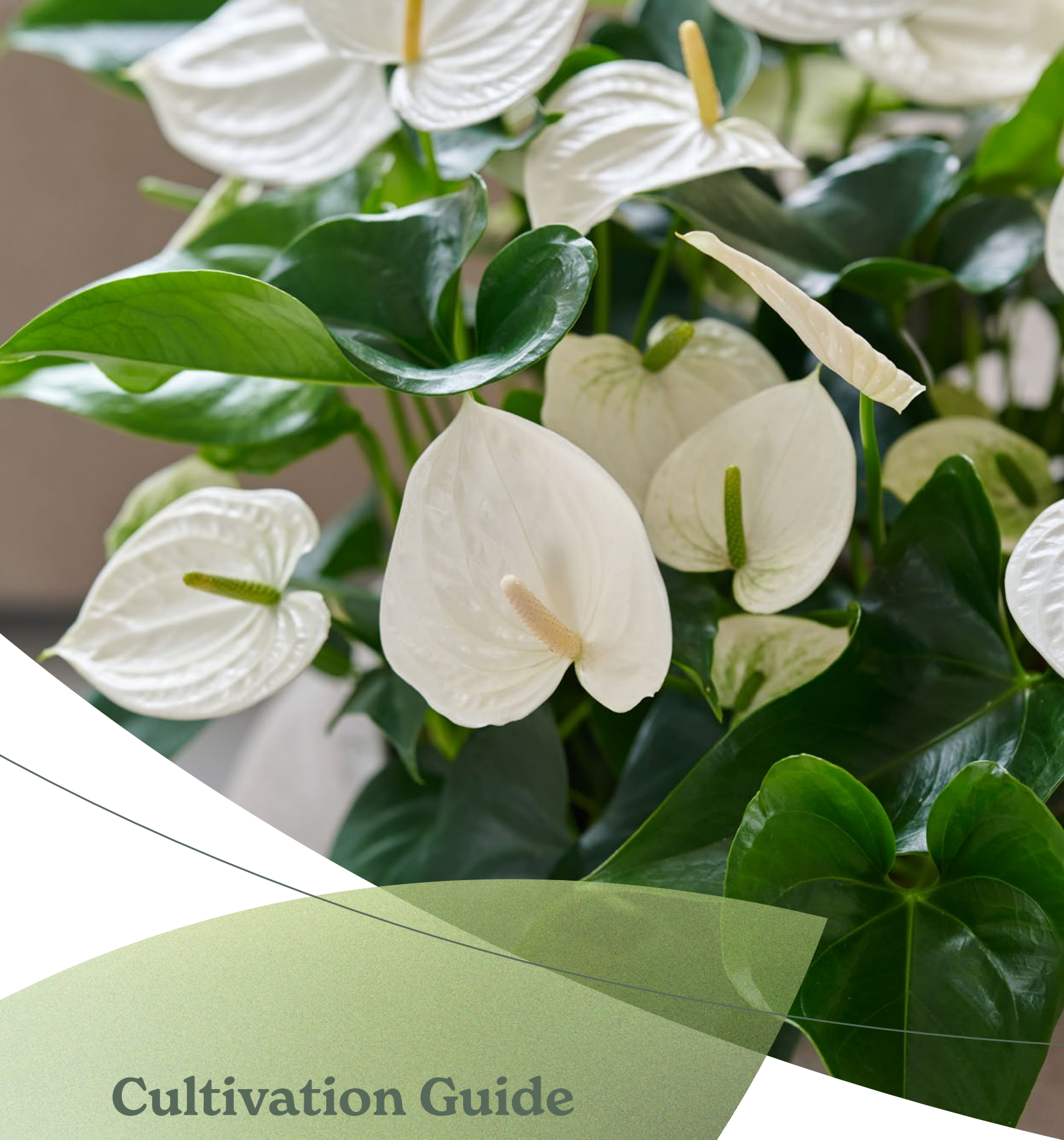

Cultivation Guide

Anthurium pot plants

Anthura®
Creating blooming happiness

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Cultivation guide to Anthurium pot plants

As a specialist in Anthurium breeding and propagation, Anthura recognizes the importance of knowledge. We constantly strive to broaden and deepen our knowledge, aiming to produce strong and healthy young plants for the Anthurium pot plants cultivation. The next step takes place with you – the grower – as you tend the Anthurium pot plants.

This cultivation manual has been compiled to provide you with background information about the Anthurium cultivation. Our website also regularly publishes articles addressing specific and up-to-date cultivation issues on the "Expertise" page.

Introduction to anthurium

Anthurium is the largest genus of the arum family, Araceae. Within the Araceae family, Anthurium is the largest genus, including Anthurium Andreanum. We breed this genus at Anthura. The inflorescence of Anthurium Andreanum consists of a bract with a straight spadix, on which the flowers are situated. Anthuriums originate in the Andes region of Central and South America, where the plants grow in a shady environment.

Planting material

The planting material can be supplied in several ways. As a general rule, the smaller the plants, the more attention they require.

Plug - PP1L

Plugs are made at Anthura by growing one micro-cutting in a paper plug until the young plants reach a height of 6 to 12 cm. At this point, the young plants are three months older than the tissue culture. For cultivation in 14 and 17 cm pots, it is better to grow the plugs first in a 7-9 cm pot or in a tray with a 7-9 cm tray cup. It is advisable to continue growing these young plants under protected conditions, preferably in a cultivating greenhouse. Two paper plugs should be planted per pot to make a nice finished product.

6 and 7 cm plug - 6PP2 and 7PP2

All 6 and 7 cm plugs come with two plants per plug. The varieties produce cuttings themselves, as a result of which the plant gets heavy (full) enough. The two paper plugs are grown in a 7-9 cm pot into plantable plants for pot sizes 14-17 cm. In the smaller pot sizes, the two plugs can be planted directly. The 6 cm plug is grown with 28 plugs per tray, the 7 cm plug with 18 plugs per tray.

PP1L

6PP2

7PP2

To the left, plants planted too deep; in the middle, plants correctly planted; and to the right, plants planted too high.

The young plants should be unpacked immediately upon arrival so they can acclimate under cultivation conditions. They can then be planted. When potting, it is important to ensure the plants are straight, centered and at the correct height. Planting too deep has the disadvantage that the growing tip is more prone to fungi and it interferes with the formation of cuttings. Planting too high will result in poor anchoring, making the plant unsteady. It is also important that you do not squeeze the growing tip too hard when planting This can lead to deformation in the leaf or permanent damage to the growth point. Keep the substrate as well-aired as possible and do not press it down too hard when planting. The drill hole has to be large enough.

Cultivation plan

After planting, the pots can be placed against each other. The sooner the plants make contact again, the better it is for the microclimate and thus growth. When the pots or the substrate are no longer clearly visible, the plants need more space. Generally speaking, 30% more space is required when spacing the plants to ensure that there will be contact again between the leaves within a few weeks.

Depending on the type, the cultivation period and the amount of light, the plants have to be spaced again by 30%. Spacing the plants too late results in poor flower development and plants with a more stretched plant structure. Spacing them too early or too late will affect their growth, because there is no proper micro-climate between the plants.

Below you will find schemes for different pot sizes of Anthurium Andreanum, which indicate the number of weeks per phase and the number of plants per metre. These figures serve as a guide and are influenced, amongst other things, by the assortment, the size of the plant material, the season and the pursued quality.

Because of its predominant epiphytic growth habit, the Anthurium grows best on an airy substrate. When selecting the substrate, it is important that it is capillary (distributes the water properly) and contains sufficient fine particles or fibres to retain and distribute the water and nutrients. The substrate often consists of peat with coconut fibre. Other additives can include perlite, parts of peat, coconut chips or fine bark. Ultimately, the substrate must be made up of 50% solid parts, 25% water and 25% air. The substrate must not

A batch that needs to be spaced.

A batch that has just been spaced.

Phases of anthurium by pot size

	Cultivation duration in weeks					Plants per m²				
Pot size	**9**	**10,5**	**12**	**14**	**17**	**9**	**10,5**	**12**	**14**	**17**
Phase 1	8	10	14	8	12	100	60	69	49	34
Phase 2	8	10	8	10	12	45	40	40	24	18-21
Phase 3	10	12	16	16	16	30	25	20	14-16	11-12
Total	**26**	**32**	**38**	**34**	**40**					

Schedule Anthurium Andreanum: 9, 10.5 and 12 cm from PP1L plug, 14 and 17 cm from 7 cm plug.

contain too many dust particles, because of the obstruction of the structure at the bottom of the pot.

In order to ensure a better structure, more use is made of coconut fibre, as a result of which the water distribution also improves. Since we are talking about a long cultivation period, it is important that the substrate does not decompose too fast. Besides the composition of the substrate, the drainage of the pot is important as well. After an irrigation session, water may not stay in the substrate of the pot for too long. Pot sizes of 9-17 cm are mainly used. A smaller pot is for compact plants with fast flower development. The 14 and 17 cm pot is more suitable for the slightly coarser species and those that need more time before they are ripe for flowering.

Anthurium is grown both on the ground and on tables or containers. The cultivation system depends on the pot size, the circulation speed, the level of automation and the desired working height. It is important that a proper drainage system is installed and that in dry conditions overhead irrigation is also possible.

Components for a proper substrate: coconut chunks (centre top), Irish peat, coconut fibre for a capillary effect.

To the left, pot for cultivation on ebb/flow floor; to the right, pot for cultivation on ground cover.

Anthurium on aluminium cultivation containers.

Anthurium on ebb/flow concrete floors.

Irrigation system

In cases where water is only administered from below, the top layer of the substrate will become very dry in the event of a longer cultivation period. The crop also gets somewhat dull because of the dryer top layer and dust on the leaves. The crop also gets a little dull because of the drier top layer and dust on the leaves. This can be avoided by irrigating once every 4-6 weeks from above using the irrigation pipe or watering boom.

Water must be free of any chemicals and visible contamination. Elements like sodium and chlorine must remain below 4 mmol or 91 mg and the bicarbonate content should not be too high either. In the absence of sound water, osmosis water (with a ventilation tower) has to be used. The amount of water depends on the climate, the substrate and the age of the crop. The system should be suitable for a release of 5-12 litres/m².

Fertilisation

In anthurium, single fertilizers are mainly used via a Dosatron® or A and B container system. General advice on the basis of an A and B container composition is included. The requirements can differ according to the type.

Be careful with the trace elements manganese, copper and boron. These elements are to a small extent used by anthurium and can accumulate in the substrate and in the return water when recirculating. Higher values can rapidly cause leaf tips. When a substrate with basic fertilisation is bought, 2-3 kg/m³ Dolokal and 0.5-0.75 kg/m³ PG mix per m³ peat is usually mixed. As a result, the pH of the substrate should amount to approximately 5.5 and the EC to 0.5 mS/cm.

The EC session ranges between 1.8 and 2.4 EC in an overhead irrigation session and between 1.8 and 2.2 EC in a drip irrigation session. Rinsing with a low EC or wetting agent is required when you irrigate from above with an EC higher than 1.0. The pH may vary between 5.5 and 6.2.

During the cultivation of anthurium, CO_2 is dosed during the day with values between 600 and 800 ppm. Avoid values above 1000 ppm, as this can damage the flowers. Anthurium can also be grown perfectly without additional CO_2.

Fertilisation advice for pot anthurium

Output water: rainwater | Tank volume 1,000 litres | Solution 100 x concentrated | scheme code A. 0.0.0

Solution A (Bin A)								
Calcium nitrate		40	kilogram	$Ca(NO_3)_2$	18.8% Ca	1.1% $N\text{-}NH_4$	14.4% $N\text{-}NO_3$	
Potassium nitrate		5.1	kilogram	KNO_3	38.4% K	13.7% $N\text{-}NO_3$		
Calcium chloride	liquid	20	litre	$CaCl_2$	35% Ca			
Trace elements								
Manganese sulphate		50	grams	$MnSO_4$	33% Mn			
Zinc sulphate		160	grams	$ZnSO_4$	23% Zn			
Borax		140	grams	$Na_2B_4O_7$	11% B			
Copper sulphate		50	grams	$CuSO_4$	26% Cu			
Sodium molybdate		50	grams	Na_2MoO_4	40% Mo			
Iron chelate	3.5 l or	4.4	kilogram	Fe-DTPA	3% Fe			

Solution B (Bin B)						
Mono potassium phosphate	18	kilogram	KH_2PO_4	28.5% K	22.7% P	
Potassium nitrate	23	kilogram	KNO_3	38.4% K	13.7% $N\text{-}NO_3$	
Bittersalt	35	kilogram	$MgSO_4$	9.9% Mg	13% S	

Fertilisation scheme.

Target feeding rates

	EC	pH	$N\text{-}NO_3$	$N\text{-}NH_4$	Ureum	P	K	Ca	Mg	SO_4	Fe	Mn	Zn	B	Cu	Mo
Nutrition	1.6	5.6-6.0	7.4	0.3	0.0	1.4	4.4	2.9	1.5	1.5	26.2	3.2	6.0	15.9	2.2	2.2
			mmol/l								µmol/l					

Target rates.

Climate

Temperature

Anthurium is a subtropical plant. Temperatures below 15 °C and above 30 °C should be avoided. For good growth, an average temperature of 19-22 °C is ideal.

In the table "Climate parameters for pot Anthurium" on page 12, you can find more information about desired temperatures in combination with moisture deficit and light.

Air humidity

If the humidity is too low, the photosynthesis will be lower. Yet, overly high humidity may result in more problems with fungi. However, these problems rarely occur. It is important that more moisture is present at higher light levels. In countries with high humidity, a higher day temperature and a higher light level can be allowed. A relative humidity (RH) of between 60% and 80% should be sought. Most growers set the humidity on the basis of the moisture deficit (MD) values. In the case of lower humidity, certainly in combination with higher temperatures, it is important that systems are installed to increase the humidity.

We recommend choosing systems that do not wet the crop (high pressure humidification above in the greenhouse, irrigation pipe below the cultivation system, pad/fan systems etc.).

Light level

At the level of the crop, in the case of Anthurium Andreanum, the light value in the table may be maintained. In the event of too much light, the leaf and flower colour bleach and burning can occur. A lack of light results in an overly-stretched and qualitatively lightweight plant, with a lower flower production. At maximum values of 1400 W/m² on clear days, a screening percentage of 80% is necessary. This can be achieved by using chalk on the cover and/or the use of screens.

There are several coatings (chalk) on the market which offer, a diffuse or infrared (IR) effect. When screening, you can choose from transparent screens or diffuse screens. For energy-saving purposes, there are screens with white straps and aluminium straps. A very effective way to prevent high greenhouse temperatures is the use of an external screen.

In tropical countries, a shade net of approximately 75% screening is required. It is better to use two shade nets, i.e. a fixed screen of 60% and a second movable screen of 50%. This movable screen can be closed during sunny periods and in the middle of the day to avoid high peaks of light irradiation. At locations with a lot of rain, we recommend using a plastic screen. The crop stays dryer, as a result of which it suffers fewer diseases (bacteria and fungi). Another advantage is that the fertilizers leach less easily, as a result of which the nutritional situation remains optimal and the plant grows faster. To ensure a constant temperature and good air circulation, a gutter height of 4-6 metres in the greenhouse is advised.

Shadow hall in the tropics.

Movable screen for optimal light level.

Climate parameters for pot Anthurium

	Desired			Damage threshold	
	Day	Night	24-h period/sum		
Light	200 µmol/m²/s / 20-25klux		9 mol/m²	> 300 µmol *	
Temperature	22-25°C	19-20°C	22.0-23.5°C	< 15°C	>30°C**
Moisture deficit (MD)/RH	6 gr/m³ / 80%	> 2 gr/m³ / <95%		> 8 gr/m³ / <65%***	

* with MD max. 8 g/m³
** with MD max. 8 g/m³
** depending on light/energy level/moisture level
*** depending on light/energy level

In order to make an accurate analysis of subsequent cultivation problems, it is important to record the main climate data such as light, temperature and relative humidity Use a climate computer or hand meter and note down the minimum and maximum values every day.

With the table below you can easily see how much light enters your greenhouse if you do not have a par/lux meter in the greenhouse. The transmission from the outside to the inside has been set to 80%.

Overall outdoor (W/m²)	µmol PAR in the greenhouse	lux
25	40	3,053
50	80	6,106
75	120	9,160
100	160	12,213
125	200	15,266
150	239	18,319
175	279	21,373
200	319	24,426
225	359	27,479
250	399	30,532
275	439	33,585
300	479	36,639
325	519	39,692

Conversion of light values.

Diseases and pests

In anthurium, several diseases and pests occur which can damage the crop to a greater or lesser degree.

Animal infestations

Thrips, nematodes (Radopholus similis), aphids, white fly, mites, snails, armoured scales and soft scales.

Thrips and aphids are the main pests in anthurium.

These insects can be controlled by spraying with crop protection agents or by using biological control agents.

Fungi

Fusarium, Colletotrichum, Pythium, Phytophthora and Calonectria.

Bacterial diseases

One of the diseases which causes the most losses in Anthurium cultivations is the bacterium Xanthomonas phaseoli pv. Dieffenbachiae, but the bacterium Pseudomonas solanacearum can also lead to considerable production decline. Bacterial diseases come from outside. Taking preventive phytosanitary measures is therefore the best control.

Phytotoxicity

Watch out for phytotoxicity; not all chemical means can be applied without causing damage to anthurium. Before applying a new pesticide, the product must be tested on a few plants. Be aware of the slow reaction of the crop when making an assessment (which can be up to 10 weeks). Corporate hygiene is an effective way to prevent diseases from developing.

Our website features several articles on specific diseases and/or pests and how to prevent and/or deal with them to the extent possible.

Sale

The plants are ready for sale when the flower-leaf filling is optimal and there are sufficient flowers on the plant. In many anthurium species the older flowers do not die immediately, but remain on the plant for some months. The colours of the flowers changes, which is considered as an extra ornamental value. Upon preparation, the damaged leaves and flowers are removed and the plants are inserted in sleeves. Leaves and flowers which are contaminated with lime deposit or dust can be cleaned with a leaf shine spray. During transport, it is important that the temperature does not drop below 15 °C.

Plants ready for transport to the customer/buyer.

Added value thanks to ornamental pot.

Conclusion

This short cultivation guide has given you some insight into the anthurium pot plant cultivation. This specialist cultivation is simple to perform, provided that certain conditions are met. If you meet these conditions, the result is a beautiful, highly durable plant that deserves a good place in the market.

If you have any questions or if you wish to receive any additional information, please be sure to contact us or check our website.

Anthura B.V.

Sales Department
T +31 10 529 19 19
info@anthura.nl