# Cultivation guide

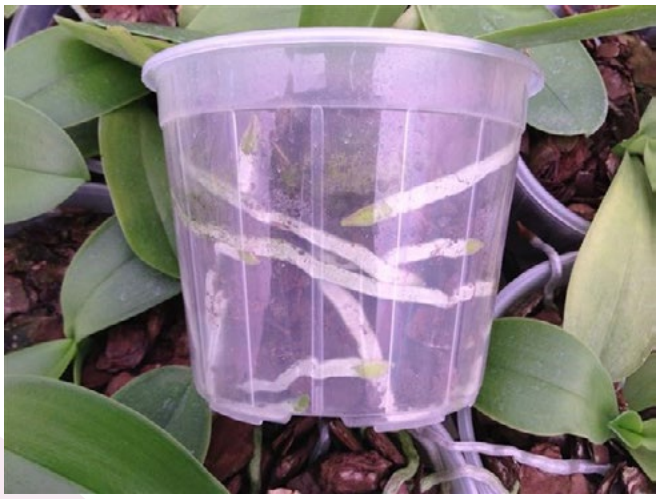
# Phalaenopsis pot plants

Anthura®
unlimited in varieties

# Introduction

This cultivation manual describes in brief the growing of Phalaenopsis pot plants. Of course this concise handbook is not all-encompassing and the cultivation is subject to new insights and techniques. For more detailed information about the possibilities of growing Phalaenopsis you can contact Anthura. For all your crop related questions, the consultants of Bureau IMAC Bleiswijk B.V. will be pleased to help you.

*One flower stem can arise from each leaf axil*



*Roots also serve for anchoring*

## Introduction to Phalaenopsis

Phalaenopsis belongs to the largest family in the plant kingdom, the Orchids (Orchidaceae). These plants exhibit a monopodial form of growth (no lateral shoots), whereby the main spike continues to grow throughout the year and only one spike of flowers can develop from each leaf axil. Phalaenopsis has fleshy distichous leaves.

In nature Phalaenopsis can be found throughout the entire tropical Asian region; in the wild the plants grow at daytime temperatures of 28°-35°C and night-time temperatures of 20°-24°C, with a fairly high relative humidity. Phalaenopsis also prefers shaded conditions and is able to absorb nutrients through the roots and the leaves. The roots also serve to anchor the plant.

## Greenhouse

A Phalaenopsis should be grown in a modern greenhouse. This could be a glasshouse or a plastic greenhouse. When the nights are cold it is preferable to use a double layer of plastic. The height of this greenhouse should be at least four metres from bottom to gutter and should be equipped with the following items:

- Heating pipes: under-bench heating (2/3) and top heating (1/3) separately stirred;
- Movable containers (preferable) or movable tables with an open bottom;
- An overhead irrigation system with a capacity of 0.5-1.0 l/m²/minute;
- At least two screens, one clear one to save energy (bottom one) and one shading screen with a shading percentage of about 65%-75%;
- Equipment for cooling down the temperature for the cooling phase. A pad-fan system or an air-conditioning system can be used for this purpose.

## Plant material

Anthura supplies the plants in flasks (laboratory material) or in plugs. Special conditions are required for the cultivation of plants from flasks. The benefits offered by the use of plants in plugs as compared to plants in flasks are lower loss of plants during cultivation and a reduction in the cultivation period of 5-7 months.

## Handling plants on arrival

After the arrival of the young plants, they have to be unpacked to

*Young plants of 5-8 cm in flasks*

*Young plants grown in plugs*

acclimatize under the cultivation conditions of the greenhouse. You can put the plants in the greenhouse eventually covered by a cloth to give the plants some more shade. This acclimatization process takes about a couple of days in the case of both laboratory material and plugs. When you have bought bare-rooted plants, they need to be potted immediately.

## Plants in plugs

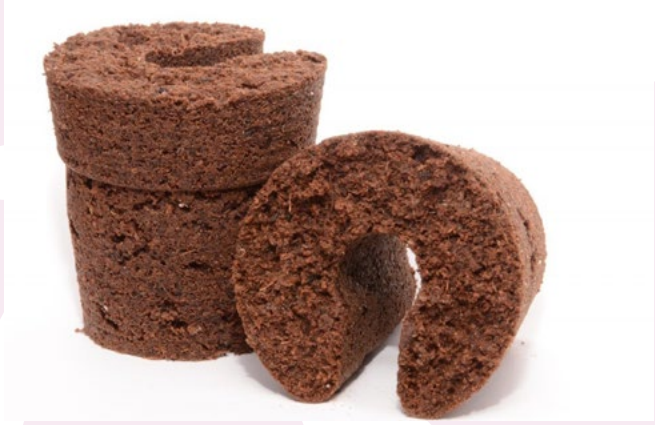
For the last couple of years, Anthura has been supplying plants in plugs only. These plugs contain coco peat and peat and tend to retain more humidity. This is a good characteristic but the start of the culture just after planting calls for a different approach. In the first weeks the new roots have to grow out. Therefore, after potting, the plants need to be kept a little bit dryer than plants from a nursery tray. Normally the drying process of the substrate of plants in a plug takes about a day longer. Furthermore, the EC of the irrigation should be lower. An EC of 0.5 mS/cm for the first six weeks is recommended. After six weeks the plants can be grown as usual.

## Growing plants in plugs

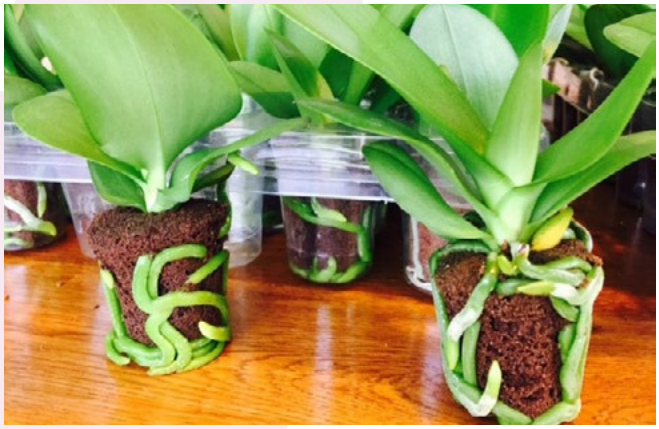
For economic reasons you might choose to get your plants from flasks and grow them in plugs. As mentioned earlier, this needs a different approach and specific knowledge. The culture takes about 20-25 weeks from flask to a product which is ready for potting in a 12 cm pot. The plants will be grown in a tray containing 60 plugs. It is important to grade the plants first into "small" and "good" sizes. Aim for about 80% "good" sizes and 20% "small" ones. The small plants need about five weeks more than the good sized plants.

When planting the plants in plugs it is very important to put them at the right height, which means that the leaves are above the border area of the plug and all the roots should be below. Last but not least, all the plugs should be pushed down to the bottom of the tray. Only then the plug will close so uniformity can be guaranteed. When the plugs are not pushed to the bottom there will be major deficiencies in the humidity of the plugs.

During the first weeks of the culture the plants should be watered quite frequently, about once every three days with about 4 l/m², and after a couple of weeks about once every five days with 10 l/m².



*Plug for Phalaenopsis young plant*



*A Phalaenopsis plug*

## Culture in 12 cm pots

The plants in plugs can be potted once they have grown 2-3 good leaves (leaf span 10-14 cm). Before potting, the plants should be graded, just as when planting the small plants in plugs. Grade the plants into two grades, for example good sized plants and smaller plants.

When potting the plants, it is important to ensure that they are vertical, located in the centre of the pot, and planted at the correct height. This means that all the roots should be inside the pot and all the leaves above the substrate. The growing point of plants that are planted too deeply is susceptible to disease, while plants that are not planted deeply enough will lack sufficient anchorage and consequently will be unstable. It is also important to ensure that the growing point of the young plant is not subjected to excessive squeezing when the plant is potted, since this could result in deformation of the leaves or permanent damage to the growing point.

Once the plants have been potted, the smaller grades are placed separately. This is necessary because small plants have a different irrigation demand. Small plants often require about 6-8 weeks' longer cultivation period and should be separated from the good sized plants. All the plants need to be placed in a triangle (Ø12 cm pot with 70-85 /m², Ø9 cm pots with +/-120 /m²) to get the right microclimate. The microclimate – and consequently growth – will benefit from a delay that is as brief as possible, before the plants regain contact with each other. Proper timing of spacing of the pots is important if the development of a poor shape with long, small leaves is to be avoided. Moreover, smaller plants that are covered by others will not continue to grow, in turn resulting in less uniform batches.

## The cultivation plan

Phalaenopsis cultivation involves three phases: growing, cooling, and finishing. Plants are transferred from the growing phase to the cooling phase once they have 4-5 adult leaves with a minimum length of 10-15 cm. Cooling can usually take place at any time of the year, subject to the provision that the required average temperature can be reached. A shorter cooling period results in less uniform flowering. An appropriate induction of flowering is achieved by cooling for 6-7 weeks at an average temperature of 19°-20°C.

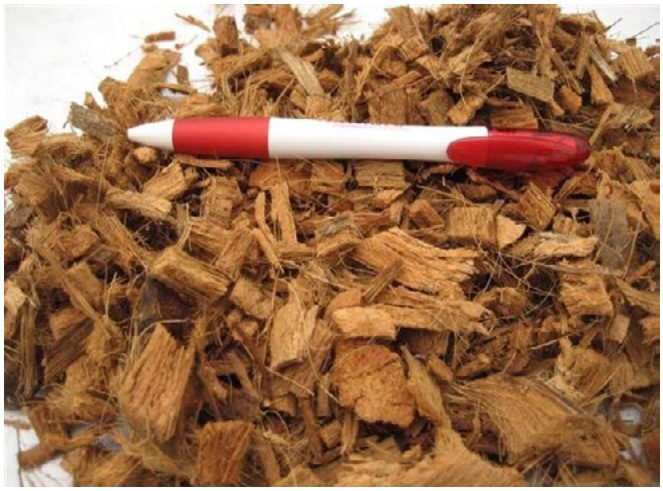
After this cooling period the plants need to be transferred to the flowering compartment at an average temperature of 20°-22°C.

*Pan-fan system*

Growing in Western Europe mostly takes place in a separate area, taking up about 50% of the total space requirement. Cooling and finishing can take place in the same area. This will take up about 50% of the total space requirement. However, it is preferable to have two separate areas. The cooling department requires about 16% (one-sixth) of the total space requirement. Cooling and finishing can take place in the same area; however, in view of the use of mechanical cooling it is often more economical to use a smaller cooling compartment. Moreover, a slightly higher temperature over 24-hour periods can be achieved in a separate finishing room, which is beneficial to the time required for completion.

| Example of spacing distances and weeks for Phalaenopsis in 12 cm pot | | | |
|---|---|---|---|
| | Plants/m² | Weeks | Temperature |
| 1st phase plug | 350 | 23-26 | 25-28°C |
| 1st phase Ø12 cm growing 1 | 70-85 | 16-18 | 27-30°C |
| 1st phase Ø12 cm growing 2 | 55-65 | 8-10 | 27-30°C |
| 2nd phase Ø12 cm cooling | 40-50 | 6-8 | 17-22°C |
| 3rd phase Ø12 cm flowering | 40-50 | 10-14 | 19-24°C |

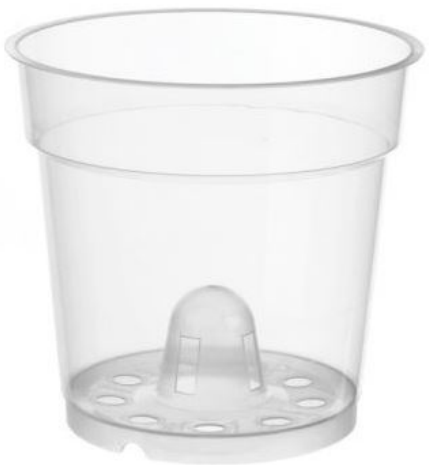
*Substrate has to be coarse enough for Phalaenopsis*


*Coco chips are also suitable for growing*

## Substrate

When selecting the substrate, it is important to ensure the presence of coarse particles for drainage and fine particles (not dust) for the retention and distribution of the water and nutrients. The substrate should not contain an excessive amount of dust, as this would result in an overly-compact structure at the base of the pot. A mixture commonly used in The Netherlands consists of bark (12-16 mm) and 2-3 kg/m$^3$ sphagnum moss. A mixture of bark and coconut chips (in a ratio of 70-30) is becoming more and more common.

Coconut chips are also frequently used. Coconut chips need to be rinsed before use to get rid of the sodium and chlorine salts. After rinsing, the coconut complex needs to be filled with calcium and magnesium.



Care should be taken to ensure that the top layer of the substrate does not become too dry during the first month. Large fluctuations in the moisture content of the substrate during the first weeks will be difficult to correct later on during cultivation. When using a basic fertilizer on the substrate it is important to ensure that the fertilizer contains Dolokal (< 3-4 kg/m$^3$) and PG mix (an NPK basic fertilizer). The Dolokal (which contains $CaCO_3$ and $MgCO_3$) keeps the pH of the substrate stable during the culture.

## Pots

In general, 12 cm pots are used for cultivation. The pots are transparent and will have a pylon in the middle of the bottom for better drainage. Good drainage will keep the EC of the substrate stable. Within a period of 4-6 days the substrate should be ready again for the next irrigation.

## Water and Fertilizers

It is important to supply the water from the top, using either sprinkler lines or spray booms. Using sprinkler lines is preferable. The water must be free of chemical and visible contamination; moreover, the water may not contain elements such as sodium and chlorine in excess of 100 mg/l, and may not contain an excessive amount of bicarbonate. The EC of the starting water should be lower than 0.2 mS/cm. In the absence of supplies of good quality water it will be necessary to make use of reverse-osmosis water. The quantity of water required by the plants depends on the climate, the substrate, and the age of the crop. The irrigation system must be capable of supplying between 30-40 litres of water per square metre per hour. If there is any bicarbonate (>0.5 mmol/l) in combination with a high pH

| System: Mixing tank; 1,000 litre tanks; Water supply: 100% rainwater | | | | |
|---|---|---|---|---|
| A Solution (concentration 100x) | | | Amount | |
| Fertilizer A tank | Chemical formula and concentration | | Vegetative | Generative |
| Nitrate of lime | $Ca(NO_3)_2$ | 19.0% Ca, 15.5% N | 25.0 kg | 25.0 kg |
| Ammonium nitrate (liquid) | $NH_4NO_3$ | 18% N (9.0% $NO_3$ + 9.0% $NH_4$) | 20.0 l | 10.0 l |
| Nitric acid (38%) | $HNO_3$ | 8.4% N, 6.0 mol $H_3O$+ per kg | 0.0 l | 0.0 l |
| Potassium nitrate | $KNO_3$ | 38.2% K, 13.0% N | 10.0 kg | 15.0 kg |
| Iron chelate | (DTPA) | 6% Fe | 4.0 kg | 4.0 kg |

| B Solution (concentration 100x) | | | Amount | |
|---|---|---|---|---|
| Fertilizer B tank | Chemical formula and concentration | | Vegetative | Generative |
| Urea | $CO(NH_2)_2$ | 46% N | 20.0 kg | 15.0 kg |
| Phosphoric acid (59%) | $H_3PO_4$ | 26.8% P, 8.6 mol $H_3O$+ per kg | 0.0 l | 0.0 l |
| Potassium nitrate | $KNO_3$ | 38.2% K, 13.0% N | 10.0 kg | 15.0 kg |
| Potassium di-hydrate phosphate | $KH_2PO_4$ | 28.2% K, 22.3% P | 15.0 kg | 15.0 kg |
| Potassium sulphate | $K_2SO_4$ | 44.8% K, 17.0% S | 0.0 kg | 0.0 kg |
| Epsom salt | $MgSO_4$ | 9.9% Mg, 13.0% S | 12.5 kg | 12.5 kg |
| Manganese sulphate | $MnSO_4$ | 32.5% Mn | 125 g | 125 g |
| Borax | $Na_2B_4O_7$ | 11.3% B | 75 g | 75 g |
| Zinc sulphate | $ZnSO_4$ | 22.7% Zn | 90 g | 90 g |
| Copper sulphate | $CuSO_4$ | 25.5% Cu | 60 g | 60 g |
| Sodium molybdate | $Na_2MoO_4$ | 39.6% Mo | 25 g | 25 g |

(>6.5), the water needs to be acidified.

Phalaenopsis cultivation can employ either compound fertilizers, a system with separate mixing tanks for the fertilizers, or straight fertilizers. General advice based on the use of separate mixing tanks for the fertilizer is enclosed with these guidelines.

The pH of the fertilized water may fluctuate between 5.2 and 6.2. The EC of the nutrient solution should lie within the range of 0.8 and 1.2 mS/cm. Caution should be exercised with an excessive application of nitrogen in the form of ammonia and urea, since this can result in excessively luxuriant leaves.

| Fertilizer recipes in mmol/l and ppm | | | | |
|---|---|---|---|---|
| | Vegetative phase | | Generative phase | |
| | mmol/l | ppm | mmol/l | ppm |
| $N_{total}$ | 14.4 | 201.6 | 11.8 | 165.2 |
| $N_{NO3}$ | 6.1 | 85.4 | 6.1 | 85.1 |
| $N_{NH4}$ | 1.8 | 25.2 | 1.0 | 14.0 |
| $N_{urea}$ | 6.5 | 91.0 | 4.8 | 67.2 |
| P | 1.1 | 34.1 | 1.1 | 34.1 |
| K | 3.0 | 117.3 | 3.9 | 152.5 |
| CaO | 1.2 | 67.3 | 1.1 | 61.7 |
| MgO | 0.5 | 20.2 | 0.5 | 20.2 |
| S | 0.5 | 16.1 | 0.5 | 16.1 |
| | µmol/l | | µmol/l | |
| Fe | 42.7 | 2.38 | 41.7 | 2.33 |
| Mn | 7.3 | 0.40 | 7.2 | 0.40 |
| Zn | 3.1 | 0.20 | 3.0 | 0.20 |
| B | 7.8 | 0.08 | 7.6 | 0.08 |
| Cu | 2.4 | 0.15 | 2.3 | 0.15 |
| Mo | 1.0 | 0.10 | 1.0 | 0.10 |

## Climate

Stirring the greenhouse climate with the help of a climate computer such as a "Priva" or "Hoogendoorn" system is highly recommended. There is also the possibility using a local system, but your options are limited with such a system.

### Temperature

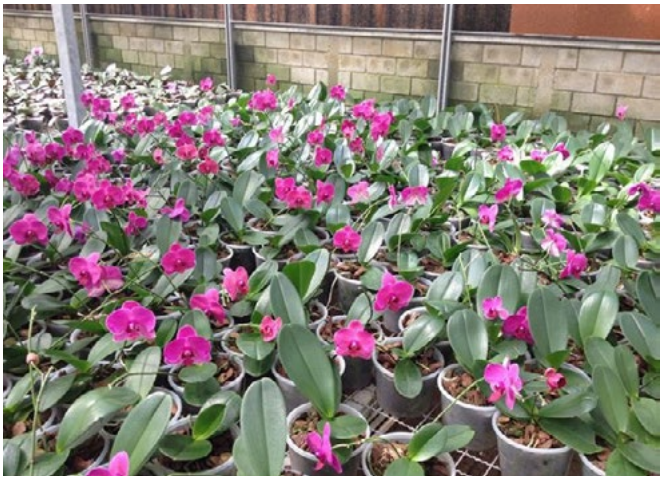
- Growing: for optimum growth, endeavours should be made to maintain an average temperature of 28°C during the growing phase. The minimum temperature in the growing area should be 26.5°C, the maximum temperature about 30°-32°C.
- Cooling: during the cooling phase the temperature must be maintained between 18°C and 20°C. A temperature of 18°C or even a bit lower is particularly necessary if the daytime temperature exceeds 22°C. It is possible to maintain a lower temperature during the night to compensate high day temperatures. The lowest possible temperature for cooling Phalaenopsis is about 17°C without having problems of leaf damage. Below this temperature or a night temperature of 17°C in the absence of high day temperatures (>24°C), leaf damage can occur. The lower temperatures and the higher light intensities required for the development of flower stems often results in the leaves acquiring a reddish hue. This is not a problem when this hue develops during the cooling period; subsequent to cooling the plants continue to the finishing phase, where they will be exposed to slightly higher temperatures. This way the flower is able to develop and the leaves are able to return to their original colour.
- Finishing (flowering): to speed up the flowering process and achieve nice tall flower stems, in the finishing area the temperature should be higher than in the cooling phase: 19°-24°C. With an average temperature of 20°-21°C, the quality of the plants is at its best. The bigger the temperature difference between day and night, the taller the flower stems will become.

### Premature flowering

Most flowering is induced at the required time by means of the cooling period. However, in some instances the plants begin to flower spontaneously, for example 'premature flowering'. When this has occured with plants that are already big enough, the flower spikes are induced by lower temperatures. The critical temperature is about 26°C. You have to take the plant temperature into consideration because this is the most important factor. When the greenhouse temperature drops in the evening, the plant temperature is about 1°C to 2°C lower than the greenhouse temperature. However, the premature flowers will need to be removed if the plant is still too small. If this is done quickly, the spike will still be soft and can be pinched off; however, when the spike is a little older it will need to be cut away. If the lowest bud on the spike is not cut away, it may develop at a later time; in general, these lateral shoots are of poor quality.

*Phalaenopsis abroad in the cooling phase*

*Uniform spiking*



*Premature flowering*

## Light intensity

The provision of sufficient light during cultivation is of importance for the development of suitable leaves and roots. Excessive light intensities will result in burning of the leaves. Inadequate light intensities result in straggly, poor quality plants with an inadequate spray and insufficient root development.

- Outside shading: At a maximum of 1000-1200 Watt/m$^2$ on sunny days, a shading percentage of 70-80% will be required, which can be achieved by the use of whitewash for the summer period or an outside screen. For cultivation in tropical countries, an outside screen is recommended, preferably a movable one.
- Inside shading: Preference is given to the use of two screens, both movable. The lower one is only for energy saving and is clear (shading percentage is 15%-20%). The upper screen needs a shading percentage of 60%-75%.

In countries where the light intensity is more constant throughout the year, 20% more light may be permitted, provided that the light is diffuse. However, it is important to allow for a higher relative humidity at higher light intensities.

| | Temperature | Light amount in µmol/m²/s (lux) |
|---|---|---|
| 1st phase plug | 25-28°C | 80-120 (4,500-6,500) |
| 1st phase Ø12 cm growing 1 | 27-30°C | 100-150 (5,000-6,000) |
| 1st phase Ø12 cm growing 2 | 27-30°C | 100-150 (7,000-8,500) |
| 2nd phase Ø12 cm cooling | 17-22°C | 150-170 (8,500-9,500) |
| 3rd phase Ø12 cm flowering | 19-24°C | 170-190 (9,500-10,500) |

## Relative humidity

Although Phalaenopsis can protect themselves reasonably well from the effects of excessively low relative humidity, their growth will nevertheless benefit from a relative humidity that is not too low. However, a high relative humidity in combination with high temperatures increases the risk of bacterial diseases. Endeavours should be made to maintain the relative humidity in the range between 60% and 75%. In situations in which the relative humidity is too low – and certainly in combination with higher temperatures – it is important to install systems that will increase the relative humidity, such as systems that do not moisten the crop (for example, high-pressure humidification in the upper region of the glasshouse, sprinkler lines under the pots, pad/fan systems, etc.).

For the purposes of subsequent thorough analyses of any cultivation problems that may occur, it is important that suitable records are kept of the most important climatic parameters, such as the light intensity, temperature and relative humidity. These measurements should be made using a climate computer or hand-held meters; records should be kept of the minimum and maximum daily values.

## Pests and diseases

Appropriate hygiene measures in combination with the weekly removal of diseased plants prevent the spread of most pests and diseases. Infection with bacteria in particular occurs as a result of water splashing onto the plants or during handling; these diseases cannot be controlled using chemical agents. A summary of the most important diseases and infestations is given on the next page.

*A symptom of Acidovorax*

*A symptom of Erwinia*

## Bacterial diseases

- Acidovorax: Acidovorax avenae spp cattleya (formerly known as Pseudomonas) is the most important bacterial disease in the cultivation of Phalaenopsis. The disease can be recognized by the characteristic brown patches on the leaves, which have an oily heart or spot and are surrounded by a yellow rim. An infection with Acidovorax begins as a small dark pit in the leaf. The spread of the disease can be countered to some extent by adjusting the amount of nitrogen, taking hygiene measures (the removal of diseased plants) and maintaining a constant relative humidity. High hygiene standards will help to prevent problems with this bacterial disease. Most growers add a disinfectant to the water, such as hydrogen peroxide ($H_2O_2$), chlordioxide ($ClO_2$), copper ions (produced by electrolysis, i.e. an "Aquahort" installation) or other additives to prevent problems with these bacteria.
- Erwinia: Erwinia chrysanthemi and Erwinia carotavora are devastating bacterial pathogens in orchid horticulture and cause soft-rot diseases by the secretion of cell wall-degrading enzymes. This pathogen will occur when the greenhouse climate is unstable. Large fluctuations in relative humidity and/or temperature can induce problems with these bacteria. Just as with an infection of Acidovorax, the spread of this disease can be countered by removing diseased plants and disinfecting all the neighbouring plants.

## Moulds

- Fusarium: the base of the plant becomes black, and the plant will have orange sclerotia and yellowing of the leaves. This mould is a parasite which takes advantage of the weakness of the plant. An infection with this mould is in most cases secondary. It appears most often in the cooling phase, when the plants are under stress. Moreover, warm, damp conditions will increase the proliferation and spread of this mould.
- Rhizoctonia: brown web structure around the soil, sometimes brown colouring of the base and bottom leaves of the plants. Large fluctuations in the moisture content and the EC can cause damage to the roots and make them inactive. When this occurs, Rhizoctonia has a chance to infect the roots of Phalaenopsis. Once this mould has taken hold, it is hard to get rid of. Because Rhizoctonia is a result of a cultivation problem, it is easy to prevent. Make sure that the substrate can dry out over a period of 4-6 days and keep the EC of the drain water under 1.3 mS/cm.

*A symptom of Rhizoctonia*

*A symptom of Botrytis*

*A severe infection of Brevipalpus*

*A symptom of moss mites*

- Botrytis: petal blight (Botrytis) is manifested in the form of a large number of small spots on the flowers; it is caused by the plants remaining wet for too long or by an excessively high relative humidity. Keep the humidity below 80% and it is important to have dry flowers within five hours of irrigation.

### Viral diseases

On occasion Phalaenopsis may exhibit poorer growth as a result of viral infections, with symptoms such as smaller flowers and retarded development into a full-grown plant; however, some species are virtually unaffected. Viral diseases often become apparent during or after the cooling phase, since the plants will have been subjected to slight stress during this period of the cultivation. Loss of plants due to viral diseases can also occur, with many exhibiting poor growth. Viruses can on occasion be tolerated in Phalaenopsis, since the disease is not highly infectious as long as no flowers are cut off. In severe instances, the removal of the diseased plants is the only remedy. Buying healthy plant material prevents these viral problems.

### Pests

Phalaenopsis can be afflicted by pests of a variety of organisms that can, to a greater or lesser extent, cause damage to the plants.

- Lyprauta ("Potworm"): the larvae of the Lyprauta mosquito attacks the root tips and can cause a major problem in your culture. The Lyprauta will develop quite rapidly in a humid environment. Therefore it is important to wait for the substrate to dry out before another irrigation session.
- Mites: there are two types of mites which cause problems in the culture of Phalaenopsis:
  - Bark mite/mossmite: this mite is a small, round, dark brown, almost black mite which can be found at the base of the plants and the root tips. When there are a lot of them, all the roots could be attacked and the young leaves will be damaged. There can also be damage to the flowers. The mite can be controlled by a pesticide like Abamectine (see control of Brevipalpus).
  - Brevipalpus: this red spider mite causes a slight deformation and silvery discoloration of the leaves. This mite is more localized, and can be controlled solely by pesticides such as Vertimec (e.g. Abamectine 18 g/l), 50-75 cc per 100 litres of water.
- Slugs and snails: slugs and snails can chew round holes in the young leaves of the plant, and a large number of plants can suffer damage within a few days. Small slugs and snails can also chew away the tips of roots, causing damage. Slug pellets in the pots and on the floor offer an effective means of controlling slugs and snails.
- Sciaridae (fungus gnats): large numbers of sciarid larvae attack the root tips; large numbers of larvae of fungus gnats are particularly likely to be found in the last plants of big batches. The preventive deployment of the Hypoaspis predatory mite (100-150/$m^2$) is often sufficient to prevent infestation.

## Abnormalities because of climatic circumstances

### Bud loss

Buds may become detached from the flower spikes during the finishing phase if the temperature is excessively high in relation to the light intensity (low). Bud loss can also occur if the roots of the plant as a whole are of poor quality, or if the plant has not been hardened off in the appropriate manner prior to delivery. Another cause is a dry greenhouse climate.

### Cooling or transport spots

Plants transferred from the growing phase to the cooling phase may develop sunken spots on the leaves. These spots are caused by the death of some or all of the cells. These cooling or transport spots may also develop as a result of stress and excessive light on moving the plant.

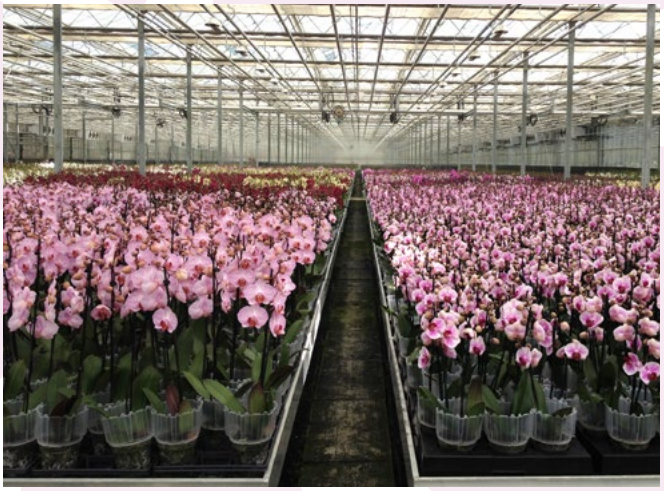
### Phytotoxic

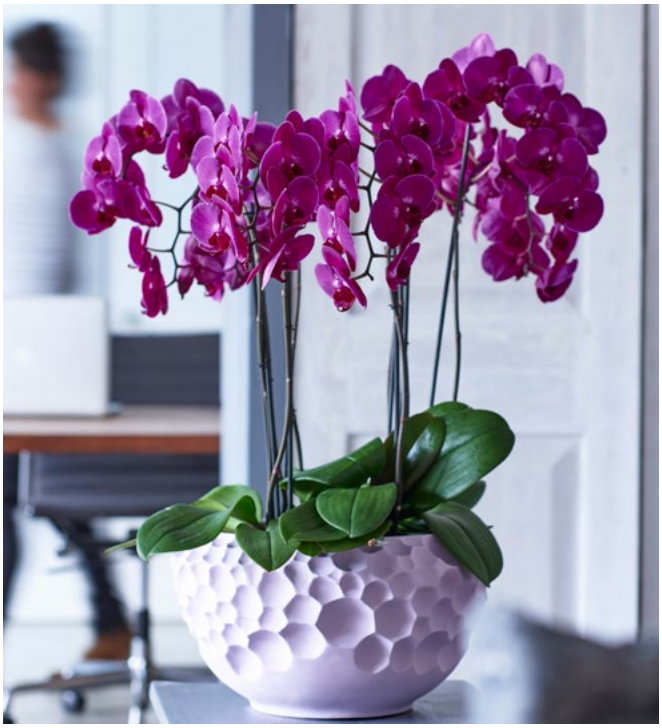
Caution should be exercised with respect to phytotoxic; not all chemical agents can be used on Phalaenopsis without causing damage. You can contact Bureau IMAC Bleiswijk B.V. for adequate pest-control measures. Any new pesticide agent should be tested on a few plants prior to large-scale use. It is also necessary to take account of the slow response of the plants when making an assessment of the effectiveness of a treatment.

## Sales

The spikes of Phalaenopsis are braced using support sticks to carry the flowers. The supports are placed at the time that the lowest bud on the spike begins to swell (to the size of a marble), since thereafter the spike will not grow any longer. Moreover, it then becomes possible to estimate the number of flowers that will develop on the spike. The support must not project beyond the spike, and it must be inserted close to the plant to ensure that the spike is sufficiently braced.

A wide variety of grades are customarily employed for Phalaenopsis. In addition to colour, the plants are also graded according to spike length, number of buds, branching, and number of spikes per plant. The number of spikes per plant is the most important of these criteria, followed by branching and the number of flowers per spray. The price increases with the number of spikes and buds.





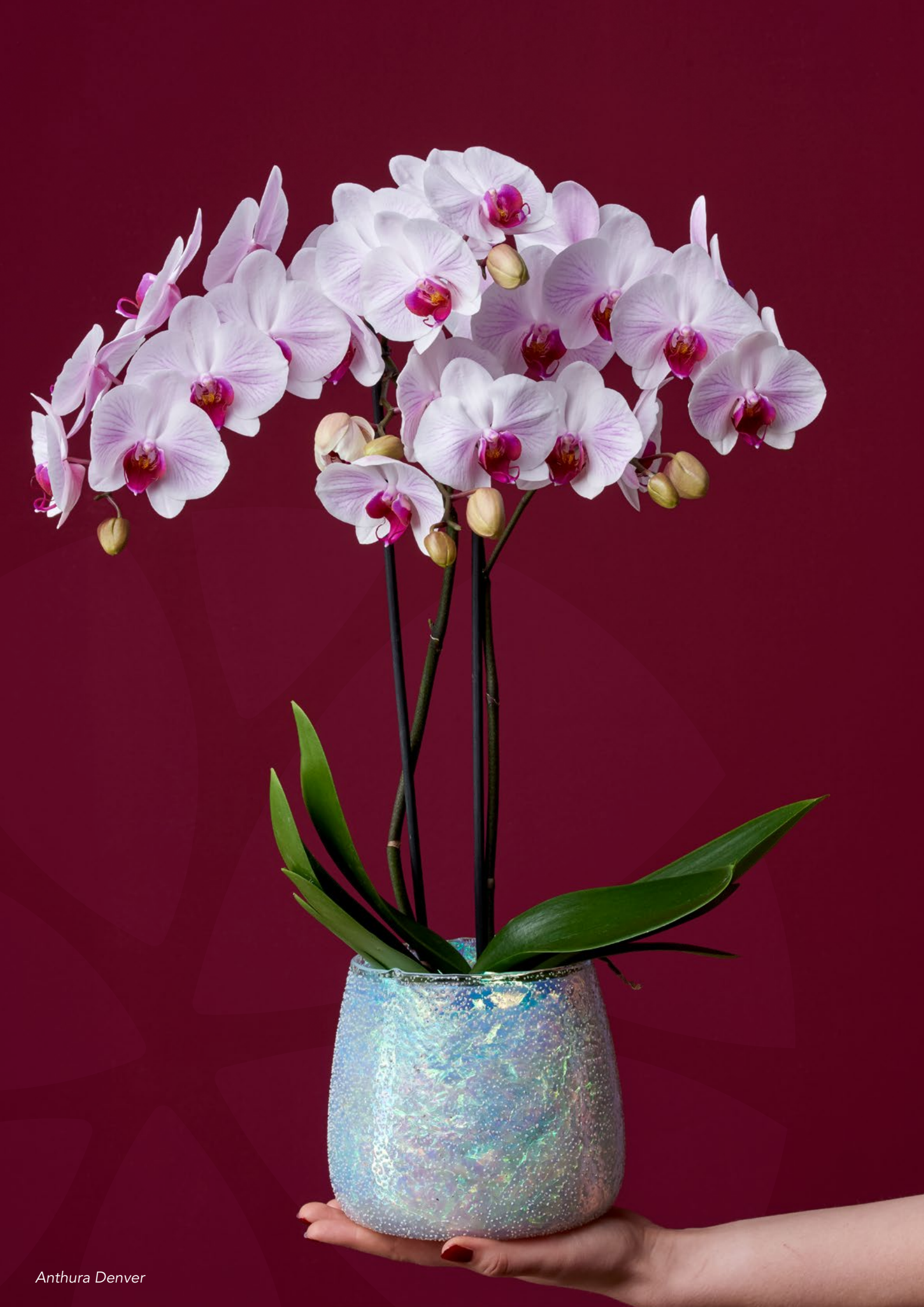
*Anthura Stellenbosch*

The plants are ready for sale once the flowers are sufficiently developed. During the darker periods of the year the trade requires at least 4-5 flowers per spike to have opened on delivery; during other periods fewer open flowers are sufficient. When the plant is made ready for sale, any damaged leaves are removed and, if required, the plant is wrapped in a sleeve. It is important that the temperature does not fall below 15°C during transport.

## Conclusion

We hope that these brief cultivation guidelines will have given you an insight into the cultivation of Phalaenopsis pot plants. This specialized cultivation is certainly feasible, provided that a number of conditions are met. Growers who fulfil these conditions will be rewarded with a beautiful plant that can readily be kept in a good condition, and which deserves an excellent place in the market.

You are welcome to contact us should you have any additional questions, or require a further explanation of any issues.



*Anthura Denver*