

Anthurium cut flower cultivation guidelines



Introduction Anthurium

Anthuriums are members of the Arum lily family (*Araceae*). *Anthurium* is the largest genus in the *Araceae* family. A common feature of the *Araceae* is the typical, cup-shaped inflorescence: the arum. It consists of the spathe and the spadix, on which the flowers are situated. The Anthurium is an 'evergreen' which can produce flowers all year round. Both the flowers and the leaves are harvested from the crop. In nature Anthuriums grow in the Andes Mountains of Central and South America, where they are to be found in shady and humid locations. There are more than 100 different varieties with a wide range of sizes, shapes and colours.



Several varieties from Anthura

Plant material

The plant material can be supplied in a variety of forms. In general the smaller the plants, the more attention they will require.

Tissue culture

Plants grown by means of tissue culture are planted in plastic containers by the laboratory. Each container contains 30 or 40 plants. The nutrient medium (comprised of agar, without antibiotics) contains carbon (black) to promote the rooting of the plants. Some countries do not permit the import of tissue-culture plants on a black nutrient medium; it will be self-evident that in such instances Anthura can supply the plants on a white nutrient medium.

Micro cuttings

Micro-cuttings can also be supplied, provided that this is permitted under the phytosanitary regulations. Micro-cuttings are comprised of the tips of tissue-culture plants, and are transported in a plastic container without agar. From a technological perspective these plants are identical to tissue-culture plants, although they are often somewhat larger and sturdier. A great deal of experience in the cultivation of both tissue-culture plants and micro-cuttings is required if they are to be grown with success; hardening them off and raising them are both complex operations. Growers with insufficient experience run a risk of losing plants.

Plugs

Plugs are produced by growing one micro-cuttings in a plug of oasis (polyphenol foam) until the plants are about 8 to 10 cm tall. These plants will then be about four months older than those grown by tissue culture. Plugs cannot be planted directly into a cultivation bed or the final pot. It is recommended that they are first allowed to grow further in a 9 cm pot in reasonably protected conditions, preferably in a propagating house. After about 6 months, the plants can be planted in the cultivation bed.

9 cm Pots (20-25 cm)

The plugs are planted in a 9 cm pots. These are filled with inert-medium rock wool cubes. The plugs are then cultivated for four months, into plants of 20-25 cm. These pots can be directly planted in cultivation beds or final pots.

9 cm pots (25-30 cm and 30-40cm)

For those who want larger plants, the plants can be cultivated until they reach a height of 25-30 cm or 30-40 cm.



Tissue culture, micro cuttings, plugs, 20-25 cm plants and 30-40 cm plants (f.l.t.r.)

All plugs and pots are supplied with one plant in each plug or pot, unlike the Anthurium pot plants. Since each pot contains only one plant, the plant will have more space during its growing time at our facilities. Apart from that, producing single plants means that the plants are more uniform. This results in a higher quality and production. Further, less labour is required for leaf pruning because the plants grow more regular and all the plants are separated.

The cultivation plan

On arrival the young plants must be unpacked and allowed to acclimatize under the cultivation conditions. The plants can be planted once they have become acclimatized. When planting the plants it is important to ensure that they are planted deep enough, so that the plant with its air roots already formed can be placed in the medium. For plants in 9cm pots, this will require a depth of between 12 and 17 cm (about 6 inch). However, it is important not to plant the plants too deeply. This could cause it to stretch inordinately. Nor should it be too shallow. This causes the plant to grow too slowly and falls over too quickly. A good guideline is for the air roots to be just in the medium, while the growing point still captures the light.

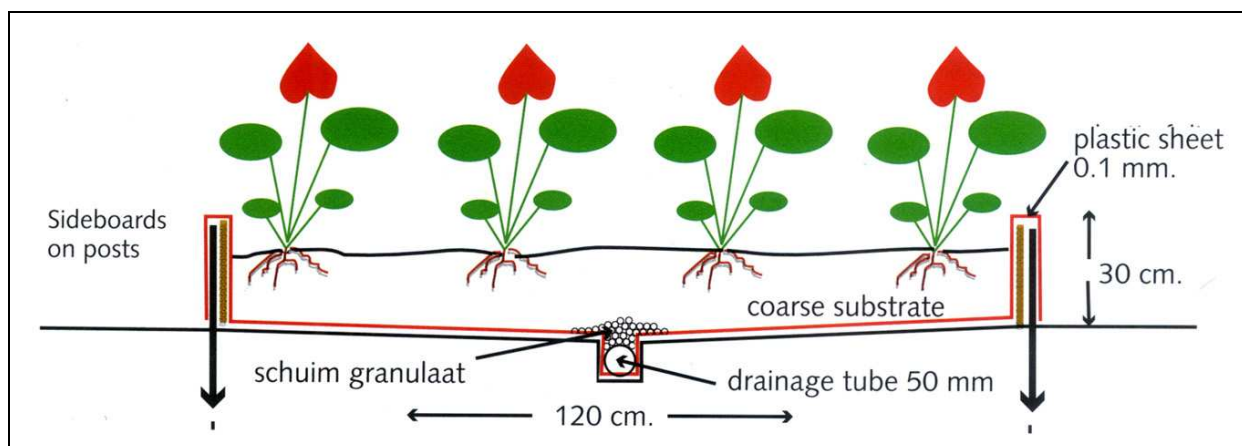


Too young plants planted too deep



The ideal plant depth

The plant density usually depends on the varieties. In our brochure you will find a column with recommendations for the number of plants per gross square metre. Four rows should be planted per bed (1.20 metres wide) and the distance between the plants should be varied on the row. This plant distance should be between 10 and 20 cm. The exact plant distance is calculated on the basis of the total surface area of the greenhouse and the number of beds. We shall be pleased to calculate this exact plant distance for you.



An Anthurium bed, more systems are possible

In view of Anthuriums' primarily epiphytic growth preference is given to the use of a porous substrate. The Anthurium cultivation lasts between 5 and 6 years. In choosing the substrate it is therefore important to select a material with a stable structure. Most important, the substrate must provide sufficient room for the roots to grow and to store oxygen. The growing media can be divided into inert media and non-inert media. The inert media hardly change, but sometimes retain less water and fertilizers. The non-inert media is often better available and cheaper, but changes over time. We prefer the usage of inert media like oasis and perlite. However, the plants can also be grown in non-inert media of which peat and coconut shells are the best types.

The Anthurium can be grown directly in the ground, in beds, pots and gutters. We strongly prefer the last 3 growing systems which are separated from the underground. This way the substrate is separated from the soil and this makes it easier to prevent diseases and pests reaching and damaging the roots of the plants. Most important for all growing systems and substrates is the use of a matching irrigation system.



Cultivation bed with 360° sprinklers (substrate is lava stones)



High greenhouse with 2 sprinkler lines, 180° sprinklers (substrate is oasis)

The irrigation system

Anthuriums can be given water either from above or below the plant. The top layer of the substrate may become very dry when plants receive water solely from below the pot (by using drip tubes or dripping spikes) during longer cultivation periods. Moreover the plants will assume a somewhat dull appearance due to the drier top layer and dust on the foliage. These problems can be avoided by watering the plants at intervals of 4-6 weeks, with water supplied either by sprinkler lines or spray booms.

When cultivating in beds a sprinkler system can be perfectly used for distributing the water. However, for cultivation in pots it is better to use dripper spikes. The water must be free of chemical and visible contamination. Elements like sodium and chlorine must stay under 3mmol/litre and also the bicarbonate can not be too high. 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 capacity of the irrigation system should equal approximately 3 to 5 litres per m² per day. This amount should be dosed in three to five hours. For the irrigation system it is important that the drain water can easily be removed. The excess water should be removed to avoid the substrate getting too wet.

Fertilizers

Anthurium cultivation usually employs straight ammonium nitrate fertilisers using a Dosatron[®] or a system with mixing tanks. Below you will find general advice based on the use of mixing tanks for the fertilizer. The needs may vary from variety to variety; Bureau IMAC Bleiswijk B.V. can be requested to provide customised advice for the relevant variety, as well as for recommendations based on the use of compound fertilizers.

Caution should be exercised with manganese, the water soluble NPK fertilizers and the sulphate fertilizers. Manganese can quickly causes signs of excess in the Anthurium. If no manganese occurs in the initial water or substrate, it would nevertheless be advisable to add 50 gram of the fertilizer. A high concentration of the NPK- and sulphate fertilizers in combination with calcium substances, can easily lead to gypsum formation. The pH of the nutriment water should be between 5.5 and 6.0 and the EC should be 1.2.

System: Mixing tank; 1,000 litre tanks.

Water supply: 100% rainwater; scheme code A. 0.0.0

A - Solution, a concentration of 100 times

Calcium nitrate	Ca(NO ₃) ₂ 19,0% Ca, 15,5% N	32,4 kg.
Ammonium Nitrate (liquid)	NH ₄ NO ₃ 18% N (9,0% NO ₃ en 9,0% NH ₄)	10,9 kg.
Potassium nitrate	KNO ₃ 38,2% K, 13,0% N	14,2 kg.
Ironchelate 3%	(DTPA)	2,8 kg.

B - Solution, a concentration of 100 times

Potassium nitrate	KNO ₃ 38,2% K, 13,0% N	11,0 kg.
Mono potassium phosphate	KH ₂ PO ₄ 28,2% K, 22,3 % P	13,6 kg.
Potassium sulphate	K ₂ SO ₄ 44,8% K, 17,0 % S	8,7 kg.
Magnesium sulphate	MgSO ₄ 9.9% Mg, 13,0 S	24,6 kg.
Borax	Na ₂ B ₄ O ₇ 11,3% B	192,0 g.
Zinc sulphate	ZnSO ₄ 22,7% Zn	87,0 g.
Copper sulphate	CuSO ₄ 25,5% Cu	12,0 g.
Na-molybdate	Na ₂ MoO ₄ 39,6% Mo	12,0 g.

The climate

Temperature

Anthuriums are tropical plants, and consequently temperatures lower than 15°C and above 30°C should be avoided. Night temperatures of around 15°C will usually not cause direct damage to the plants, but they will have a negative effect on production. The same concerns for a maximum temperature above 30°C. In case the temperature is higher than 30°C, the production can be kept on a reasonable level by using a higher relative humidity. For an appropriate growth endeavours should be made to maintain an average temperature of 20-24°C.

Relative humidity

An excessively low relative humidity will reduce the rate of photosynthesis, whilst an excessively high relative humidity will increase the risk of problems with moulds. However these problems are rare. Nevertheless it is important that more moisture is present at higher light intensities. Countries with a climate possessing a high relative humidity may make use of higher daytime temperatures and light intensities. Endeavours should be made to maintain the relative humidity in the range between 60 and 80%. In situations in which the relative humidity is too low (<40%) – 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 wet the crop (for example, high-pressure humidification in the upper regions of the glasshouse, sprinkler lines under the pots, path/fan systems, etc.).



Moveable screen for optimum light level



Shade hall in the tropics

Light intensity

A light intensity at the level of the plants between 18,000-25,000 lux (250-300 Watt) may be employed. Excessive light intensities will often result in pale foliage and flowers, whilst it is also possible that the plant will become burnt. Inadequate light intensities result in stretched and poor quality plants, with a lower production of flowers. At a maximum of 1400 Watt/m² on sunny days a shading percentage of 80% will be required, which can be achieved by the use of chalk and/or screens.

For cultivation in tropical countries a screening net offering about 75% shading is required. Preference is given to the use of two nets, i.e. a fixed net providing 60% shading and a second movable net offering 40% shading. The movable net can be closed during dry periods and at the middle of the day, thereby avoiding peaks in the light intensity. The use of plastic screens is recommended when the plants are grown in regions with a great deal of rain, since this will result in a drier crop and a reduced incidence of disease (bacteria and moulds). An additional benefit offered in these conditions is the reduced degree of the leaching of nutrients from the substrate; as a result the nutrient concentration remains optimal, in turn ensuring for a more rapid growth.

For the purposes of subsequent thorough analyses of any cultivation problems that may occur it is important that suitable records be made 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.

Plant Treatment

Too many leaves often lead to crooked stems and damaged flower buds. Regular cutting of the leaves is therefore necessary to keep the crop open and to get a higher production of quality flowers. The more plants per square metre, the more leaves that must be cut more frequently. In general the plant must contain at least 2-3 leaves. However, this depends on the variety and the plant density.

Diseases and pests

By nature, Anthurium is not very susceptible for pests and diseases. Some of them can, to a greater or lesser extent, cause damage to Anthuriums.

Animal pests:

Thrips, aphids, whitefly, mites and slugs and snails.

Thrips and aphids constitute the most important pests affecting Anthurium. These insects can be controlled by spraying the plants with pesticides such as:

Thrips Vertimec (a.i. abamectine 18 g/l) 70-100 cc per 100 litre water

Mesurool (a.i. methiocarb 500 g/l) 100 cc per 100 litre water

Violin (a.i. fipronil 80%) 3 g per 100 litre water

Aphids Admire (a.i. imidacloprid 70%) 10 g per 100 litre water

Pirimor (a.i. pirimicarb 50%) 50 g per 100 litre water

Moulds:

Fusarium, *Colletotrichum*, *Pythium* and *Phytophthora*

Bacterial diseases:

One of the diseases causing the greatest loss of Anthuriums is the bacteria *Xanthomonas axonopodas* *pv. dieffenbachia*, although *Pseudomonas solanacearum* (I) can also result in a considerable reduction of the crop. Infection with bacteria occurs from the exterior of the plant, and consequently preventive phytosanitary measures constitute the best remedy. Use should be made of material with Elite[®] certification, which is tested for its intrinsic quality by the Netherlands Inspection Service for Horticulture (NAK-Tuinbouw, www.naktuinbouw.nl).

Caution should be exercised with respect to phytotoxicity; not all chemical agents can be used on Anthuriums without causing damage. You can contact Bureau IMAC Bleiswijk B.V. for information about adequate pest-control agents. Damage is known to occur when using pesticides such as Orthene, Dichloorvos and Parathion. 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 (the response time can be as much as 10 weeks).

Sale

When the spadix is three-quarters ripened, the flowers can be harvested. During the ripening process the spadix discolours and points (pinstils) appear in the open flowers on the spadix. The ripeness for cutting can also be determined by feeling the flower stem directly beneath the spathe. It may no longer be soft, but must be hard and sturdy. Prudence is called for cutting the Anthurium flowers, since these can easily damage.



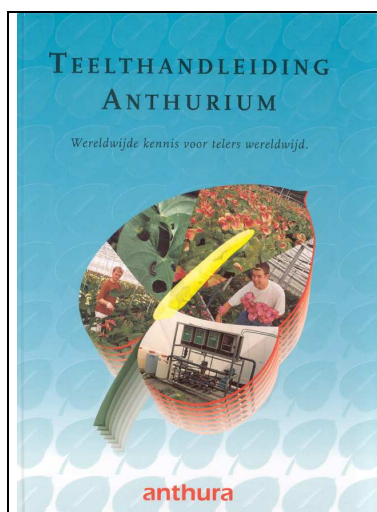
Anthurium flowers in a box



Anthurium leaves can also be sold

Conclusion

We hope that these brief cultivation guidelines will have given you an insight into the cultivation of Anthurium cut flowers. Although their cultivation is a specialized operation, it is certainly feasible provided that a number of conditions are met. Growers who fulfil these conditions will be rewarded with beautiful flowers with a long vase life, 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.



In May 1998 our cultivation guide **'Global Know-How for Growers around the Globe'** was published in the Dutch, English, Spanish and Chinese language (140 pages). This well illustrated guide describes in a very structured way the most important aspects of the Anthurium cut flower culture. It includes drawings, tables and pictures.

The guide will help growers answer very difficult questions regarding the culture and more important help avoid unnecessary mistakes, so that the grower can achieve a successful culture. Since the guide deals with both economic and technical aspects, the book can be considered the first complete guide regarding the Anthurium cut flower culture.

You can order the book now at Anthura!

Anthura B.V. and Bureau IMAC Bleiswijk B.V. cannot accept any liability whatsoever for any damage that may be caused to the crop by following the advice in these guidelines. Moreover in view of the fact that many factors are both outside of our influence and our control we are unable to guarantee specific results.



Introduction Anthura B.V.

Anthura B.V. is the world market leader for planting material of Anthurium for pot plant and cut flower culture with greenhouses covering 14 hectares. Besides Anthurium we specialise in the breeding, selection and propagation of Phalaenopsis for pot plant and cut flower culture. Bromeliad completes our current product assortment, and we are happy to offer growers abroad planting material from Corn. Bak B.V. From a growers perspective all of these products are compatible and in many countries are cultivated next to each other. At the establishments in the Netherlands (Bleiswijk) are 180 workers employed and at the establishment in Germany (Borken-Burlo) are 55 workers employed.

It is important that before you begin planting you are thoroughly acquainted with the various husbandry methods we recommend here. This will enable you to make a good start and allow your crop to realise its full potentials. Additional information can be sought through our visiting representatives and agents as well as from the independent consultant agency Bureau IMAC Bleiswijk B.V. Alternatively you can contact the Anthura Sales department.

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Introduction Bureau IMAC Bleiswijk B.V.

IMAC consultants are well educated individuals equipped with a great deal of practical experience gathered at home and abroad and dedicated to your success and ultimately to our own. Consequently there is a great deal of information exchange between our respective organisations upon which growers may call.

Because of our small-scaled mode of operation and a good consultative structure within our walls we keep each other well informed about the developments in the various cultures. Owing to the unique co-operation with Anthura a broad exchange of knowledge takes place between both companies without affecting the independence of IMAC. The activities of IMAC are not limited to the Netherlands only. Many foreign growers make use of the services of our consultation agency. Because of this international character the IMAC consultant is able more than anybody else to get the most out of your cultivation under your specific circumstances.

Activities of IMAC services world-wide include: advice on cultivation and management, support of study groups, fertilisation analysis and advice, studies in the fields of plant disease, business economics, plant evaluation and pot plant planning.

For more information, without obligation, you can contact the consultants at Bureau IMAC Bleiswijk B.V.

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