

Cultivation guide



Anthurium pot plants



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Introduction to anthurium

Anthurium is the largest genus of the arum family, Araceae, which also include the Anthurium Andreanum. 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.



Alabama®, *Colorado*®, *Aramon*®

Plant material

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

Tissue culture

Tissue culture plants are planted in plastic containers in the laboratory. One container contains 30 or 40 plants. The soil (which consists of agar, without antibiotics) contains carbon (black) for better root formation. Some countries do not allow the import of tissue culture plants on black soil. In these cases, Anthura can obviously supply plants on white soil.

Micro-cuttings

If phytosanitary rules permit, micro-cuttings can also be supplied: tops of tissue culture plants transported without agar in a plastic container. From a technical point of view, these young plants are similar to tissue culture, but they are often slightly larger and stronger. Both tissue culture plants and micro-cuttings require a great deal of experience with cultivation; they are very difficult to harden off and grow. Without having sufficient experience, there is a high chance of loss.

Plugs

Plugs are made by growing two micro-cuttings in a glue plug, until the young plants reach a height of 6 to 8 cm. At this point, the young plants are three months older than the tissue

culture. For cultivation in 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.

7 cm pot

The plugs are planted in a 7-9 cm pot, filled with coarse peat. Then, the plants are further grown during three months until they reach a height of 10-15 cm. These 7 cm pots can be processed directly in the final pot.

7 cm plug in tray

Almost all plugs and pots are supplied with two plants per plug or pot. The varieties produce cuttings themselves, as a result of which the plant gets heavy (full) enough. Varieties that do not



7 cm plug in tray



Tissue culture (2-3 cm), plugs, (6-12cm), plugs (10-18 cm)

easily produce cuttings are sold with two plugs per pot. These varieties are often cultivated in pots larger than 17 cm.

It is advisable not to split the plants to forestall possible root damage and the occurrence of fungi. In practice it has been proven that the growth rate of double plants is a lot higher compared to single plants, regardless of the variety, since the plant does not put any energy into producing a lot of cuttings. As a result, Anthura varieties are often ready two months earlier. The length of flowering in the winter (the period with the least light) is usually better in Anthura varieties.

The young plants should be unpacked immediately upon arrival so they can acclimate under cultivation conditions. They can then be planted. It is important that the plants are planted upright, in the middle and at the right 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 leads to a poor anchoring, as a result of which the plant will be unstable. It is also important that you do not squeeze the growing tip too hard when planting This can result

in deformities in the leaf or in definitive damage to the growing tip. 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.



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



A batch that needs to be spaced



A batch that has just been spaced

Below you will find schemes for different pot sizes of Anthurium Andeanum, 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 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,

Pot size	Cultivation period in weeks					Plants per m ²				
	9 cm	10.5 cm	12 cm	14 cm	17 cm	9 cm	10.5 cm	12 cm	14 cm	17 cm
Phase 1	8	12	14	8	12	100	60	69	49	34
Phase 2	8	10	8	10	12	45	40	40	24	18-21
Phase 3	10	13	16	16	16	30	25	20	14-16	11-12
Total	26	35	38	34	40					

Scheme for Anthurium Andeanum, 9, 10.5 and 12 cm from plug, 14 and 17 cm from 7 cm



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



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

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 14-17 cm are mainly used. The 14 cm pot is for compact plants with fast flower development. The 17 cm pot is more suitable for the slightly coarser species and those that need more time before they are ripe for flowering.



Anthurium on aluminium cultivation containers

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.



Anthurium on ebb/flow concrete floors

Irrigation system

Anthurium can be irrigated both from below and above. 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. 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 mmole 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.

Fertilization

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 fertilization 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, CO₂ is dosed during the day with values between 600 and 800 ppm. Avoid values above 1000 ppm, as this can damage the flowers.

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.

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

System: mixing container; 1.000 liter containers.
Starting water: 100% rainwater; scheme code A. 0.0.0

A - solution, 100 x concentrated

Calcium nitrate	Ca(NO ₃) ₂ 19.0% Ca, 15.5% N	70.0 kg.
Ammonium Nitrate (vlb)	NH ₄ NO ₃ 18% N (9.0% NO ₃ and 9.0% NH ₄)	0.0 kg.
Nitric acid 38%	HNO ₃ 8.4% N, 6.0 mole H ₃ O ⁺ per kg	0.0 ltr.
Potassium nitrate	KNO ₃ 38.2% K, 13.0% N	6.7 kg.
Iron chelate 6%	(DTPA)	2.0 kg.

B - solution, 100 x concentrated

Phosphoric acid 59%	H ₃ PO ₄ 26.8% P, 8.6 mole H ₃ O ⁺ per kg	0.0 ltr.
Potassium nitrate	KNO ₃ 38.2% K, 13.0% N	12.3 kg.
Mono potassium phosphate	KH ₂ PO ₄ 28.2% K, 22.3 % P	20.4 kg.
Potassium sulphate	K ₂ SO ₄ 44.8% K, 17.0 % S	15.0 kg.
Bittersalt	MgSO ₄ 9.9% Mg, 13.0 S	20.0 kg.
Mangese sulphate	MnSO ₄ 32.5 % Mn	50 g.
Borax	Na ₂ B ₄ O ₇ 11.3% B	95.0 g.
Zinc sulphate	ZnSO ₄ 22.7% Zn	90.0 g.
Copper sulphate	CuSO ₄ 25.5% Cu	20.0 g.
Na-molybdate	Na ₂ MoO ₄ 39.6% Mo	25.0 g.

Fertilization scheme

NO ₃	NH ₄	NH ₂	P	K	Ca	Mg	SO ₄	Mn	Zn	B	Cu	Mo	Fe
11	1,2	0	2,6	8,7	3,6	0,9	1,8	4,3	4,3	13	1,7	1,1	26

Target figures in mmole

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.).



Movable screen for optimal light level

Light level

At the level of the crop, in the case of Anthurium Andreanum, 18,000-25,000 lux (155-215 W) 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 1,400 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.

Globally outside (W/m ²)					
	desired			damage threshold	
	day	night	24-hr period/sum		
light	200 μmole/m ² /s / 20-25klux	-	9 mole/m ²	> 300 μmole *	-
temperature	22-25°C	19-20°C	22,0-23,5°C	>30°C**	< 15°C
moisture deficit (MD)	6 gr/m ³ / 80%	> 2 gr/m ³ / <95%	-	> 8 gr/m ³ / <65%***	-

* at MD max. 8 gr/m³

**at MD max. 8 gr/m³

** depending on light/energy level/moisture level

*** depending on light/energy level

Climate parameters for pot anthurium

There are several coatings (chalk) on the market which offer, amongst other things, 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.



Shadow hall in the tropics

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.

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%.

Globally outside (W/m ²)	μmole PAR in the greenhouse	lux
25	40	3053
50	80	6106
75	200 μmole/m ² /s / 20-25klux	9160
100	160	12213
125	200	15266
150	239	18319
175	279	21373
200	319	24426
225	359	27479
250	399	30532
275	439	33585
300	479	36639
325	519	39692

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 pests:

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 cause the most loss in anthurium is the bacterium *Xanthomonas axonopodas* pv. *Dieffenbachiae*, but also the bacterium *Pseudomonas solanacearum* (I) can lead to considerable production decrease. Bacterial diseases come from outside. Taking preventive phytosanitary measures is therefore the best control. Buy Elite® certified material. This material is tested by NAK-Tuinbouw for internal quality.

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.

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.

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 fulfil these conditions, the result will be beautiful,



Plants ready for transport to the customer/buyer



Added value thanks to ornamental pot

long-lasting plants which deserve a good market position. If you have any questions or if you wish to receive any additional information, please be sure to contact us.

Bureau IMAC Bleiswijk B.V

Bureau IMAC provides comprehensive cultivation advice, guidance for study groups, fertilization research and advice, plant pathology research, advice for analyses, and pot plant planning.

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