARNATION

## 1. Chabaud or marguerite:

- Developed by crossing *D. chinensis x D. caryophyllus*,
- They are annuals produces single or double flowers.
- Reproducing by seeds
- Flowers are large with fringed petals. Moderate vase life.

## 2. Border and picotee:

- Easy to grow and has symmetrical flowers
- Flower colour varies from single to blend with irregular markings.
- They produce single stem in first year and form bushy in subsequent years

## 3. Malmaison:

- Malmaison has stiff and massive habit with broad leaves
- Flowers are large and fully double mainly pink with well frilled centers.
- Flowers have rich fragrance.
- Suitable for pot purpose due to its dwarf in habit.

## 4. Perpetuals:

- They are hybrids involving many *Dianthus species*.
- Plants are not hardy and flower all round the year.
- Flower stalks are long and hence suitable for cut flowers.
- They produce better quality flowers and withstand long transportation.
- They are grouped into standards or Sim and sprays.



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**Chabaud/ marguerite**



**Border/ picotee**



**Malmaison**



**Perpetuals**



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1. **Standard types:**

- Produces single large blooms with longer flower stalks.

2. **Spray types:**

- The miniature or spray type produces many flowers of smaller size.
- Better adapted to warm climate than standard types.



**Standard type**



**Spray type**



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## **SPECIES:**

There are about 250 species of Dianthus of which only a few are under commercial cultivation. They are as follows,

### **Major species**

- *D. caryophyllus*
- *D. barbatus*
- *D. chinensis*

### **Other species**

- *D. alpinus*
- *D. grandiflorus*
- *D. giganteus*
- *D. hybridus*
- *D. nobilis*



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## **SOIL/GROWING MEDIA AND PREPARATION OF BEDS**

Soil should be ploughed upto 80-100 cm deep.

Addition of calcium carbonate or dolomite limestone to corrects severe acid condition and also supplies calcium and magnesium for plant nutrition.

- ✓ Addition of sulphur or use of acid forming fertilizers will inturn reduces the soil pH if it is on the higher side.
- ✓ A rich sandy loam or loamy soil is considered to be the most ideal for successful production of carnation.
- ✓ The ideal soil pH is between 6.0 to 7.0
- ✓ EC of 1.2 at the start of the crop and 1.5 at the generative period is ideal.
- ✓ Plants can be grown in a perlite / rock wool mixture at 3:1 or 1:1.
- ✓ Soil mixture : 50 % sand, 30% loam and 20% clay
- ✓ Media have to be sterilized with methyl bromide@ 25-30g / formaldehyde @ 3-7% (7.5 to 10.0 l/100/sq.mt or Basamid (Dazomet) @30-40g/m<sup>2</sup>
- ✓ Bed size : 30 cm height ; 1.05 m wide ; length varies as per the length of the protected structure.
- ✓ Spacing between beds : 30 cm



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## CLIMATE:

- **Light** is the most important factor, which influences growth of the plant.
- Mild climate with a temperature ranging from 5-18<sup>0</sup>C is considered to be the ideal for the crop.
- **Quantitative Long Day plant** (long days promote flowering)
- CO<sub>2</sub> enrichment in greenhouse upto 500-1000 ppm improves the flower quality.
  - Day temperature - 28<sup>0</sup>C (20 -25 <sup>0</sup>C)
  - Night temperature - 16-18<sup>0</sup>C (10 -15 <sup>0</sup>C)

1.

## VARIETIES:

### 1. Standard Carnation

Red : Scania, Tanga, Killer

Pink: Nora, **Pink Sim**, Candy, Calypso

Yellow: Pallas, Murcia, Tahiti

White : Sim, Roma, Candy white

Others: Charmeur, Santiago, Vanessa, Monaco, Regina, Trendy,  
Rush, Internet, Monopole, Cobra, Shocking pink and **White Sim, Papaya, Gold**



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## CULTIVARS OF CARNATION



**Dona**



**Farida**



**Firato**



**Hildelgo**



**Lavender Lace**



**Lady Green**



**Master**



**Sunrise**



**Baltico**



**CherrySolar**



**Farida**



**Frivole**



**Malga**



**Dover**



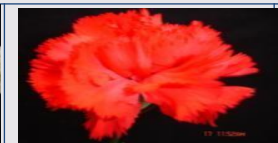
**Pink Dover**



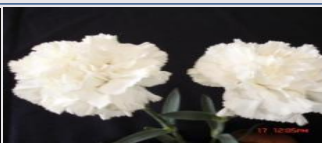
**Liberty**



**Parasio**



**Red Corso**



**White Wedding**



**Pax**



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## 2. SPRAY CARNATION

Red: Rony, Karma, Etna

Pink : Annelies, Barbara, Silvery Pink

Yellow: Odeon, Alicetta, Lior

White: Royalette, Tibet, Excel

Others: Exquisite, Scarlet Elegance, Kissi : Kristal, Celins, Furore,  
White Barbara and Red Barbara, **Stardust**



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## **PROPAGATION:**

Carnation may be propagated by both sexual and asexual methods.

### **SEED :**

- ♣ July or August to October
- ♣ In the hills, sowing should be done during August to October and March to April depending upon temperature.
- ♣ At four-leaf stage, the seedlings are pricked or transplanted.
- ♣ Sowing at 20°C gives the maximum germination.





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## **VEGETATIVE PROPAGATION**

### **CUTTING**

Using soft terminal cuttings is the common method of multiplication used by commercial growers throughout the world.

Cuttings of 10-15 cm with 3-4 nodes weighing around 10g are ideal for multiplication.

Rooting hormone such as IBA at 500ppm is used prior to planting of cuttings for rooting.

Terminal cuttings give rise to good plants. Cuttings can be stored at 0°C before planting for several weeks.

Cuttings are spaced at 5 cm apart and intermittent misting should be used for good rooting.

### **LAYERING**

- ♥ Layering is done in pots or directly in the ground.
- ♥ The layering generally roots earlier than the cuttings.
- ♥ Ground layering was found to be most suitable method.

### **GRAFTING**

- ♥ 65 to 70 % success
- ♥ Union was completed in 15 days.

### **MICRO-PROPAGATION**

- ♥ Almost all parts of the plant may be used as explants in carnation except the root.



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## **PLANTING AND AFTERCARE:**

Carnation plants are planted in different spacing normally, 30-45 plants per sqm is considered to be ideal.

Different **spacings 15x8cm, 15x15cm, 15x20cm and 15x10cm**, are followed.

Shallow planting is followed. Deep planting should be avoided.

Shading should be given in the beginning of the crop for few days.

Care should be taken to maintain the humidity to prevent plants from drying.



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## **SPECIAL CULTURAL PRACTICES:**

### **1. SUPPORT MATERIAL:**

- Carnation crop has the tendency to bend unless supported properly. Hence the crop needs support while growing.
- Good support material is metallic wire woven with nylon mesh.

### **2. PINCHING:**

■ Pinching refers to breaking out tip of budding and encouraging growth of side shoots.

■ Essential for Standards.

■ 4-6 well grown laterals are allowed.

■ At six pairs of leaf first pinching has to be done.

■ First pinching done 3 -4 weeks after planting.

■ Depending upon the need of crop spread it is classified into,

- Single,**
- One and half and**
- Double pinches.**

#### **SINGLE PINCH**

- Ideal time for pinching is morning.
- When the plant attains 6 nodes, the first pinch is given.



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- 5 -7 cm of apical portion has to be pinched off.

- This would give rise to 4-6 lateral shoots.

### **ONE AND HALF PINCH**

- After single pinched shoots flower, half of side shoots are pinched off.

- 2-3 of these lateral shoots are pinched again.

### **DOUBLE PINCH**

- All the lateral shoots are pinched off. i.e., 3 - 4 weeks after first pinch

- Pinching is done at 4 well developed pairs of leaves

## **4. DISBUDDING:**

Disbudding refers to removal of side buds so that the central/terminal bud receives maximum food for the full development.

### **1. FOR STANDARDS**

- Removal of lateral buds.

- Main flower bud alone left.

### **2. FOR SPRAYS**

- Terminal or main buds are removed to encourage more number of side shoots.

Best time for disbudding – when apical bud is 15 mm in diameter.



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## MANURING:

- ❑ No inorganic fertilizers in first 3 weeks after planting
- ❑ Fertilizer application of **40g N, 20g P and 10g K, in addition to 5kg of well decomposed FYM /m<sup>2</sup>** will increase the yield of flowers. OR
  - ❑ 250 : 80 : 200 : 125 : 400 g / m<sup>2</sup> / yr N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O, Ca, Mg application in 24 splits once in 15 days.

## IRRIGATION:

- ♣ Over watering and poor drainage causes root death and stunted growth.
- ♣ Water logging would cause deprival of oxygen to plants.
- ♣ The growing medium should be evenly moist.



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## **HARVEST AND POST HARVEST:**

After planting normally it takes **110-120 days to come to peak flowering.**

### **STANDARDS**

- Carnation flowers mature in 4-5 months period.
- Standard cultivars are harvested at '**Paint Brush**' stage with half-open flowers, or almost fully open flowers.
- At large bud / tight bud / cross bud stage
- Petals are visible at this stage

### **SPRAYS:**

- When at least 2-3 top flowers have opened & other buds show colour

### **TIME OF HARVEST:**

- 15 – 20 weeks after single pinching

### **YIELD:**

- On an average **10-20 flowers / plant/year** or **150-300 flowers / m<sup>2</sup>/ year**
- Yearly production of 300-400 flower/m<sup>2</sup> is ideal and economical.





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## **POST HARVEST OPERATIONS:**

- Harvested flowers are bunched together based on their physical measurements like length of stem, diameter of flower etc.
- For a good post harvest life, flower stems have to be trimmed at the base and should be immediately placed in a bucket of preservative solution (Acidic pH 4.5) with 2-5 % sucrose and biocides for 2 to 4 hours.
- Carnation flowers can be stored for 2-4 weeks before marketing.
- Flowers have to be packed in cartons lined with polyethylene be pre-cooled without lid.
- The plastic is then loosely folded on top of the stems and the lid is closed.
- These cartons are stored in cool chambers designed to maintain 0°C with good air circulation and a constant RH of 90-95 %.
- Floral preservatives like, 8-HQS or 8-HQC @ 200-600 ppm; STS (Silver Thio- sulphate) @ 0.2- 4mM; Cytokinin @ 10-100 ppm; Sugar @ 0.5-2% and Citric acid @ 50-100 ppm.



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## PHYSIOLOGICAL DISORDER

### CALYX SPLITTING:

Cultivars with too many petals are susceptible to calyx splitting.

Due to **fluctuation in temperature and environmental conditions** also influences calyx splitting.

### MEASURES

Selection of cultivars that are less prone to splitting,

Regulation of temperature and maintenance of optimal fertilizer level can minimize this disorder.

**This can also be reduced by placing a rubber band or 6mm wide clear plastic tape is used around the calyx of the flowers which have just start opening. This operation is referred as 'Calyx banding'.**

## PEST AND DISEASES

**Aphids**

**Thrips**

**Red Spider**

**Nematodes**





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**Grading**



**Packing**



**Packing comprises  
three stages :**

- **Bunching,**
- **Wrapping and**
- **Packing.**



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**THANK  
YOU**

