

# Cutting Raised Miniature Pot Carnations

**Plant type:** Perennial

**Approximate crop timing(mid season):**

Potting to flowering                      12 weeks

**Growing on:**

Temperature	Initially 16 <sup>0</sup> C dropping to 10 - 12 <sup>0</sup> C day and 12 - 14 <sup>0</sup> C night after establishment. The warmer recommended night temperature will produce sturdier more compact plants.
pH	6.0. high pH can cause iron deficiency.
Feeding	Regular 1:1:1 NPK balanced feeding required.
Growth regulation	Plants once established will respond to Chlormequat (Cycocel) 1.0 ml/l. Pinch to produce well structured plants.
Pot size/ spacing	9 - 10 cm. 75 - 80 plants per sq.m
Advice	Generally hardy enough to overwinter. Can be planted out.
Common diseases	Alternaria - leaf spot often in conditions where humidity is high

# Dianthus (Annual)

**Plant type:** Annual  
**Sowing** January - February  
For spring pack or pot sales green in April in colour May  
Later sowings for summer and early autumn pot sales.  
18 - 25<sup>0</sup>C  
Cover with an average layer of medium vermiculite  
Germination in 1 - 2 weeks  
A pre- sowing fungicide drench would be recommended

## Approximate crop timing(mid season):

Sowing to transplanting	3 - 4 weeks
Sowing to flowering	14 weeks (March sowing) 20 weeks (January sowing)
Seedling to flowering	11 - 16 weeks
GREEN 350 to flowering	9 - 14 weeks
GREEN 230 to flowering	8 - 11 weeks

## Growing on:

Temperature Grow under cool conditions with a maximum temperature of 15<sup>0</sup>C. Optimum temperature 12 - 15<sup>0</sup>C  
pH 5.5 - 6.0  
Feeding The use of a slow release fertilizer in the compost is popular for Dianthus. Alternatively a balanced 1:1:1 NPK liquid feeding will be needed from an early stage, changing to a 1:1:2 about 8 weeks after sowing.  
Growth regulation Plants will respond to Chlormequat (Cycocel) 0.5 - 1.0 ml/l applied 5 - 6 weeks after sowing and regularly repeated when necessary. Shade plants from bright sunlight after application. Leaf tip yellowing may occur.  
Pack/Pot size Pack 18 or 9 - 10 cm pot  
Planting out 20 cm  
spacing  
Advice Ensure best light conditions especially early season and grow dry to restrict and harden growth.

Common diseases Alternaria - leaf spot can occur on maturing plants. Dianthus should not be planted in the same area the following year after a problem.  
Fusarium Wilt - yellowing of lower leaves before wilting, soil borne.

Common pest Red Spider Mite, Aphids, Thrips.

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**Approximate crop timing(mid season):**

Potting to flowering 12 weeks

**Growing on:**

Temperature Initially 16<sup>0</sup>C dropping to 10 - 12<sup>0</sup>C day and 12 - 14<sup>0</sup>C night after establishment. The warmer recommended night temperature will produce sturdier more compact plants.

pH 6.0. high pH can cause iron deficiency.

Feeding Regular 1:1:1 NPK balanced feeding required.

Growth regulation Plants once established will respond to Chlormequat (Cycocel) 1.0 ml/l. Pinch to produce well structured plants.

Pot size/ spacing 9 - 10 cm. 75 - 80 plants per sq.m

Advice Generally hardy enough to overwinter. Can be planted out.

Common diseases Alternaria - leaf spot often in conditions where humidity is high

# Fuchsia Fuseedia

**Plant type:** Annual  
**Sowing** December for May pack sales to March for summer planting and sales.  
20 - 22<sup>0</sup>C  
Cover with an average layer of medium vermiculite  
Germination in 2 - 3 weeks  
Light benefits germination

**Approximate crop timing(mid season):**

Sowing to transplanting	3 - 4 weeks
Sowing to flowering	15 - 18 weeks
GREEN 230 to flowering	9 - 12 weeks

**Growing on:**

Temperature Initially 18 - 20<sup>0</sup>C until seedling establishment followed by 16 - 18<sup>0</sup>C  
pH 5.5 -6.0  
Feeding Balanced 1:1:1 NPK regular feeding

Growth regulation	Regulation of plant size can be done by a combination of pinching between the 4th and 6th leaf pair and chemical growth regulant. Plants respond to Chlormequat (Cycoel) at 1.5 ml applied 1 week prior to first pinching and followed with 2 or 3 further applications after pinching.
Pack/Pot size	4 or 6 pack. 9 cm pots.
Planting out spacing	20 cm
Advice	Plants require regular watering and should not be allowed to dry out.
Common diseases and pest	Rust disease - light brown spotting on the underside of leaves. Whitefly and aphids.

## Geranium

<b>Plant type:</b>	Tender perennial
<b>Sowing</b>	December - January for May colour sales Autumn for earlier spring sales 15 - 20 <sup>0</sup> C Cover with an average layer of medium vermiculite Germination in 1 - 2 weeks

### **Approximate crop timing(mid season):**

Sowing to transplanting	3 weeks
Sowing to flowering	15 - 16 weeks
GREEN 350 to flowering	12 weeks
GREEN 230 to flowering	9 weeks
GREEN 100 to flowering	7 - 8 weeks

### **Growing on:**

Temperature Initially 18 - 21<sup>0</sup>C day with night minimum of 17<sup>0</sup>C. This can be gradually lowered as first buds appear to 10 - 12<sup>0</sup>C.

pH	6.0
Feeding	Weekly nitrogen feeding starting 4- 5 weeks after potting increasing to twice weekly mid April onwards. A high potash feed added if growth is soft or excessive. Some growers prefer to use a 3- 4 months slow release fertilizer incorporate in the compost.
Growth regulation	Responds to Chlormequat (Cycocel) 0.5 - 2.0 ml/l applied weekly as a spray to run off from 21 days after sowing until flower buds initiate. The lower rates of chemical should be used initially increasing to higher rates as necessary. A spreader (e.g. Agral) should be incorporated into the spray. Application should not be carried out in strong sunlight or at temperatures below 10 <sup>0</sup> C. Earlier flowering, better basal branching, height control and more distinct zoning are benefits from growth regulation.
Pack/Pot size	9 cm - 1 litre pots. Double six packs.
Planting out spacing	20 - 30 cm depending on variety
Advice	Grow on a dry watering regime especially for autumn sown plants. An anti petal shatter (eg.Argylene) is sometimes used 5 - 10 days before marketing.
Common diseases	Botrytis - grey mould plants crowded with poor ventilation. Pythium - stem and root rots in cold wet conditions

## Cutting Raised Geraniums

### Approximate crop timing(mid season):

GREEN 65 to flowering 7 - 9 weeks ( Peltatums)

GREEN 40 to flowering 6 - 8 weeks

### Growing on: GOOD HYGIENE IS ESSENTIAL AT ALL STAGES OF PRODUCTION

Temperature Minimum of 18<sup>0</sup>C day and night for first 2 weeks after potting. Later maintain a maximum of 20 - 22<sup>0</sup>C day and 15 - 17<sup>0</sup>C night.

pH 5.5 - 6.0

Feeding A balanced NPK weekly feeding should be introduced 2 - 3

weeks after potting, increasing Potassium levels as flower bud develops.

**Growth Regulation** Plants will respond to Chlormequat (Cycocel). The amount generally needed is variety specific. Refer to table for guidelines, however it must be noted that the number of applications will depend on the growing conditions.

Pot size	Americana/Eclipse	11 - 13 cm
	Peltatum	10 - 12 cm
	Scented	10 - 12 cm

**Advice** Allow adequate ventilation to prevent high humidity. Space plants well not allowing the foliage to touch. Do not overwater.

**Common diseases** Botrytis - grey mould. Pythium stem and root rot. Xanthomonas - bacterial wilt and Rust can be serious though not common diseases of cutting raised Geraniums. Strict monitoring of the crop and clean growing conditions are essential.

**Common pests** Aphid, Whitefly, Thrips and Red Spider Mite

### **GUIDE TO GROWTH CONTROL ON CUTTING GERANIUMS**

The use of chemical growth regulant may affect the size, number and timing of flowering. Apply as a light mist to avoid leaf yellowing.

<b>Variety</b>	<b>Rate</b>	<b>No. of applications</b>
Americana Rose Salmon Pink Coral White Splash	0.5 - 1.5 ml/l	1 - 2

Americana	Cherry Dark Red Deep Rose Light Pink Light Salmon Red Rose Splash Violet White	0.5 - 1.5 ml/l	2 - 4
Eclipse varieties		Not usually necessary	
Eclipse Red			2 - 4
Peltatum	Amethyst Coralit Purpalit Rosalit Samat	0.5 - 1.5 ml/l plus pinching	1 - 2
Peltatum	Gillian Katrine Nealit	0.5 - 1.5 ml/l plus pinching	2 - 3
Peltatum	Tomboy Velvet Weisse Perle Mexikanerin Lilian Ville deDresden	0.5 - 1.5 ml/l plus pinching	3 plus
Peltatum Evka		NONE	NONE
Peltatum	Decora Lila Decora Rosa Decora Rot	0.5 - 1.5 ml/l	2 - 3

## Seed Germination Techniques for the Bedding Plant Grower

The most important stage of raising any crop from seed is the germination of the seed itself. Strong, healthy seedlings will develop into the best quality plants, but

unless the various preparations and principles are carried out correctly, the likelihood of problems occurring is increased, and the cost of production will be unnecessarily raised. The following steps, if carried out correctly, will ensure that the best results are obtained.

## **Seed**

Order seed in good time so that it can be sown on time. Delays may result in a missed marketing opportunity. Always buy good quality seed which has been laboratory tested. All GREEN seed is assessed and tested in our own laboratory by specialist staff.

### **Seed is often available in many different forms:**

#### **\*System seed**

This is a refined form of seed which gives guaranteed seedling counts if grown correctly.

#### **\*Active seed**

This is primed seed where the initial stages of germination have been induced. The seed will germinate well, even in a less than optimum environment, producing stronger seedlings in faster time.

#### **\*GREEN Improve Quality Seed**

This has been treated in our own laboratory to make the emergence of seedlings more successful. This may be by breaking dormancy, improving seedling vigour or reducing problems on species prone to disease. Please refer to the reverse of this Fact Sheet for details.

Several items are now available as products which lend themselves easily to machine sowing. Pelleted, coated, clipped and clean seed all improve the ease of handling and accurate sowing by hand or mechanical methods.

Storing seed without losing seedling emergence potential needs carefully controlled humidity and temperature conditions. Seed will not keep for long periods of time and remain in good condition. If you have to store seed, place unopened packets in cold conditions.

## **Hygiene**

The propagating area and equipment must be scrupulously clean. At the start of the season, wash down and sterilize all benches and pathways etc. Make sure that watering systems and associated fittings do not contain algae or contaminated water.

## **Containers**

Whether using seed trays or modules, always use new containers each season. Many of the common fungi which can affect seedlings can be carried over in compost which sticks to previously used trays etc.

## **Compost**

Use fresh clean compost every time. Avoid temptation to reuse compost which has raised one batch of seedlings. The compost should have an open structure and be relatively free draining. A specialist fine grade seed compost, e.g. Levington's F1 is best where nutrient levels are balanced for germination and young seedling growth.

It is a good idea to use a pre-sowing fungicide drench on the compost. The main disease problems will be from Rhizoctonia and Pythium which lead to damping off.

## **Preparation**

Fill the tray or module to level and tap gently to settle the compost. Water (or fungicide drench) the tray thoroughly, using clean watering equipment and allow the compost to drain before sowing.

## **Sowing**

Always sow thinly and evenly on the surface of the compost. Seed that is sown too thickly will be difficult to transplant and root damage is likely. When hand sowing, aim to sow the required amount of seed in two sweeps of the tray unless you are sufficiently skilled to achieve uniform distribution in one sweep.

## **Covering**

Not all seed requires to be covered, particularly items such as Begonia semperflorens or Lobelia which have very fine seed. If in doubt, cover to the depth of the seed itself, using compost or a medium grade Horticultural Vermiculite. This is recommended as it retains moisture during germination and allows some light to get through once the seed coat has split.

High humidity levels should be maintained in the trays either covering, e.g. with polythene or placing in a relative humidity of over 80%. If the surface of the compost is allowed to dry, then germination will be affected. Some species will germinate best in the dark and, therefore, black polythene can be used, remembering that this will absorb heat in some instances.

## **Temperatures**

Temperature has a great effect on the germination process. Different species have different optimum temperature ranges at which germination is best. Once outside the optimum temperature range, the number of seedlings which will emerge from the seed is reduced. An air thermometer placed some distance above the bench will not give an accurate reading for germination temperature. It is the compost temperature at seed level which is important.

### **Management**

Check temperature and moisture levels daily. As soon as germination has taken place, remove any covering and place in the light so that the seedlings do not become leggy. Keep accurate records of sowing dates and early seedling growth in your own conditions. This will enable you to plan future sowings and avoid bottlenecks at the transplanting stage.

### **Facilities**

Wherever possible, use a heated bench or growing room with a reliable thermostat. For detailed information on the construction of these contact: The Electricity Council, Farm Electric Centre, National Agricultural Centre, Kenilworth, Warwickshire, CV8 2LS

GREEN Seeds Ltd. recommendations for optimum seed germination conditions are shown on each seed packet and also in the current catalogue.

### **GREEN IMPROVED QUALITY SEED**

Several subjects that we offer are treated or cleaned in our own laboratory in order to improve the emergence potential. As a result, many of our varieties have a much higher emergence potential or yield more seeds per gram than untreated seed of the same variety.

<b>Antirrhinum</b>	decolourised and approximately 5% more seeds per gam.
<b>Arabis</b>	cleaning and grading gives improved emergence.
<b>Asparagus</b>	fungicide treatment reduces damping off and results in a higher seedling count.
<b>Aster</b>	clean seed contains 2 - 3% more seeds per gram with less disease risk
<b>Bellis</b>	cleaned to remove dust and debris.
<b>Branchycome</b>	cleaned seed contains 4 - 6 % more seeds per gram
<b>Campanula Chelsea Pink</b>	fungicidally treated to combat Alternaria
<b>Carnation</b>	fungicide treatment results in up to 25% more seedlings
<b>Chrysanthemum multicaule Gold Plate &amp; Moonlight</b>	cleaned seed increases purity.
<b>Coreopsis Early Sunrise &amp; Cutting Gold</b>	dormancy broken and fungicide treated.
<b>Cyclamen</b>	fungicidally treated seed to combat Fusarium.
<b>Dahlia</b>	cleaned to remove dust and inferior seed.
<b>Diascia Pink Queen</b>	cleaned to remove dust and inferior seed.
<b>Dianthus F1 Parfait</b>	fungicidally treated seed to compat Alternaria and damping off.
<b>Dicentra</b>	dormancy broken to improve emergence.
<b>Digitalis Excelsior hybrids</b>	smallest seeds are removed
<b>Doronicum Magnificum</b>	dormancy broken to improve emergence.
<b>Erysimum</b>	cleaned to improve purity.
<b>Eucalyptus</b>	cleaned seed resulting in virtually 100% pure seed

<b>Gentiana Lagodechiana</b>	dormancy broken to improve emergence.
<b>Geum</b>	clean seed contains approximately 3 - 6% more seeds per gram.
<b>Helenium Red &amp; Gold</b>	dormancy broken to improve emergence.
<b>Hollyhock</b>	removes dust from the seed coat improving handling.
<b>Hypericum</b>	small inferior seed is removed.
<b>Inula</b>	impurities and small seed is removed
<b>Kochia</b>	clean seed contains approximately 16% more seeds per gram
<b>Lathyrus</b>	increases emergence speed and gives up to 30% extra seedlings
<b>Laurentia</b>	impurities and small seed is removed.
<b>Lavatera Beauty Series</b>	scarified to increase emergence.
<b>Lavender</b>	dormancy broken to increase speed, uniformity and number of seedlings.
<b>Lobelia</b>	more seeds per gram and treated against Alternaria.
<b>Meconopsis Betonicifolia</b>	inferior light seed is removed.
<b>Mesembryanthemum</b>	cleaned seed contains up to 3% more seeds per gram.
<b>Mina Lobata</b>	scarified to increase emergence.
<b>Nemesia</b>	clean seed, decolourised for earlier identification.
<b>Papaver</b>	graded to result in a higher seedling count.
<b>Plumbago</b>	cleaned and graded. Seed results in a higher seedling count
<b>Polyanthus/Primrose</b>	many varieties graded to improve seedling count.
<b>Primula</b>	dormancy broken to improve emergence.
<b>Saxifraga</b>	small inferior seed is removed.
<b>Sedum</b>	small inferior seed is removed.
<b>Solanum</b>	dormancy is broken to improve emergence.
<b>Stocks</b>	clean seed with dust reduced for easier sowing and more seeds per gram.
<b>Thalictrum</b>	clean seed for easier handling and improved germination.
<b>Thunbergia</b>	cleaned to give a higher seedling count
<b>Trollius</b>	removes inhibitors allowing dormancy to be

	broken.
<b>Verbena Imagination</b>	seed purity greatly improved.

Refer to our catalogue for full details of all GREEN Improved Quality Seed treatments.

## **The Use of Growth Regulation in Bedding Plant Production**

The increased choice of more dwarf and compact varieties available from breeders has reduced the need for some specific growth regulation in plant production. However, many varieties do benefit from growth control.

### **NON CHEMICAL GROWTH REGULATION**

It must always be recommended that the three best growth regulants are light, temperature and moisture. By skillful control of these, good quality plants can be achieved with a minimal use of chemical regulation.

The majority of bedding plants respond better to a dry rather than wet growing regime. This will help to produce plants which are more sturdy and compact, with reduced leaf vegetative growth and the ability to initiate more flowers. Plants grown in drier conditions will also be less susceptible to disease problems such as Pythium, Rhizoctonia and Botrytis.

It is always important to control optimum growing temperature with regard to the particular crop being grown. Where effective temperature control can be maintained it is possible to use manipulation of the night and day temperature to control the growth habit of some plant types. Recently, such temperature control methods are being more widely used. The difference between day and night temperature, or DIF, may be reversed so that plants are being growth at warmer temperatures at night than in the daytime. This can cause reduced height growth. If the temperature at dawn, for the first couple of hours at daylight, can be maintained some 3 - 4<sup>0</sup>C lower than the night-time temperature, then good growth control can be achieved.

In our trial production, we have found that this method has been effective when growing the following items:

	Night Temperature	Dawn Drop	Day Temperature
Pansy/Viola	7 <sup>0</sup> C	0 <sup>0</sup> C	4 <sup>0</sup> C
Impatiens			

Petunia Salvia Ageratum	16 <sup>0</sup> C	12 <sup>0</sup> C	12 <sup>0</sup> C
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This has worked effectively for our early season production, but is not so practical in the warmer months. The use of this negative DIF as described may also delay flowering for a few days. When applying DIF it is important to be able to accurately monitor temperatures. Too severe negative DIF can result in plants becoming chlorotic. If this happens, the problem can be reversed simply by returning to temperatures higher in the daytime than night for a few days.

### **CHEMICAL GROWTH REGULATION**

Chemical growth regulants are commonly used by the bedding plant grower as means of producing more compact plants, with the added bonus - in some cases - of improving foliage colour and reducing the amount of space required per plant. There may be a slight delay in flowering, but this can be offset by earlier sowings.

The two most widely used chemical growth regulators are applied as a fine spray, usually absorbed through the leaf which has been wetted to the extent that formation of large droplets or excessive run off is avoided. 'Spray to glisten' is a term often used to describe the required amount of solution to be used. Growth regulants should only be applied in the cool of the day to healthy plants which have been well watered beforehand and when the foliage is dry. Treated plants should not be watered for 24 hours after spraying. No other chemicals should be applied with growth regulants. With certain crops, such as Geranium, the application of a growth regulator at the highest concentration will possibly result in marginal leaf scorch. For this season some growers prefer to spray a weaker solution on a more regular basis. We recommend this policy unless you are absolutely conversant with the use of these products. A common belief is that an application of a growth regulant that worked well one season will automatically work on the same crop the following year. There can be variation for several reasons: incorrect mixing or application, differing stages of growth, changes in feeding or watering practices or incorrect light and temperature management, all of these will influence the effectiveness of the chemical used.

For a chemical plant growth regulator to be effective, it must be absorbed by the plant and applied when and where new growth occurs. Growth regulators cannot make plants smaller, so it is important to apply sooner rather than later. The overall purpose of application is to check and control growth.

The two main chemical growth regulants used for summer bedding are:

**DAMINOZIDE** Supplied in soluble powder form which contains a wetting and spreading agent. This product is sold under the trade names of ALAR, DAZIDE or B-NINE.

**CHLORMEQUAT** Supplied in liquid form to be diluted according to the species. This chemical should be used in conjunction with a non-ionic wetting agent (e.g. Agral at 1ml/10 litre of mix). Growers may be familiar with the names CYCOCEL and C.C.C. These are common product names for the chemical Chlormequat. The percentage active ingredient of Chlormequat in products varies and this should be checked before application so that the correct dilution rate is used.

Another chemical with limited use is:

**PACLOBUTRAZOL (BONZI)**. A good response is achieved on Pansy, Geranium and Petunia, but the mode of action differs from that of the above two chemicals. The product is effective mainly by systemic action via the stem and only to a lesser extent by leaf absorption. It is essential, therefore, to 'drift' the spray through the crop rather than apply to run-off. Too much chemical applied to foliage and running off into the compost can have a severe regulating effect, with permanent inhibition. Plants to be treated must be under no stress and the foliage must be dry. Application rate is generally 1.25 ml per litre of water. However, growers are advised to experiment with small quantities of plants before treating the entire crop.

With the increase in use of modules for seedling production there is sometimes a requirement for holding the plants back for a few days prior to transplanting. Growth regulators can be used for this purpose, but only at very low concentrations (e.g. Daminozide at 1000 ppm or Chlormequat at 250 ppm) on certain crops. This treatment will also encourage stronger root and shoot growth once the seedlings are transplanted, providing supplementary liquid feeding is given.

### **IMPORTANT:**

The following growth regulators have been used on our trials. Their suggested application rates are based on Daminozide at 85% a.i. and Chlormequat at 46% a.i.

<b>Genus</b>	<b>Recommended Growth Regulator</b>	<b>Dilution Rate</b>	<b>Remarks</b>
			Pack grown plants -

Ageratum	Daminozide	1500-3000 ppm	spray at 4 true leaves. Repeat 14-21 later.
Antirrhinum	Chlormequat	500 ppm	Only necessary to use if plants are likely to develop soft growth.
Begonia semperflorens	Chlormequat	250 ppm	Can be used to reduce foliage size if sprayed 2-3 times before flowering if necessary.
Calceolaria rugosa type	Chlormequat	700 ppm	Apply when flower axis elongates and again 14 days later.
Dahlia	Daminozide	2500-3000 ppm	Spray taller varieties when first bud appears.
Dianthus	Chlormequat	250-500 ppm	Spray when well established, then at twice weekly intervals.
Geranium	Chlormequat	250-1000 ppm	Spray 21 days after sowing and repeat every 7-10 days until flower buds initiate. An initial rate of 250 ppm is used building up to a maximum rate of 500 ppm for F1Multiblooms and 1000 ppm for other Geraniums.
Impatiens	Daminozide	3000-4000 ppm	21 days after transplanting, then twice weekly, stopping before buds appear.
Lobelia	Chlormequat	250-500 ppm	As soon as plants cover the box. Only if necessary.
Mesembryanthemum	Daminozide	2500-3000 ppm	Spray at 5th true leaf stage.
Mimulus	Daminozide	2500-3000 ppm	Spray at 4-6 true leaf stage.
Nemesia	Daminozide	2500-3000 ppm	Spray when plants cover

			the box. Only if necessary.
Nicotiana	Daminozide	2500-3000 ppm	Spray at 4-6 true leaf stage. Only if necessary.
Ornamental Kale	Chlormequat	500-1500 ppm	Start once true leaves have developed. Several applications necessary at 7-10 day intervals.
Pansy	Chlormequat	250-2000 ppm	Spray at 2-3 true leaves, repeat at 10-14 day intervals.

# Impatiens

## Seed raised Impatiens

**Plant type:** Tender Annual  
**Sowing** January - May for pack sales and summer bedding  
20 - 25<sup>0</sup>C  
Cover with an average layer of medium vermiculite  
Germination 2 - 3 weeks  
Light is beneficial for the first stages of germination.

**Approximate crop timing(mid season):**

Sowing to transplanting	3 weeks
Sowing to flowering	10 weeks
Seedling to flowering	6 weeks
GREEN 550 to flowering	5 weeks
GREEN 350 to flowering	5 weeks
GREEN 230 to flowering	4 weeks
GREEN 80 to flowering	4 weeks

**Growing on:**

Temperature Initially day 18<sup>0</sup>C minimum night 15<sup>0</sup>C. After establishment night temperature can be lowered to 12 - 15<sup>0</sup>C.

pH	6.0 - 6.5
Feeding	Balanced NPK feed at weekly intervals after bud initiation. Plants are sensitive to high EC concentration levels
Growth regulation	Particularly for pack production respond to Daminozide (Alar, B-Nine) at 3.0 - 3.5 g/litre stopping before flower buds appear.
Pack/Pot size	Pack 12 - 18's. Pot 9 cm up to 1 litre for mid summer booster sales
Planting out spacing	15 - 20 cm.
Advice	Strict hygiene should be maintained at sowing and throughout the production. Grow on a dry compost regime with as much light as possible. Maintain temperature levels and avoid leaving plants wet late in the day to prevent growth tip abortion.
Common diseases	Rhizoctonia, Pythium - damping off diseases

## **Cutting Raised Impatiens Double Impatiens**

### **Crop timing**

GREEN 69 to finishing 10 - 12 weeks

### **Growing on:**

Temperature	22 <sup>0</sup> C day and 18 <sup>0</sup> C night
pH	6.2 - 6.5
Feeding	Regular low level balanced feeding. High nutrient levels will promote leafy growth with few flowers and can damage roots
Growth regulation	Not essential but the plants will respond to Daminozide (Alar, B-Nine) at 3.5 g/litre applied after the plant has covered the spot surface.
Pot size	10 - 12 cm
Advice	Maintain a just moist compost, drying out will cause flower abortion. Plants require good light but shade lightly on very bright days to keep flowers above the foliage and prevent leaf burn Space plants well to avoid stretching

# New Guinea Impatiens

## Crop timing

GREEN 82 to finishing 14 - 16 weeks

## Growing on:

Temperature Initially 18<sup>0</sup>C minimum night dropping to 16<sup>0</sup>C after establishment and 22<sup>0</sup>C day

pH 5.8 - 6.2

Feeding A balanced fertilizer at 150 ppm nitrogen after establishment increasing potash at flowering. Plant are very sensitive to high EC levels. Incorporating a slow release long term granular fertilizer in the compost is popular for this crop.

Growth regulation Not necessary

Pot size 9 cm minimum through to large containers. Intermediate potting on is required.

Advice Good hygiene is essential. Plants require high light levels. Watering should not be at saturation but plants should not be allowed to wilt. Space plants once the foliage touches.

Common pests and diseases Tomato Spotted Wilt Virus carried by Thrip causing spotting and distortion. Pythium, Phytophthora, Phizoctonia root rots. A regular fungicide would be recommended. Red Spider Mite, biological control is useful since the crop is very sensitive to certain chemicals.

# Laurentia

**Plant type:** Annual

**Sowing:** For early flowering September/ October  
For flowering early July sow January - February  
15<sup>0</sup>C  
Do not cover with vermiculite  
Germination in 3 weeks

## Approximate crop timing:

Autumn sowing to flowering	32 - 34 weeks
January sowing to flowering	24 - 26 weeks
GREEN 230 to flowering	18 - 22 weeks

GREEN 100 to flowering      11 - 14 weeks

**Growing on:**

- Temperature 15<sup>0</sup>C until established and then cool until risk of frost is over.
- pH 5.5 - 6.0
- Feeding Maintain a low level balanced feeding program early on increasing potassium after the flower buds develop.
- Growth regulation Plants can benefit from being cut back hard 3 - 4 weeks after potting on. This gives good habit control and does not significantly delay flowering. We have found a limited response to B-Nine at 5.0 g/l and to Cycocel at 2.0 ml/l: 2- 3 applications on a weekly basis give some habit control.
- Pack/Pot size 10 - 12 cm pot. Can be used in Baskets as a guide 6 - 8 plants per 12 in basket.
- Advice Growing cold is the best method of production for a good quality plant. However this may delay flowering. It is important to keep plants well ventilated and on a dry regime.  
The plant sap may be irritating to eyes and skin.
- Common pests and diseases Botrytis - Grey mould more likely in poorly ventilated and high humidity conditions.

## Marigold

- Plant type:** Tender annual
- Sowing:** 20 - 25<sup>0</sup>C  
Cover with an average layer of medium vermiculite  
Germination 1 - 2 weeks

- Approximate crop timing (mid season):**  
Sowing to transplanting      1 - 2 weeks

	(as soon as the cotyledons are expanded)
Sowing to flowering	8 - 10 weeks
Seedlings to flowering	7 - 8 weeks
GREEN 350 to flowering	5 weeks
GREEN 230 to flowering	4 - 5 weeks
GREEN 80 to flowering	3 weeks

### Growing on:

Temperature	12 - 16 <sup>0</sup> C night and 18 <sup>0</sup> C day
pH	6.0 - 6.5. A low pH can cause iron, manganese or sodium toxicity shown by leaf chlorosis or leaf margin burn.
Feeding	Weekly balanced feeding. It is important not to add excessive ammonium nitrogen which will encourage leafy growth.
Growth regulation	This is not normally necessary. However plants will respond to Daminozide (Alar, B-Nine) at 3.5 g/litre
Pack/Pot size	French: 5 plants per strip or 15's and 18's packs 9 cm pots
Planting out spacing	French 15 cm. American and Triploid 25 cm
Advice	Grow on a generally dry regime but bud abortion and lack of flowers can occur if the plants are too dry and stressed. Good light levels needed.
Common pests and diseases	Phytophthora - Damping off of seedlings in over wet compost or with poor hygiene. Botrytis - Grey mould in hot humid conditions causing lower leaf damage and also flower damage if outdoor conditions are excessively wet. Red Spider Mite specking and webbing on leaves in early summer dry, warm conditions.

## Ornamental Kale

<b>Plant type:</b>	Half Hardy Annual
<b>Sowing:</b>	May to early July for September - October sales. Large pot sales require the earlier sowing time.
	15 - 20 <sup>0</sup> C
	Cover with an average layer of medium vermiculite
	Germination 1 - 2 weeks
	Seedling emergence is very fast.

**Approximate crop timing (mid season):**

Sowing to transplanting	10 - 14 days
Sowing to color sales	11 - 12 weeks for 11- 13 cm pot size 7 - 8 weeks for 9 cm pot size
GREEN 230 to color sales	5 - 8 weeks

**Growing on:**

Temperature	13 - 15 <sup>0</sup> C optimum. Plants respond to cool nights and are best grown outdoors.
pH	6.0
Feeding	Constant balanced NPK feeding. Many growers prefer to incorporate a slow release fertilizer in the compost. It is important to maintain nitrogen levels until the temperatures cool in September and the plant starts to colour, or plants will show yellowing and lose lower leaves. Nitrogen levels can be reduced once coloration starts.
Growth regulation	Plant will respond to Daminozide (Alar, B-Nine) at 3.5 - 5.0 g/litre. First applications can start after the transplanted plant has established. Several applications may be necessary. No further growth regulant should be added after the plants begin to develop colour.
Pot size	Variable. 9 cm through to 2 litre.
Planting out spacing	20 - 30 cm
Advice	Seedlings can be transplanted to the depth of the first pair of leaves. Transplant plugs before roots become restricted in the plugs. Often transplanted directly into the marketing container. A clay based compost gives the plants extra stability. Allow to dry between watering and water early in the morning to avoid wet overnight foliage.
Common pests and diseases	Inspect for Flea beetle, Caterpillar, Cabbage aphid. Some growers prefer to take preventative measures against Cabbage Root fly 7 -10 days after potting on and immediately after planting out. Downy Mildew and Botrytis - Grey Mould where plants are kept wet and poorly ventilated.

## **Primrose and Polyanthus**

**Plant type:** Hardy and tender Perennials

**Sowing:** Main sowing period May - July  
 15 - 20°C  
 Do not cover with vermiculite  
 Radicle emergence 7 - 10 days  
 Cover with a thin layer of fine vermiculite  
 Return to propagation area until cotyledon emergence

**Approximate crop timing (mid season):**

Sowing to transplanting	5 - 6 weeks
Approximate age of young plants plugs at delivery	
Seedlings	6 weeks
GREEN 230	7 - 8 weeks
GREEN 100	10 weeks

Seed/young plant to flowering is controlled by variety:

Varieties requiring frost protection

<b>Flowering</b>	<b>Primrose</b>	<b>Polyanthus</b>
<b>Early varieties</b> (October - December)	Quantum Pageant	Pacific Giants
<b>Mid early varieties</b> (November - December)	Danova	
<b>Mid season varieties</b> (Late December - February)	Gemini Forza Charisma	Rumba
<b>Mid late season</b> (February - March)	Supra	
<b>Late season varieties</b> (March - April)	Alaska	
<b>Outdoor Varieties for Autumn planting</b>	Primrose Husky Primrose Wanda	Polyanthus Crescendo

**Growing on:**

Temperature	After young plant establishment 5 - 10 <sup>0</sup> C. Frost protection below 3 <sup>0</sup> C.
pH	5.5 - 6.0. High pH can cause chlorosis as iron becomes unavailable. Iron sequestrene drench can help.
Feeding	The crop requires LOW feeding levels using a non ammonium based feed. Plant roots are sensitive to high salt levels.
Growth regulation	The economics of the crop do not usually warrant chemical growth regulation. However the plants do respond to Daminozide at 2.0 g/l used before flower buds opening. Chemical growth regulation should not be used on the varieties Gemini and Quantum which have been specifically bred to have smaller leaf size. The best growth regulation is cultural: low feed, low temperature and maintain a dry regime through winter.
Pack/Pot size	9 cm pot or six packs for outdoor varieties
Planting out spacing	20 cm
Advice	The young plants should be shaded in bright sunlight. The crop can be grown outdoor until Autumn frosts. It is essential to space the plants well and provide good ventilation.
Common concerns	Late sowing of the late season varieties can lead to blindness. High temperatures can lead to Polyanthus stems in Primroses and high temperatures broken by a short cold period August or early September can promote premature flowering. Botrytis - Grey mould, and Ramularia - leaf spot, can affect plants in high humidity, poor ventilated conditions. Monitor the crop for Aphids, Red Spider Mite and Whitefly.

# Poinsettia

## Care on Arrival

Water plants on arrival if necessary.

Use a well aerated loam free compost pH approx. 6.0.

Pot as soon as possible after delivery with the Jiffy only just below the compost surface.

Water the growing medium after potting to maintain a moist environment round the roots.

Apply a balanced feed within a week.

Grow on at 20<sup>0</sup>C minimum night and 25<sup>0</sup>C day for the vegetative stage, use shading in strong light.

Apply a fungicide drench to prevent stem and root diseases. Good hygiene and disease protection is essential through the production of the crop.

## Growing on

Pinching can be done to establish shape about 2 weeks after potting on.

Good humidity around the plants after pinching will encourage breaks.

Maintain well balanced liquid feeding until the end of September when potash can be increased.

Temperature can be dropped to 18 - 20<sup>0</sup>C late September and as the crop matures further lowering over 2 - 3 weeks in 0.5<sup>0</sup>C steps to 14 - 15<sup>0</sup>C will harden the plants and intensify bract colour.

Space well to maximise light and ventilation.

# Petunia Grandiflora and Multiflora

**Plant type:** Tender annual  
**Sowing** 20 - 25°C  
Sow thinly. Do not cover with vermiculite  
Germination 2 - 3 weeks  
The use of a pre sowing fungicide would be recommended  
Light is benefits germination.

## **Approximate crop timing(mid season):**

Sowing to transplanting	2 - 3 weeks
Sowing to flowering	10 - 12 weeks (allow 2 weeks extra for double varieties)
Seedlings to flowering	7 weeks
GREEN 550 to flowering	6 weeks
GREEN 350 to flowering	5 weeks
GREEN 230 to flowering	4 weeks
GREEN 80 to flowering	3 weeks

## **Growing on:**

Temperature Initially 15°C until transplanted seedlings or plugs have established. The plants should then be protected from frost but temperatures lowered to below 10°C to produce a well branched vegetative plant. To promote flowers warmer temperatures needed over 12°C at compost level.

pH 5.5 - 6.0. Higher pH will cause chlorosis as iron is unavailable.

Feeding Balanced NPK fertilizer approximate 10 days intervals. High ammonium nitrogen can cause soft leggy growth.

Growth regulation After the plants have established growth regulation may be necessary. The plants respond to Daminozide (Alar, B-Nine) at 3.5 g/litre. Several applications may be necessary. Stopping before flower buds develop.

Pack/Pot size 18's pack or 9 cm - 1 litre pots  
 Planting out spacing 20 cm.  
 Advice Grow cool and dry, allowing plants to dry between watering. Do not allow plants be wet overnight. Provide good ventilation. Plants require good light over 14 hours per day to flower.  
 Common diseases Pythium, Phytophthora - Damping off. Good hygiene essential.

## Cutting raised Petunias

Once established require a growing regime minimum 10 - 12°C with a regular balanced feeding programme. Pinching is required to produce a good branched habit if further growth regulation is required plants respond to Daminozide (Alar, B-Nine). High light levels needed for flower production. Good hygiene essential throughout production.

## Junior Petunia™

**Plant type:** Tender annual  
**Sowing** 20 - 25°C  
 Sow thinly. Do not cover with vermiculite  
 Germination 2 - 3 weeks  
 The use of a pre sowing fungicide would be recommended  
 Light is benefits germination.

### Approximate crop timing(mid season):

Sowing to transplanting	2 - 3 weeks
Sowing to flowering	8 - 9 weeks
GREEN 550 to flowering	6 weeks
GREEN 350 to flowering	5 weeks
GREEN 230 to flowering	4 weeks
GREEN 80 to flowering	3 weeks

### Growing on:

Temperature 12 - 16°C  
 pH 6.0.  
 Feeding A balanced feeding programme throughout the plants development is needed, increasing to a 1:1:3 high Potash feed about 2 weeks prior to sales to encourage flowering.  
 Growth regulation Should not be necessary. The plant is naturally compact  
 Pack/Pot size 18's pack or 9 cm pot  
 Planting out spacing 20 cm.

**Advice** Transplant directly into the finished pack or pot. Plants need to be kept actively growing NOT stressed as may benefit other types of Petunia. A good balance of air and water is needed in the compost for good root development. Liberally water the plants and then allow the compost to dry back but NOT to the point of plant wilting before the next watering. Water early in the day so that water does not sit on the plants overnight. The plants require good light conditions and are long day plants needing over 12 hours light a day to initiate flower buds.

**Common diseases and pests** Pythium, Phytophthora - Seedling damping off in poor hygiene germination conditions.

## **Pansy and Viola**

**Plant type:** Perennial treated as biennial. Some Winter hardy

**Sowing** July - August for Autumn colour back sales and outdoor winter plantings  
(Pansy F1 Universal Plus and Banner, Viola F1 Penny and Sorbet)  
September - October for pot/pack overwintering spring sales and plantings. (Pansy F1 Turbo, Viola F1 Penny and Sorbet)  
15 - 20<sup>0</sup>C  
Cover with an average layer of medium vermiculite.  
Germination 2 - 3 weeks

### **Approximate crop timing(mid season):**

Sowing to seedling transplanting	3 - 4 weeks
July - August sowing to flowering	10 weeks
September sowing to flowering	25 weeks
GREEN 230 plug delivered weeks 28 - 40 to flowering	4 weeks
GREEN 230 plug delivered weeks 40 - 46 to flowering	20 - 24 weeks
GREEN 230 plug delivered weeks 2- 8 to flowering	6 - 8 weeks

### **Growing on:**

Temperature Maintain below 20<sup>0</sup>C if possible through summer months.

Overwinter pot production average 5 - 10°C. The crop will stand lower temperatures fleecing may be used if very cold night temperatures are forecast.

pH 5.8 - 6.0

Feeding Once the roots of the plants have developed to the wall of the container feeding can be every 2 to 3 watering at 100 ppm with a non ammonium based fertilizer when the plants are actively growing.

Growth regulation Chemical growth regulation is likely to be needed from the 2 - 3 true leaf stage. Chlormequat (Cycocel) at 1 - 2 ml/litre repeated 2 or 3 times at about 10 day intervals is usually sufficient. Extra applications can be needed if temperatures are high. Violas generally require less. Daminozide (Alar, Dazide, B-Nine) also has some effect when used as first flower buds show. Overwintered Pansy plants are responsive to a negative DIF program with a dawn drop in temperature.

Pack/Pot size 6 pack or 9 cm pot

Advice Plants should be grown dry watering evenly when necessary. Chemical growth regulators applied in high temperatures can cause malformed growth. The crop needs to have good air circulation in well ventilated conditions.

Diseases Downy Mildew seen as upper surface leaf yellowing with grey/pink felt growth under the leaf.  
Ramularia brown papery leaf spot which is yellow edged.  
Mycocentrospora dark purple leaf spots.  
All are spread in high humidity and poor ventilated conditions.  
Thielaviopsis (Black Root Rot) black lesions on the root.  
High temperatures, high compost pH and stressed plants will be affected most.  
Fungicides can be used for prevention or control at early stages.

# Ranunculus

**Plant type:** Tuberos rooted hardy perennial  
**Sowing:** August to October for March to April colour sales  
15<sup>0</sup>C  
Cover with an average layer of medium vermiculite  
Germination 3 - 4 weeks  
Chilling for 1 week at 4<sup>0</sup>C after sowing can improve emergence

## Approximate crop timing (mid season)

Sowing to seedling transplanting	5 - 6 weeks
Sowing to flowering	August sowing March October sowing mid April
GREEN 230 to flowering	20 - 22 weeks

## Growing on:

Temperature After transplanting seedling or plug 14 - 16<sup>0</sup>C for 2 weeks until established. Then average 8 - 10<sup>0</sup>C (night minimum 5<sup>0</sup>C, day maximum 12<sup>0</sup>C ) to promote vegetative growth and

initiate flower buds. Flower stems will lengthen with higher light levels and long days, temperatures can then be raised 8 - 12<sup>0</sup>C night and 12 - 15<sup>0</sup>C day.

- pH 6.0 - 6.5.
- Feeding After establishment a balanced regular feeding program to maintain approximately EC 1.4. This may increase as the flowers develop.
- Growth regulation The dwarf MAGIC SERIES DOES NOT REQUIRE GROWTH REGULANTS. The Accolade series will respond to Daminozide (Alar, B-Nine) at 3.5 - 5.0 g/litre. The first application should be as soon as the buds are visible in the heart of the plant or as soon as leaf stems begin to elongate.
- Pack/Pot size Double six pack or 9 - 10 cm pot
- Pot spacing 10 cm 50 per sq.m
- Advice Plants should not dry out between waterings when actively growing. Ventilation should be good in cold conditions.
- Common pests and diseases Phytophthora root disease. Ramularia leaf spot. Botrytis - grey mould. Leaf miner, aphids.

## Stock Cinderella

**Plant type:** Tender Annual, Selectable Stock.

**Sowing** November - March  
15 - 20<sup>0</sup>C  
Cover with an average layer of medium vermiculite  
Germination 1 - 2 weeks

**Approximate crop timing:**

Sowing to transplanting 2 - 3 weeks  
Sowing to flowering 13 - 15 weeks  
February sowing natural flowering end April/May  
December sowing with supplementary 14 hour light through mid  
January and February flowering end March/April

**Growing on:**

Temperature	5 - 8 <sup>0</sup> C after seedlings establish but before transplanting to allow leaf colour segregation of doubles to be visible. On average 30 - 40 % of seedlings should be pale/yellow, these develop double flowers. After selection 10 - 12 <sup>0</sup> C
pH	6.0 - 6.5
Feeding	As flower buds develop keep constantly moist and feed with a well balanced liquid feed containing trace elements.
Growth regulation	Growth regulation may not be necessary. Plants however will respond to Daminozide (Alar, B-Nine) at 3.5 g/litre
Pot size	9 cm
Advice	Grow cool and in bright light with plenty of ventilation. Good light is essential for the development of a good flower spike. If plants are to be bedded out they should be planted out green
Common diseases and pests	Botrytis - grey mould and Downy Mildew are both minimised by good hygiene and adequate ventilation. Aphids and Leaf Miner presence should be monitored

## Helichrysum Chico

**Plant type:** Tender Annual

**Sowing** April - May  
Earlier sowings can be made but may require supplementary lighting and growth regulation.  
20<sup>0</sup>C  
Cover with a thin layer of fine vermiculite  
Germination 1 - 2 weeks

**Approximate crop timing:**

Sowing to flowering	10 - 12 weeks
GREEN 230 to flowering	7 - 9 weeks
GREEN 100 to flowering	5 - 6 weeks

**Growing on:**

Temperature	18 - 21 <sup>0</sup> C
pH	5.8 - 6.5
Feeding	Maintain low level Nitrogen feed to limit vegetative growth
Growth regulation	Only necessary if plants develop leaf growth. Variety responds to B-Nine around 4 weeks after sowing. Two or more applications may be necessary at 10 - 14 day intervals.
Pack/Pot size	10 cm
Planting out spacing	25 - 30 cm
Advice	Stressing plants by drying down and low feed levels promotes initiation of flowers. Increase moisture and feeding levels afterwards.

