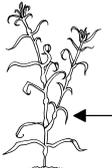


## Sampling Notes

The nutritional status of this flower is monitored using soil tests and plant analysis. Monitoring regularly is important to help sustain optimum levels and avoid nutritional disorders. If disorders do occur, rapid diagnosis is necessary to assist correction.

Regular soil and plant analyses should be obtained through the growing season (e.g. six weekly intervals) in order to monitor the effect of liquid feeding programmes being used. In this way, imbalances may be rectified before any adverse effects on the crop health occurs.

### Leaf

<b>Sampling Time:</b>	6 - 8 weeks after planting, then every 2 months.	
<b>Plant Part</b>	5th and 6th leaf pair from the top.	
<b>Collect From:</b>	Non-flowering stems.	
<b>Quantity per Sample:</b>	50 leaves.	
<b>Recommended Tests:</b>	Basic Plant (BP).	
<b>Comments:</b>	Just prior to flowering or during early flowering is considered to be the appropriate time to sample. However, regular leaf analyses should be obtained through the growing season (e.g. 6 - 8 weekly intervals) in order to monitor the effect of liquid feeding programmes being used.	

### Soil

<b>Sampling Time:</b>	Prior to crop establishment.
<b>Core Depth</b>	15cm.
<b>Collect From:</b>	From the root zone of the plants.
<b>Quantity per Sample:</b>	12 - 20 cores.
<b>Recommended Tests:</b>	Basic Soil (BS), Soluble Salts (SSg).
<b>Comments:</b>	If a problem is suspected during the growing season, then a sample should be taken from the rooting zone immediately adjacent to the plant. Collecting a second sample from an unaffected area may help identify the cause of the problem.

## Interpretation

Interpretation of the laboratory's results is possible by comparison with normal levels expected for the crop in question. The interpretation given is based on the best information available and relate specifically to the sampling instructions given.

Leaf			Soil		
Analyte	Unit	Range	Analyte	Unit	Range
Nitrogen	%	3.3 - 4.2	pH	pH	5.7 - 6.5
Phosphorus	%	0.26 - 0.40	Olsen Phosphorus	mg/L	70 - 150
Potassium	%	2.8 - 4.0	Potassium	me/100	1.5 - 4.0
Sulphur	%	0.27 - 0.35	Calcium	me/100	10 - 20
Calcium	%	1.1 - 1.6	Magnesium	me/100	2.0 - 4.0
Magnesium	%	0.29 - 0.39	Sodium	me/100	0.20 - 0.60
Sodium	%	0.10 - 0.50	CEC	me/100	15 - 30
Iron	mg/kg	51 - 120	Volume Weight	g/mL	0.60 - 1.0
Manganese	mg/kg	50 - 250	Soluble Salts	%	0.0 - 0.15
Zinc	mg/kg	20 - 60			
Copper	mg/kg	6.0 - 10			
Boron	mg/kg	30 - 100			

## Comments

Carnations are thought to be more susceptible to high salt levels than other glasshouse flowers. The soil soluble salts should be maintained at less than 0.15%. Apart from this, they are regarded as being quite tolerant with respect to nutrient levels, showing less chlorosis and variation in leaf colour because of nutrient imbalances than many other glasshouse crops.

Potassium deficiencies are occasionally observed in carnations, with the upper middle leaves developing yellowish necrotic spots. The affected regions become dry and shrivelled.

Manganese deficiency is not likely to occur, but manganese toxicity has been observed, particularly after steam sterilisation of the soil.

Boron deficiencies have also been observed in carnations. Visual symptoms are a shortening of the internodes and deformation of the flowers. The crop is relatively tolerant of boron toxicity.

Because carnations are sensitive to chloride, the sulphate form of fertilisers should be used whenever possible.

Results for copper, zinc and manganese in leaves sprayed with fungicides will not be reliable due to adhering spray residues on the leaves.

Iron deficiency symptoms may exist even when leaf levels appear satisfactory. This may be due to the presence of physiologically inactive forms of iron within the tissue. Also, soil contamination of leaves growing near the ground may elevate total iron results.

## References

- Bunt, A.C. 1976. Modern potting compost. George Allen and Unwin, p 129.  
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 Scaife, A. and Turner, M. 1983. Diagnosis of mineral disorders in plants. Volume 2, Vegetables. MAFF/ARC London.  
 Cresswell, G.C. and Weir, R.G. 1997. Plant nutrient disorders 5. Ornamental plants and shrubs. Inkata Press.

## Disclaimer

Normal Range levels quoted relate specifically to the sampling procedure given. The Normal Range levels and Comments provided are the most up to date levels available, but may be altered without notification. Such alterations are implemented immediately in the laboratory histogram reports. It is recommended that a consultant or crop specialist be involved with interpretations and recommendations.