Carnation Technical & Cultural Guide

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we love to grow

Transplanting of rooted cuttings

To carry out the transplant, it is important to take into account several technical conditions that allow for greater effectiveness in the process.

- **The conductivity of the substrate should not be greater than 1.5**
- **The material to be transplanted must be free of pests and diseases**
- **At the time of transplanting, plants that have low root volume or apical damage should be discarded**
- **Planting density 52 plants/m² for Standard carnation, 39 plants/m² for Spray carnation**
- **Sow first thing in the day when the greenhouse conditions are cool; with a temperature not higher than 15°c**




Substrate and Crop support/Tutors

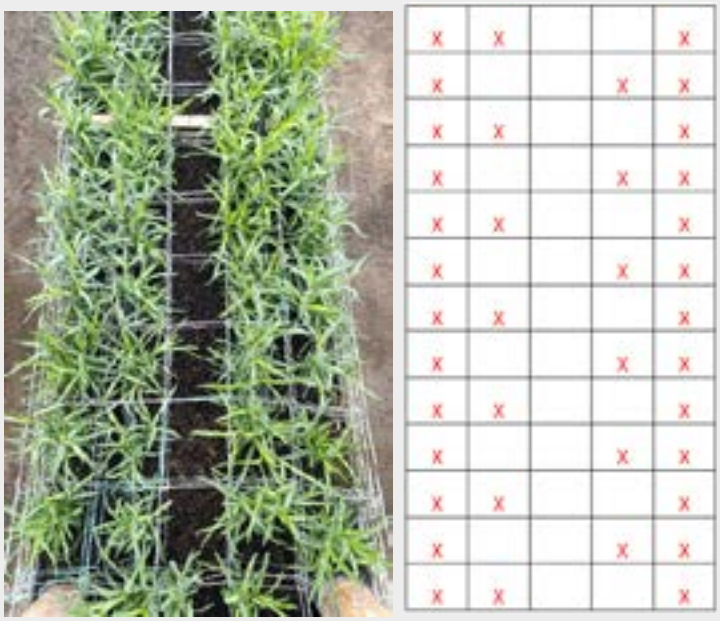
A composition of 80% burnt husk, 10% yellow husk and 10% compost is used. It must be incorporated very well to obtain a homogeneous mixture. It must be previously disinfected with steam at high temperature. When the substrate is ready, the bed with humidity in the field capacity is disinfected with Vitavax 300 WP Fungicide.

Spanish mesh with 5 holes of 11cm*11cm is used, 5 levels of mesh must be placed to be able to guide the plants throughout the physiological process.

Sowing distribution

Take the cutting with your right hand and with your left hand make a hole in the center of the mesh box, place the cutting in the hole, cover the roots and even out the substrate with both hands. Repeat this operation with each of the cuttings until you have planted 100% of them.

Standard 52 plants/m²



Spray 39 plants/m²

Planting

Right way

Wrong way

If cuttings with dehydrated substrate are found during sowing, they should be placed in water for hydration and then later sowing.

Fertilizing

- **Nitrogen:**

Encourages growth. Young plants and after flush.
Too much Nitrogen causes soft and floppy stems. Is quickly leached out.

- **Potassium:**

When lacking thin and weak stems. Lower foliage burns or ripen prematurely.

- **Calcium:**

Give strength to the cell walls. Good for strong stems, leaves and flowers.

- **Phosfor:**

Improves roots and is needed for good intensive colour of flowers.

- **Magnesium:** Is needed for structure of leaf-green. Shortage: less asimilation and less growth.

- **Trace elements:** Iron, Manganese, Zinc, Cupper, Molybdate and Boron are important for growth. Especially Boron.

- **Boron:** In Carnation is very important: Symptoms of shortage: Brittle stems (cracking off stems), Excessive calyxsplitting, failure in flower buds devolepment.

Elements in the growth medium and their values

Element			Optimal nutrient values in mmol/l	
Nitrogen	NH_4^+			4,0
Phosphorus	P			0,2
Potasium	K^+			1,5
Magnesium	Mg^{2+}			1,2
Calcium	Ca^{2+}			2,5
Sulphate	SO_4^-			1,5
Bicarbonate	HCO_3^-	less than		0,5
pH (water)				6,2
Chloride	Cl^-	less than		3,0
Sodium	Na^+	less than		3,0
Boron			in micromol/l	20-25
Conductivity (E:C) in mS	1,5 or less at25°C			

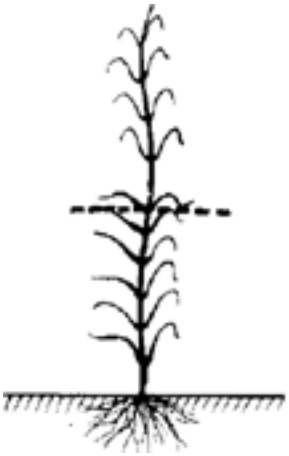
Handling and Management of the crop

Crop management is the set of agricultural practices performed to improve the growth, development and yield of crops and crop maintenance.

Pinch:

It is carried out three weeks after transplanting in the field, the stem is taken from the base part with the left hand, 6 internodes are counted and after that the apex is removed with the right hand 0.5 cm from the internode.

Avoid tears in the plants and leave stumps (apical stem greater than 0.5 cm from the last internode)



1 Pinch

Right Way

Wrong Way

Disbudding:

In standard carnations, unbudding is an essential cultivation practice that consists of removing the lateral buds or buds from a floral stem from the node closest to the main bud to the node where the flower is going to be cut. This work is done only on **Standard carnations**, and it is carried out between week 13-16, the lateral or axillary shoots are removed to guarantee just one flower and the quality of the stem.

Heading:

This work is carried out with a **Spray carnations** in week 13, the apical dominance of the stems is broken, optimizing the formation of lateral or axillary stems (spray).

Watering:

Alwasy use clean water
Never mix drain water with irrigtion water with out desinfecting it before (Fusarium, Virus)
Check drip sistem at leart twice a year, dripplets can be blocked.

Dripline with drippler

Pests & Diseases

Trips:

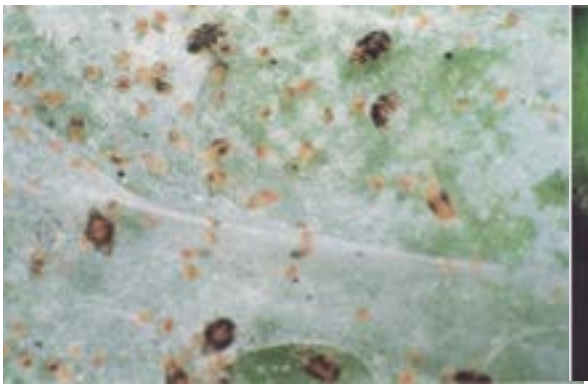
Deformation of leaves and flowers

Adult Thrips

What to do?

- Use blue or yellow plastic “catch sheets”
- If possible use anti-Thrips nets in doors and windows
- Treatments: add Sugar and spray in (late) afternoon with Confidor (imidacloprid) (diclorvos), Dimethoate, Methomyl, Deltamethrin etc

Red spider mite (Tetranychus urticae):



Adults, larves and eggs

Cobweb, adults and eggs on below side of flower bud.

What to do?

- Check plant material
- Check dry and warm places, near doors and windows.
- Treatments: Use products against eggs, larves and adults. - Kelthane, Magister, Omite, Milbeknock, pyridaben, etc.

Caterpillars, different species (Heliothis,Tortrix, etc.)

What to do?

- Use anti-fly nets in windows and doors
- Use light traps
- Treatments: methomyl, deltamethrin, pyrethrines, spinosad, Larvin etc.

Pests & Diseases

Nematodes (Meloidogyne spp)

Roots of Carnation plant with root knots made by nematodes

What to do?

- Use plant clean plant material
- Work hygienic, clean machines and tools etc. from infected soil.
- Preventive treatments: desinfect infected soil before planting. Methyl Bromide if possible.
- Dichlorpropene, Oxamyl.
- Treatments during culture: oxamyl fenamifos (Nemacur) aldicarb (Temik)

Fusarium oxysporum

What to do?

- Use plant clean plant material
- Work hygienic, clean machines, tools and shoes etc. from infected soil.
- Use resistant varieties in case of infected soil
- Desinfect the shoes before enter the greenhouse.
- Treatments: desinfect infected soil before planting. Methyl Bromide if possible.
- Treatments during culture: Benomyl, Rhidomil

Rhizoctonia solani, Alternaria, Phytophtora (Foot rot)

What to do?

- Use plant clean plant material
- Plant well hardened plants (Rhizoctonia)
- Good drenage and structure of soil
- Don´t over water
- Don´t plant too deep
- Treatments during culture: Benomyl, Rizolex, Aliete, Zineb, Mancozeb, Captan

Left: Plant infected by Rhizoctonia, completely died.
Right: Plant infected by footrot, wilted stem and leaves.

Mycosphaerella dianthi, Cladosporium echinulatum: spots

What to do?

- Use plant clean plant material
- Prevent condensation on the plants
- Treatments during culture: Zineb, Mancozeb, Captan, sulphur, etc.
- Keep plants dry before the night
- Start working at clean part of greenhouse
- Keep greenhouse well ventilated
- Be carefull with high Nitrogen and soft plants.

Cladosporium echinulatum, Mycosphaerella dianthi, Alternartia (spots)

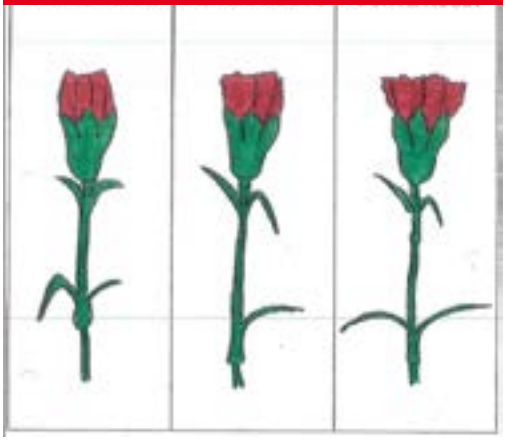
Right: Bud damaged by „spot“ round-oval dry spots with dark border and development of spores in centre.
Left: Spots of Alternaria

Harvest:

- The openning stage to cut depends on the markets and the customers needs.
- Cutting to green reduces vaselife.
- Harvesting needs to be don early in the morning or late in the afternoon.

Spray Cut Stage

Standard Cut Stage



Postharvest:

Reception: Place assigned in the post-harvest where the flower arrives and the process begins, in this place it is stored according to the storage destination or direct classification.

Grading / Classification grades

Standard:

• **Select stems:** are defined as select must have a minimum length of 65 cm, bunches of 25 and 20 stems per bunch. The openings must be uniform according to the client and the need, the leaf removal must be at 10 cm.

• **Fancy stems** that are defined as select must have a minimum length of 55 cm, with 25 to 20 stems per bunch. The openings must be uniform according to the client and the need, the leaf removal must be 10 cm.

• **Standard stems** that are defined as select must have a minimum length of 55 cm, with 25 and 20 stems per bunch. The openings must be uniform according to the client and the need, the leaf removal must be 10 cm.

Spray:

• **Select stems:** are defined as select must have a minimum length of 60 cm, more than 4 flower buds, 20 stems per bunch, the openings must be uniform according to the client and the need, the leaf removal must be 10 cm.

• **Fancy stems** that are defined as select must have a minimum length of 50 cm, more than 3 flower buds, 20 stems per bunch, the openings must be uniform according to the client and the need, the leaf removal must be at 10 cm.

Hydration:

Flowers must be hydrated with a product based on silver thiosulfate, at 1cc per liter of water this process stops the production of ethylene and reduces the senescence process of the flower.

Treatment with preservative solution is mandatory in the Netherlands for ethylene-sensitive flowers.

Prolongs vase life.
Improves the opening of secondary buttons.
Prevents the premature fall of buds, leaves and flowers.

Packaging:

Packeaging is done based on customer needs and the # of stems requested.

It is done in cart board boxes and flowers are protected with paper to avoid humidity/mechanical damage.

Boxes are tied wrapped internally to keep flowers in a fix positions, then boxes are sealed.

Capacity per box QB

300 Stems/Select
350 Stems/Fancy
450 Stems/Standard

Storage:

It is a very important area in the post-harvest, as it is where the final product is stored. It needs appropiate climatic conditions to preserve the quality, it must maintain an internal temperature less than 2° Celsius.

Flowers are stored according to the rotation, usually process the oldest flowers first and save the flower of the day, for later.

Flowers must be acclimatized for 4 hours, then they are packed in baskets with plastic sleeves; this is done until they obtain a temperature of less than 5°C. Then flowers are stored in the cold room with no temperature variation.







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