Manual for growing potted Anthuriums

Anthurium

Anthurium is indigenous to the Andes region of Central and South America. The plants thrive in a shaded and moist environment. They belong to the Aracea (or arum) family, which is characterized by its typically calyx-shaped inflorescence: the arum. The calyx is composed of a bract and a spadix, in which the flowers are contained. The Anthurium can produce flowers all year long, which makes it an ideal greenhouse crop regardless of the season. It is sold as a potted plant as well as a cut flower. When sold as a cut flower, its foliage also provides added value. There are more than 250 varieties of Anthurium in all; each of which is unique in terms of size, shape and colour.

Plant material

Plant material for propagating Anthuriums can be supplied in two ways: via tissue culture or via cuttings. The plants will, in both cases, need to become rooted under plastic tents, in separate divisions and with individual feeding schedules. This requires considerable knowledge and attention. It is also important to keep the following rule in mind: 'the smaller the plant, the more attention it will need'.

Tissue cultivation

Tissue culture plants are propagated in laboratories, in plastic containers and glass bottles. Each bottle or container contains 60 plants. The substrate is composed of agar (without antibiotics) and can, in some cases, also contain carbon (black). Carbon promotes plant growth. A white substrate can also be chosen if the plants will be marketed in a country where black substrate is not preferred.

Micro-cuttings

Micro-cuttings are the tops of tissue-culture plants and are delivered separately. They are often larger and stronger than young plants obtained through tissue culture and are propagated in plugs. A plug is made from coir, on which one or more singles are grown. The young plants are propagated for 12 to 16 weeks, depending on the plug size. The number of micro-cuttings per plug (two or three) depends on the Anthurium variety being grown. These plugs can subsequently be transplanted into pots directly.

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Cultivation plan

Planting Anthuriums

As soon as the young plants are delivered, they must be unpacked and stored in an area with environmental conditions that are close to or the same as the greenhouse. When planting plugs, the following points should be observed carefully:

- Place them upright in the pot;
- Place them in the middle of the pot;
- Plant them at the right height (plug surface equal to pot surface);
- Planting too deeply will prevent the formation of cuttings and make the plant more susceptible to fungi;
- Planting too shallowly will result in poor anchoring, as the plant will not be planted firmly in the soil.

Transplanting Anthuriums

After the Anthuriums have been planted, they must be transplanted. This can be done on the floor or on tables. The option you choose depends on four aspects:

- Pot size;
- Turnaround time;
- Automation;
- Desired working height.

Whichever option you choose, ensure proper water drainage because Anthuriums should not be left in a too moist substrate for an extended period. After the plants have been transplanted, they must be placed in the starting position. In this position, the pots are placed against one another, enabling the plants to quickly make contact with one another. This creates a good microclimate that promotes plant growth.

Once the pot or the greenhouse floor is obscured by the Anthurium leaves, the distance between the pots should be increased. In this case, approximately 30% more space is needed. This will allow the plants to grow closer to one another again within just a few weeks. Once again, increasing the spacing (30%) depends on the variety, cultivation time and the amount of light needed by the plant. Points of attention about this process are:

- If you space the plants too late this will result in poor flower development and plants with a more stretched plant structure;
- If you space the plants too early the microclimate will not be optimal, and growth will be inhibited;
- The leaves must always touch one another!

Substrate

A loose, airy substrate is best to promote plant growth. An Anthurium plant has a strongly epiphytic habit. Examples of good substrate properties and features are:

- Coarse particles;
- Fast drainage;
- Good distribution of moisture in the pot.

When applying basic fertilizer to the substrate at the beginning of the cultivation process, try to aim for a pH value of approximately 5.5. It is important that the EC of the substrate is about 0.5 mS.

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Irrigation system

Anthuriums can be irrigated from below as well as above. However, a combination of both is preferred.

If you prefer to water your Anthuriums exclusively from below (by means of an ebb and flow system, an irrigation tube or a drip system), select a substrate that performs well with your chosen irrigation method. Use a substrate that ensures an optimum distribution of water in the pot.

If you prefer to water your Anthuriums exclusively from above (via a watering boom), make sure that it is possible to rinse the plants with clean water after irrigation in order to rinse out any residual fertilizers.

It is, of course, important that the water is free of chemical and physical pollutants. Elements like sodium and chlorine must remain below 3 µmol/litre (66 mg sodium and 100 mg Chlorine/litre, respectively). Neither should the bicarbonate content be too high. If you lack sufficient rain water, you can also use osmosis water.

The amount of water that an Anthurium pot plant needs depends on a number of circumstances:

- Climate
- Substrate type
- Plant age
- Irrigation method

It is best to use 14 litres water/m^2 as a guideline for each irrigation round when using a sprinkler system.

Fertilization

When giving potted Anthurium plants fertilizer, use is primarily made of single fertilizers via two-tank system (Tank A and Tank B). We have included basic advice based on this two-tank system. Please note that nutritional needs depend on the variety and the growth stage. This can differ from the general advice provided below. You can contact Floricultura for more specific information about the composition of the solutions in Tanks A and B.

System: 1,000-litre mixing tank
Outlet water: 100% rain water

Solution in Tank A: 100 x concentrated

Calcium nitrate	Ca (NO_3 2	19% Ca, 15.5% N	75 kg
Potassium nitrate	KNO_3	38.2% K + 13% N	15 kg
Iron chelate 3%	DTPA		10 kg
Ron EDDHA 6%	EDDHA		1 kg

Solution in Tank B: 100 x concentrated

Potassium nitrate	KNO	38.2% K + 13% N	25 kg
Mono potassium phosphate	KH_2PO_4	28.2% K + 22.3% P	25 kg
Potassium sulphate	K_2SO_4	44.8% + 17.0% S	15 kg
Magnesium sulphate	$MgSO_4$	9.9% Mg + 13.0% S	30 kg
Manganese sulphate	$MnSO_4$	32.5% Mn	75 g
Borax	$Na_2B_4O_7$	11.3% B	100 g
Zinc sulphate	$ZnSO_4$	22.7% Zn	50 g
Copper sulphate	$CuSO_4$	25.5% Cu	19 g
Sodium molybdate	Na_2MoO_4	39.6% Mo	19 g

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When growing Anthuriums great care must be taken with regard to spore elements.
Manganese and boron are two spore elements that are easily given in too high concentrations. If the pH value drops, an excessive amount of manganese needs will become available. These elements are absorbed only in small doses by the Anthurium and can therefore accumulate in the substrate. Higher values may cause leaf tips to turn yellow.

The EC session ranges should be between 1.5 and 2.0 mS/cm when the plants are watered from above, and 1.7 and 2.5 mS.cm when they are watered from below. Rinsing with a low EC or wetting agent is necessary if the plants are watered from above with an EC session range above 1.7. The pH can vary between 5.2 and 6.2.

Climate

Temperature

As already mentioned in the introduction, the Anthurium originally comes from the Andes in Central and South America. It is a subtropical plant. This is why it is important that temperatures below 16°C and above 30°C are avoided to the greatest extent possible. The best possible growth conditions can be created by 24-hour average temperature of 19-21°C. However, the temperature must always be proportionate to the amount of light that is admitted.

CO_2

Anthurium plants should be given carbon dioxide during the day with values between 600 and 800 ppm. Avoid values higher than 1000 ppm as this can damage the flowers.

Humidity

When growing Anthuriums it is vital to keep an eye on the humidity. It is best to aim for a relative humidity (RV) between 70 and 85%. If the humidity is too low (<60% RV) this can cause plant stress. If the humidity is too high (>95% RV) this will result in limited evaporation.

If the level of lighting is too high, 300 µmol (more than 17,000 lux) it is important that the moisture level in the air is relatively high. If humidity is low (RV<60%), particularly in combination with high temperatures, it is important to install a system that can increase humidity: high-pressure humidification, irrigation pipes, or pad/fan systems.

Light level

The right level of light is very important when growing Anthuriums. Too much light can result in pale leaves and flowers, and can cause leaf burn, depending on the variety. We have seen that pink-tinted varieties, as opposed to other colours, are the first to bleach when exposed to a light level that is too high. Too little light will result in an overly stretched and lightweight plants (too thin) with a poor flower production. The plant will also be more susceptible to pests and disease.

The ideal light level is around 225 µmol (12,500 lux) of light. If the light level increases beyond this, screening is a must. This can be done by means of climate screens, or by applying chalk to the greenhouse roof. An ideal light integral depends on the 24-hour temperature. However, if a 24-hour temperature of 21˚C is achieved, an ideal par sum of around 6 µmol/m^2/day is fine on a daily basis. Again this depends on the variety.

Keeping records

It is important that records are kept of climate data, such as light, temperature and relative humidity. This will enable you to make a good analysis later on, thus helping you resolve specific cultivation problems. A climate computer can be used for this purpose.

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Pests and disease

In general Anthuriums are not very sensitive to pests and diseases, however there are a few that can cause damage to the plant to a greater or lesser extent.

Damage caused by animals

The most common insect pests are: thrips, aphids, whiteflies, mites, snails and armoured and soft scales. Thrips and aphids are by far the most common pests to affect Anthurium. These insects can be treated with chemical products and/or by means of biological pest control.

If you opt for biological pest control, you might consider setting out predatory mites. However, you should obtain information from your supplier first. If you decide to use chemical products, always conduct a test before spraying it onto your crop. This way, you can be certain that the plants will tolerate the product. Be sure to obtain the necessary information from your supplier with regard to admissibility.

Fungi

Fusarium, Colletotrichum and Pythium Phytophthora are the most common types of fungi. These fungi often affect weak plants that have not been exposed to optimum climate, fertilizing and irrigation conditions.

Bacterial diseases

One of the diseases that affects Anthurium most often is caused by a bacterium called Xanthomonas axonopodas pv. Dieffenbachiae. Another bacterium to watch out for is Ralstonia (Pseudomonas) solanacearum (I), which can lead to substantial production losses. Be sure to take sufficient measures to prevent the above pests and diseases. Examples:

- Purchase healthy plant material;
- Observe proper hygiene;
- Train employees and raise their awareness.

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