

# ANTHURINFO



## Cirano: the purple innovation for everyone

If there is one colourful variety that makes everybody happy, it certainly is Cirano<sup>®</sup>.

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**Interview with  
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a new champion  
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**Importance of  
humidity for plant  
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# Cirano: the purple innovation for everyone

According to the latest consumer survey, the pot Anthurium is elegant, exotic, colourful, and makes people of all ages and categories happy. If there is one colourful variety that makes everybody happy, it certainly is Cirano®.

With the introduction of this 'purple beauty' we hope to raise the interest of the younger target group for pot Anthurium. The variety is hip and can be used in any interior.

The variety is suitable for the small 9 cm pot size up to the 17 cm pot size. In this last pot size it will have a compact appearance with plenty of flowers. Because of its colour it is ideal for any interior and would not be out of place on the coffee table or the windowsill.

Its high-gloss flowers are of excellent quality. The elegant flowers stand beautifully above the foliage and the spadix has the same deep purple colour. Obviously, this variety has an excellent shelf life and is also cold tolerant. Besides Cirano® the other purple varieties Utah®, Cavalli® and Fiorino® are still doing particularly well in several countries around the world.

**Richard Smit**  
Sales & Product Manager Anthurium pot plants



## Cirano® (ANTHDUBAQ)

 Colour	purple
 Flower size	small
 Pot size	9,12,14 and 17



Frans van de Weijer

# Interview with Frans van de Weijer

- Holambra, Brazil -

Frans van de Weijer is an important grower in Brazil. He has been living there for almost 40 years, a period during which his company Ecoflora has evolved significantly.

## **You emigrated to Brazil in 1978. Why did you take this step?**

I emigrated to Brazil in August 1978 because I wanted to set up a pot plant nursery. Since I do not come from the agricultural and horticultural sector and my father did not have any resources or possibilities to help me to get started, I chose to emigrate to Brazil: a country where I needed less capital to start up a pot plant company and with a huge potential market.

## **Could you tell us something more about your company?**

I started my company in September 1980 on a rented plot with a small shadow house and some henhouses. We took away the roof tiles from the henhouses and stretched plastic over them, putting a sign on the door with the word 'greenhouse'. Those were our first greenhouses. At that time, we were growing ferns for the local market.

In 1983, I bought a 10-hectare plot near the centre of Holambra. We are still established on that location. The 10 hectares have multiplied over the years by the acquisition of some neighbours' land. Today we have 9.5 hectares of greenhouses and approximately 6,000 m<sup>2</sup> of barns here, where

we grow three hectares of young Phalaenopsis plants, 12 cm pot and 6 cm pot Phalaenopsis, one hectare of young plants of Dendrobium Phalaenopsis, 2.5 hectares of Oncidium and Intergeneric and three hectares of bromeliads.

In addition, we also bought several other plots around Holambra over the years. On one of these plots we have 6.5 hectares with shadow houses and one hectare with greenhouses for pot Dendrobium Phalaenopsis.

On another plot, 20 km away from Holambra, where we own 340 ha, we have been growing since 1999 approximately 50 hectares with Amaryllis bulbs for the international market. For the last three years we have been building a new greenhouse complex on this location where we have levelled 20 hectares of land for the future. Here we are currently cultivating 3.5 hectares of Phalaenopsis 12cm pot and we have a barn of 8,000 m<sup>2</sup>. At the moment, we are building an extra 13,000 m<sup>2</sup> for expansion purposes. On this plot we are also cultivating 80 hectares of Eucalyptus trees for our own energy provision (wood boilers).

We employ a total of 240 staff.

### **Compared to other orchid growers in Holambra, your company is huge. How have you organised all this?**

All in all, we own a considerable acreage with orchids and we are the largest orchid grower in Brazil in the global orchid package segment. We are growing at four locations and each location has its own manager and grower. Over the years I have managed to build up a good team of employees around me, where I can rely on.

### **Why did you decide to grow orchids at the time?**

I chose to grow orchids because this plant was emerging in Europe and it is a cultivation that not everybody can easily start with. It requires a long-term view, a lot of capital and extensive knowledge.

### **You sell everything through the auction of Holambra. Why did you decide to operate this way?**

The bulk of the supply of plants in Brazil is in and around Holambra, so Holambra has become the centre for the flower trade in Brazil. Traders who need large, uniform batches can only buy these at the Holambra auction. By approaching the market as growers together with the auction, in certain agreements with colleagues, we gain a better insight into the offering. This way, we try to market the plants without great surprises and fluctuations and we also try to respond to peaks and troughs in the offering in order to obtain the maximum yield from the market. If everybody were to offer plants individually, without having insight into the market, we would be completely stripped by the trade.

### **What else do you do, apart from delivering a high quality product, to make the plant interesting for (potential) customers? Do you focus on a specific market segment with the cultivation?**

We have chosen to set up a large scale production and therefore we need customers who are able to purchase these large amounts. The growth market in Brazil is especially supermarkets, the construction market, garden centres and pet shops, so this is the segment which we have opted for.

We pack the plants in sleeves of bopp (foil) with a closed bottom, as is usual in the Netherlands and in one-off plastic trays. On the Brazilian market, however, the Phalaenopsis are traditionally offered in a sleeve for the plant and each spike also gets its own sleeve. Extremely laborious.

During the plant fairs and on special events, we always try to provoke a little and do something different so as to catch attention or encourage discussions. We also do a lot of product marketing by putting plants at the disposal of TV programmes, magazines and advertisers.

One of our campaigns can be viewed on the website '[www.pote12.com.br](http://www.pote12.com.br)'. We launched this campaign to promote the 12cm pot size, since the Brazilian trade was very sceptical about smaller pots. During this campaign we approached all (potential) customers and explained the opportunity to earn more with the 12cm pot. Now, a few years later, the 12cm pot represents almost 50% of the market supply. During this



*In the greenhouse*



*Packing Phalaenopsis plant by Ecoflora*



*Traditional packing of a Phalaenopsis plant in Brazil*

campaign we also developed an app, where the trader can simply see, by introducing a few data, the amount he can earn with the 12cm pot in his truck compared to the 15 cm pot.

### **Which is, according to you, the difference between growing and marketing pot plants in Brazil and the Netherlands?**

A huge difference is that we have relatively few providers and few buyers here. This makes the market more uncertain. A problem with one grower can cause, just like that, a shortage on the market and if one supermarket chain does not buy anything during one week, this could already affect the pricing.

Since we are only trading on the Brazilian market, we have to deal with one economy. In the Netherlands, however, the trade is throughout Europe which means it depends less on economic fluctuations.

We trade more than 90% of our production through intermediaries. We have our contacts with the trade and we sell in agreement with the auction.

### **What are your challenges in cultivation techniques?**

In the cultivation in Brazil, the summer months are the most difficult. During this period, we have to cope with high temperatures outside the greenhouse (30°C - 36°C) often accompanied by high humidity. In order to keep the greenhouses cool, we use a pad and fan system and at high humidity this results in less cooling capacity of the pad and fan. In order to keep the humidity low enough at these high temperatures, we often heat in the hot summer.

We have no artificial light, making it more difficult for us in certain periods of the year to achieve the desired amount of light (PAR sum).

### **What are the major challenges for Ecoflora in the future?**

The transition towards the next generation. I have two daughters and one son working in the company.

### **What is your vision of the Phalaenopsis product and what does this mean for the position of Ecoflora in five years' time?**

The Phalaenopsis product still has a long way to go in Brazil. It is still at the preliminary stage. On the one hand, you see that there are growers setting up larger production units, but you also observe that more and more niche markets are being explored. The growers are specialising more in a certain market segment. Until a few years ago, we only had Phalaenopsis in a 15 cm pot in our offering. Now we have 15, 12, 9 and 6 cm and cascade.

Initiatives by the auction house to approach more potential customers, especially supermarkets and construction market chains, are starting to yield results. Several new chains are 'discovering' our sector.

At the moment, the Brazilian economy has landed in a recession and it will take some years to emerge from it in a healthy way. Yet the Brazilian market has a lot of consumers and at the slightest economic growth we can already expect a lot more trade. I am certainly positive about the future of Phalaenopsis in Brazil.

### **Laetitia de Goeij**

#### **Marketing & Communication**



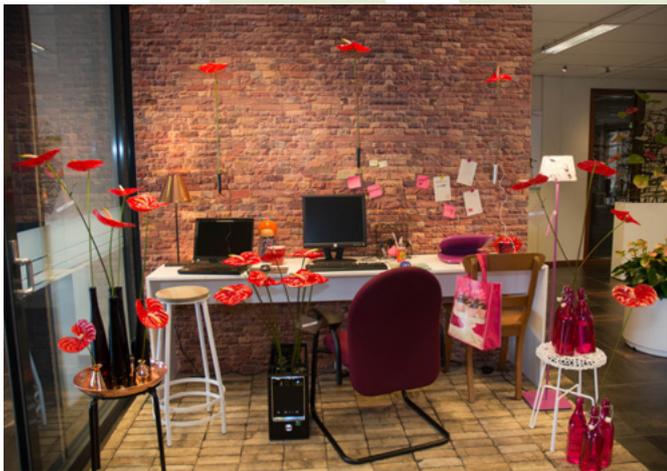
*Ecoflora, Brazil*

# Bricks & clicks: relation day for cut Anthurium

On Thursday 7 April, the annual relation day for the Dutch growers of Anthurium cut flowers took place with the theme: Bricks & Clicks: does the online sales of flowers also reinforce your offline sales?

Shopping streets are abandoned, while the number of online stores is growing. This raises issues about to what extent shopping centres and city and town centres still have sufficient appeal for consumers. Statistics show that the number of online stores (clicks) has now exceeded the number of physical shops (bricks) in the Netherlands [for your information, about 100,000 compared to approximately 95,000].

In order to gain more insight into these changes and the role of the grower in this, two presentations were scheduled about two special, different retail formulas for the sale of flowers. The first was given by Mark Kolster from Naturals, the physical flower shop formula that stands for quality, originality and authenticity. Naturals has proven that it is possible to achieve a better result with this formula, in which the 'P' of place is shaped by 'bricks', compared to the bench-mark.



*Product presentation of cut flower*

The second presentation was given by Chris Geertsma and Nicky Verbaan from Flowder.com, a relatively new, online formula that delivers flowers directly from the grower and focuses on lifestyle experience in flowers. By focusing on another aspiration level, i.e. lifestyle, the floral product is positioned in a completely different way. It is also expected to appeal to the younger consumer. After a visit to the showroom with plenty of novelties, the morning was rounded off with a lunch during which there were sufficient opportunities to network.

**Hans Prins**  
Sales and Product Manager Anthurium

The traditional brick retail outlet is under pressure, but offline and online sales can reinforce each other. This way, flagship stores or service facilities are created where online providers have direct contact with their customers. Bricks and clicks as a market development is particularly topical and very interesting, not only for growers but also for consumers. You can choose, for example, for a bouquet subscription with a fixed delivery frequency, delivered to your home at the time that suits you best. The informal way of arranging flowers offers new opportunities for Anthurium in bouquets. A few Anthurium cut flowers, combined with other stems, give a fantastic result. It is notable that this method of flower arrangement is found more and more often in physical flower shops.



*Anthura relation day Anthurium cut flowers 2016*

# Marea, imagine nature

Natural shapes and colours; that is what Marea® stands for. A flower that seems to originate directly from the jungle and therefore strongly appeals to the imagination.

Marea matches almost seamlessly with the more natural and informal way of arranging bouquets, which is quite popular in the Netherlands at present. Or, simply an individual flower in a beautiful vintage vase results in a lovely combination which consumers can certainly enjoy for a long time. Due to the flower shape, you are looking directly into the heart of the Marea flower. As a result, she is also very suitable for large arrangements to decorate hotel lobbies, churches or mosques. The shelf life of Marea amounts to 34 days on average. The special feature is the pink flame, which will be increasingly predominant as the flower is cut at a more mature phase. In the vase this colouring will last well, resulting in a special presentation.

The technical characteristics of Marea respond perfectly to market demand. A good production, shelf life and flower shape are obvious. But the solid, long stem and the coarse roots are also important and striking features. By cultivating fewer plants per square metre, it is possible to grow an even sturdier flower diameter. In this case, the flower size can be increased to a maximum of 15 cm.

**Hans Prins**

Sales and Product Manager Anthurium



## Marea®

 Colour	green/pink
 Flower size	11-13 cm
 Production/m <sup>2</sup> /year	about 95-100
 Vase life	34 days

# A showroom packed with novelties at the Flower Trials® 2016

From 14 to 17 June 2016, our showroom will be packed again with new varieties. Our product specialists have selected their favourites; on this occasion, they have chosen colourful pot Anthurium, ornamental Phalaenopsis and trendy cut Anthurium.

## Colourful

This year, colourful Anthurium are put in the spotlight. Powerful varieties that stand out for their colour, format and quality have been chosen as favourites. Aristo®, a versatile Anthurium with bright red flowers, suitable for several pot sizes. Cirano® (page 2) has lush deep purple flowers, an excellent shelf life and is cold tolerant. Colorado®, a new pink Big American with magnificent properties.

## Famous world cities

Our Phalaenopsis specialities are sold worldwide. Assess the top selection of our prototypes during the Flower Trials; your varieties of the future: Anthura Narbonne, this warm coppery-coloured orchid grows easily and has a high uniformity, Anthura Denver (page 9) is a very productive variety with elegant white flowers with a red lip

and Anthura Brisbane is a productive variety with white flowers and a high percentage of plants with two and even three spikes.

## Market leader

Anthura is the global market leader in cut Anthurium. This year we are paying particular attention to three newcomers: Cantello® and Marea® (page 7) form a special duo thanks to their 'botanical' look. Milanello® is a trendy purple novelty, its powerful colour and ideal sizes make it an absolute favourite.

## Opening hours

From Tuesday 14 June to Thursday 16 June we are open daily from 8.00 o'clock to 5.00 o'clock. On Friday 17 June, from 8.00 o'clock to 4.00 o'clock. We look forward to welcoming you during the Flower Trials at Anthuriumweg 14 in Bleiswijk.

It is very easy to register online beforehand. Please visit [www.flowertrials.com/en/registration](http://www.flowertrials.com/en/registration) to register directly!

We look forward to welcoming you!

## Mattijs Bodegom

Head of Marketing & Communication



FlowerTrials®

14-17  
June  
2016

Don'tmissit!



Register  
Online

[www.flowertrials.com](http://www.flowertrials.com)



*Anthura Brisbane*

# Anthura Denver: a new champion for the standard assortment!

The city of Denver is situated in the state of Colorado in the United States. Originally it was a city of gold diggers, so the name for this new variety has been rightly chosen: this productive variety is worth its weight in gold for a Phalaenopsis grower.

The Denver variety grows easily and uniformly, producing during a normal growing period of 26 weeks more than 30% of plants with three spikes and, moreover, it develops spikes.

The plant has a flower size of 9 cm and an average plant height of 65 cm. The shelf life has been tested several times (including a one week transport simulation) and amounts to 11 weeks on average.

The Anthura Denver variety has elegant white flowers with a soft lilac stripe and a red lip. This makes the variety just a little different from the normal white/red lip and suitable for retail, the specialist trade and wholesale. All in all, Denver is a new champion for the standard assortment of every Phalaenopsis grower!

You are welcome to visit Anthura Denver in the showroom. If you would like to receive Anthura Denver yourself, please ask your sales manager about availability.

**Robert Kuijf**

Product Manager Orchids



## Anthura Denver (PHALDANCIP)

📏 Colour	LILRS
🌸 Flower size	9 cm
↑ Height	65 cm
📏 Pot size	12 cm

# The Persian Evin Hotel, Teheran

Most columns that are written for 'Travelling' are approached from the experiences of employees in the country that was visited. In a serious and/or humorous way, we try to offer Anthurinfo readers an insight into the different markets. Abroad, things always seem to be just a bit different and that is what makes it so interesting.



*Skyline in Teheran, Iran*

Due to developments at a political level and the subsequent rapprochement, the Iranian market offers new opportunities for starting material. Iran is a huge country with a rich culture, where people share a great passion for flowers and plants. Preparing a trip requires a lot of time. Visa arrangements, making appointments, setting up meetings, hotel bookings, etc. All very important, because a job well begun is a job half done.

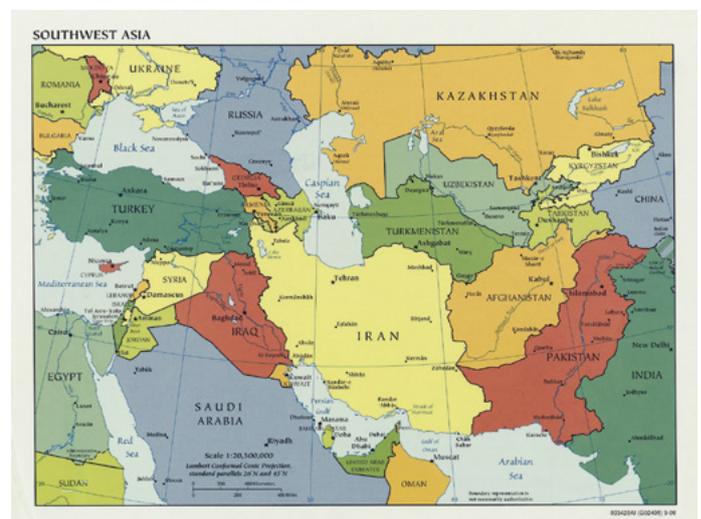
Fortunately, our customers are mostly very helpful, for example when looking for a hotel. Good accommodation is important and has to be situated in a central place, be safe and offer some comfort, so that you can check your full mailbox and keep in

touch with the home front after an intensive day. I was offered the Persian Evin Hotel. This hotel was recommended by several people and the price-quality ratio seemed to be fine. Also this time, preparation seemed to be of vital importance. On Google Earth, all hotels, facilities, etc. are displayed. The Persian Evin Hotel, for example, is situated close to Evin Road. And on Evin Road, Evin Court is established. Behind this building, there is another hotel: Evin Prison... Now, how am I supposed to explain later on in Farsi to my taxi driver that I really booked a room in the Evin Hotel...?! 'You know, that hotel where they have Wi-Fi.' Well, all those buildings together on a few square kilometres.

I am convinced that this trip will turn out to be an exciting experience from both a business and a personal point of view. During the preparation I sensed a certain relief among our contacts (finally the sanctions are being reduced) and immediately a warm and heartfelt welcome. And, as far as the accommodation is concerned, I am not in the least worried about that.

**Hans Prins**

**Sales and Product Manager Anthurium**



# CULTIVATION TECHNIQUES

## Importance of humidity for plant growth

Why is humidity so important and what are the options for keeping the stomata open?

# 12



For targeted cultivation advice on Anthurium and Phalaenopsis pot plants and Anthurium cut flowers



Cooling in Phalaenopsis

# Importance of humidity for plant growth

Humidity is important to make photosynthesis possible. In the case of Anthurium, good humidity around the plant is even more important than for most other crops, because the plant can only absorb a reduced amount of humidity and hence has less water evaporation than most plants. If the plant loses too much water, the stomata will close with the result that photosynthesis stops. If this happens, no further CO<sub>2</sub> can be absorbed, and CO<sub>2</sub> is required to keep the photosynthesis going.

In addition, the temperature of a plant on a sunny day is mainly regulated by cooling through evaporation. Evaporating water can evacuate a lot of plant heat and is an efficient way of cooling for a plant. Open stomata ensure that a lot of heat can be evacuated. By closing the stomata, the plant temperature will often increase quickly.

## Why is humidity so important and what are the options for keeping the stomata open?

### Keeping the stomata open

In order to keep the stomata open, it is important to reduce the evaporation of the plant when there is more irradiation. By keeping the humidity in the greenhouse

high, evaporation will be reduced. In addition, the greenhouse temperature can be lowered by introducing humidity, as a result of which the plant has to cool less through evaporation. Finally, the crop can be slightly moistened so that the evaporating water can cool the crop or the greenhouse temperature.

### Keeping the stomata open is more important than the optimal amount of light

In order to make photosynthesis possible, the stomata should be open to be able to absorb CO<sub>2</sub>. If you are able to keep the stomata open, photosynthesis will be possible with low light values. If the stomata are closed due to higher light

values, no photosynthesis will take place. Of course, keeping the stomata open with the optimal light level delivers the maximum photosynthesis.

### Are stomata open?

You can check whether the stomata are open or not with alcohol (>80%). Let some alcohol flow onto the underside of the leaf and rub it in; the alcohol will soak into the leaf through the open stomata. As a reaction, the leaf will turn dark green. The darker green the leaf turns, the more stomata are open. If there is no difference in colour after rubbing it in, the stomata are closed. This way, it is possible to determine to what extent the stomata are open.



Opening stomata from bad to good

### Humidity in the greenhouse

With regard to humidity in the greenhouse, a distinction can be made between relative humidity deficit and microclimate.

The relative humidity deficit can be measured by the measuring boxes. The microclimate is the humidity between the plants from the substrate to the leaves. With the appropriate leaf coverage, the microclimate of the crop will be better. As the stomata are mainly found on the underside of the leaf, evaporation can be reduced with a good microclimate. This also applies when the humidity in the greenhouse is not that high. Of course, the microclimate is affected by the humidity in the greenhouse.



*Worse microclimate due to open crop*

### Why is evaporation necessary?

Evaporation is the most important way for a plant to lose heat. Plants use on average approximately 5% of the light for photosynthesis. About 60% of the light that reaches the plant is converted into heat and should be evacuated by the plant chiefly through evaporation. Heating up water from 0 to 100°C (= 0.418 10<sup>6</sup>J/kg) does not cost as much energy as letting water evaporate (2.26 10<sup>6</sup>J/kg). Therefore, water evaporation by a plant is a very efficient way of evacuating heat.

The condition, however, is that the stomata stay open, otherwise it will be



*Burned leaf*

difficult for the plant to evacuate its heat. In this case, the plant temperature can increase too much, which may result in plant damage. An example of this is chlorophyll damage, as a result of which the leaf can turn yellow. The plant will substitute the chlorophyll where possible, which will cost it assimilates. If the plant temperatures increase further, parts of the plant can also be irreversibly damaged. This is visible in the burned parts of the leaf.

### Avoid the closure of stomata

In order to keep the stomata open, it is of course important to keep the humidity in the substrate at the right level and not to let the EC increase too much when the demand for water is high. In addition, by keeping a higher humidity percentage in the greenhouse, especially at more irradiation, too much humidity loss from the plant can be avoided. Where possible, this can be achieved by keeping humidity around the plant and, when the humidity diminishes, by working with air humidification.

Stomata can also be kept open, where necessary, by limiting irradiation and/or by cooling the plants.

### Measures for an optimal humidity regime

#### Keeping humidity in the greenhouse

With a good coverage of the plants, closing of screens and possibly foil, it is possible to keep more humidity in the greenhouse. Cutting back ventilation on the windward side and wind speed, for instance, can also achieve this. An important physical phenomenon is the fact that humid air has a higher energy content (enthalpy) than dry air. With higher humidity in the greenhouse, the same temperature drop can be achieved with a more limited window position as with dry air.

#### Use of crop or air humidification

Should the humidity in the greenhouse drop, it is possible to work with air humidification systems to increase the humidity and to lower the greenhouse temperature. There are, roughly speaking, two possibilities: crop and air humidification. With crop humidification, the crop is moistened, as a result of which direct cooling of the plant occurs, as the water on the plant evaporates. With air humidification, droplets are introduced as fine mist under pressure in the

greenhouse. In order to allow the water mist to evaporate, energy is extracted from the atmosphere. This makes the temperature of the greenhouse air drop, making it moister.

There are four humidification systems:

- 1) Crop humidification by means of low pressure/droplet humidification;
- 2) Air humidification by means of low pressure/mist system;
- 3) Air humidification by means of high pressure/spray system (see Anthurinfo October 2008);
- 4) Pad and fan system:

This system can be used in countries with high temperatures and lower air humidity. With this system, as well as humidifying the outside air, the greenhouse is also cooled.

### Improving the microclimate

To improve the microclimate, you can keep extra humidity in the plants by providing good coverage. In addition, the microclimate can also be improved by watering. An irrigation pipe is the best option to moisten the top layer of the substrate than an irrigation tube. Especially for countries with a warmer climate, it is therefore necessary to have an irrigation pipe to improve the microclimate.

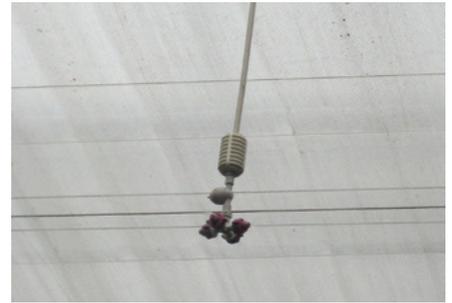
By moistening the top layer of the substrate, water from the substrate can evaporate better, which improves the microclimate. By irrigating more often with smaller quantities, the microclimate around the plant will be kept moister during the day. Abroad, the plants or the paths are sometimes watered by hand.

### Reducing irradiation

Should the humidity in the greenhouse after using all the available options still be too low, it is better to opt for reducing the irradiation. The heating of the plant is



*Low pressure droplet humidification*



*Low pressure air humidification*



*High pressure air humidification*

- windward side;
- Use of crop or air humidification;
- Improvement of the microclimate: irrigation pipes and watering;
- Lowering of irradiation to keep as many stomata as possible open. This makes it possible to further improve production and quality.

mainly reduced by minimizing irradiation. This can be achieved by providing extra screening or chalking the greenhouse deck. On days with a lot of irradiation, you can put up extra screens. In the middle of the day in particular, the amount of light can drop below the optimal value. If this keeps the stomata open, it will deliver a better yield in the end.

### In summary

Keeping the stomata open for photosynthesis is extremely important. When the stomata are completely closed, no photosynthesis will be possible. When this process halts, the plant will not grow. By keeping the humidity in the greenhouse and around the plant at the right level, the plant will be able to keep its stomata open. Then CO<sub>2</sub> can be absorbed and the plant temperature can be regulated through evaporation.

There are different ways to optimise humidity and microclimate.

- Keeping the greenhouse moist: appropriate leaf coverage, closing of screens/foil and less air on the



*Irrigation pipe*

Keeping the stomata open for photosynthesis is extremely important. By keeping the humidity in the greenhouse and around the plant at the right level, the plant can keep its stomata open. Then CO<sub>2</sub> can be absorbed and the plant temperature can be regulated through evaporation.

**Hans van Eijk**

Bureau IMAC Bleiswijk B.V.



*Pad & fan cooling*

# Cooling of Phalaenopsis

Phalaenopsis plants need the cold to switch from the vegetative (growth) to the generative (flowering) phase. In terms of plants, we speak of vernalisation.

## The plant

When the twenty-four hour temperature lies between 19°C and 20°C during the cooling period, optimal spike induction takes place for Phalaenopsis. Optimal means that most spikes are induced simultaneously. This produces the most spikes per plant. Moreover, the equal temperature also has the advantage that the spikes develop simultaneously, growing to the same length and also featuring the same amount of flower buds.

However, when during the summer period

the cooling is insufficient to achieve a constantly low temperature or when the outside temperature in combination with the solar radiation is too high, it is possible that due to an overly high day temperature the 24-hour temperature also gets too high. This 'costs' spikes and causes too low a yield. However, it is possible to keep a lower temperature at night to offset the high day temperature (partially). As a general rule, for each degree that the temperature rises above 20°C, the night temperature can be reduced by 0.5°C (see chart below).

This compensation cannot continue indefinitely. When the temperature falls below 16°C, many processes in the plant stop and lowering the temperature will only have a reverse effect. Moreover, there will be a very high risk of cold damage. Such a temperature regime can help to improve the percentage of multiple spikes, but the equality with which the flower stems grow will decrease as the difference increases. A low night temperature can only be kept when the day temperature is high, adhering fairly strictly to the chart below.

Temperature during the day:	20°C	21°C	22°C	23°C	24°C	25°C	26°C
Compensation at night:	19,0°C	18,5°C	18,0°C	17,5°C	17,0°C	16,5°C	16,0°C

### The technique

Cooling consumes power. The extent to which it consumes power depends on the cooling method. In areas around the world where the humidity is relatively low, cooling is possible by way of water evaporation. For the evaporation of water energy (warmth) is required, which is extracted from the greenhouse air.

### Screening

The sun produces a lot of energy. In most places on earth this reaches a maximum of 1000-1100 W/m<sup>2</sup>. Such an amount of energy cannot possibly be cooled down by a greenhouse. It is therefore necessary to screen down a large part of it. This can be achieved, for example, with chalk. Apply a thick layer so ±80% of the radiation is filtered out. An outside screen can filter out even more energy.

### Pad-Fan

In a lot of nurseries outside the Netherlands the use of a pad & fan is very common. On one side of the greenhouse, a wall is situated along which water flows. This can be a cardboard wall composed of many small channels or a special sort of screen, in which the inflowing water is retained for a long time (the 'Pad'). At the opposite side, very large fans are located that blow the air from the inside to the outside (the 'Fan'). This way, air is 'pulled' from the outside through the wet wall. The water evaporates in the greenhouse, extracting warmth from the greenhouse. The damp air is transported to the outside by the fans. A huge disadvantage of this system is that it creates large temperature differences in the greenhouse. Near the pad, the temperature is the lowest; near the fan, the highest temperature is measured. A temperature difference of 5°C is very normal. The distance between pad & fan should be shorter than 60 metres, considering 50 metres as the



*Pad and fan cooling in a low greenhouse*

ideal distance. If the greenhouse is wider, sometimes a system is selected where a pad is placed on both sides, the fans being located in the deck. The disadvantage of this system is the extraction of the damp air when the screens are closed. In this case, concessions are made on screening and/or the air extraction.

### Mist installation

In the Netherlands, and increasingly in nurseries outside the Netherlands, a fog or mist installation is often installed. Such a system can also be applied along with a pad & fan installation. The major advantage is that a mist installation can be turned on quickly, without having a sudden impact on the climate. In order to ventilate the excess humidity gently, it is necessary to be able to remove the air at the top of the greenhouse by means of ventilation flaps. This can also be forced with little fans on the façade in the ridge of the greenhouse (see picture). The effectiveness of a mist installation is highly dependent on the absolute humidity outside. In the event of an outside screen, with a mist installation a temperature can be kept within a range of 5°C below the outside temperature.

### Air conditioning

The best way to lower the temperature in the greenhouse is by means of a real air-conditioning installation. It consumes quite a lot of power, but it turns out to be more profitable to install and run such an installation. The power required to lower the temperature in a greenhouse from 30°C to 20°C at an outside temperature of 30°C and with radiation of ±1.000 W/m<sup>2</sup> is a minimum of 250 W/m<sup>2</sup>. It should also be noted that the irradiation in the greenhouse should be reduced by at least 80% by means of a chalk layer and/or an outside screen.

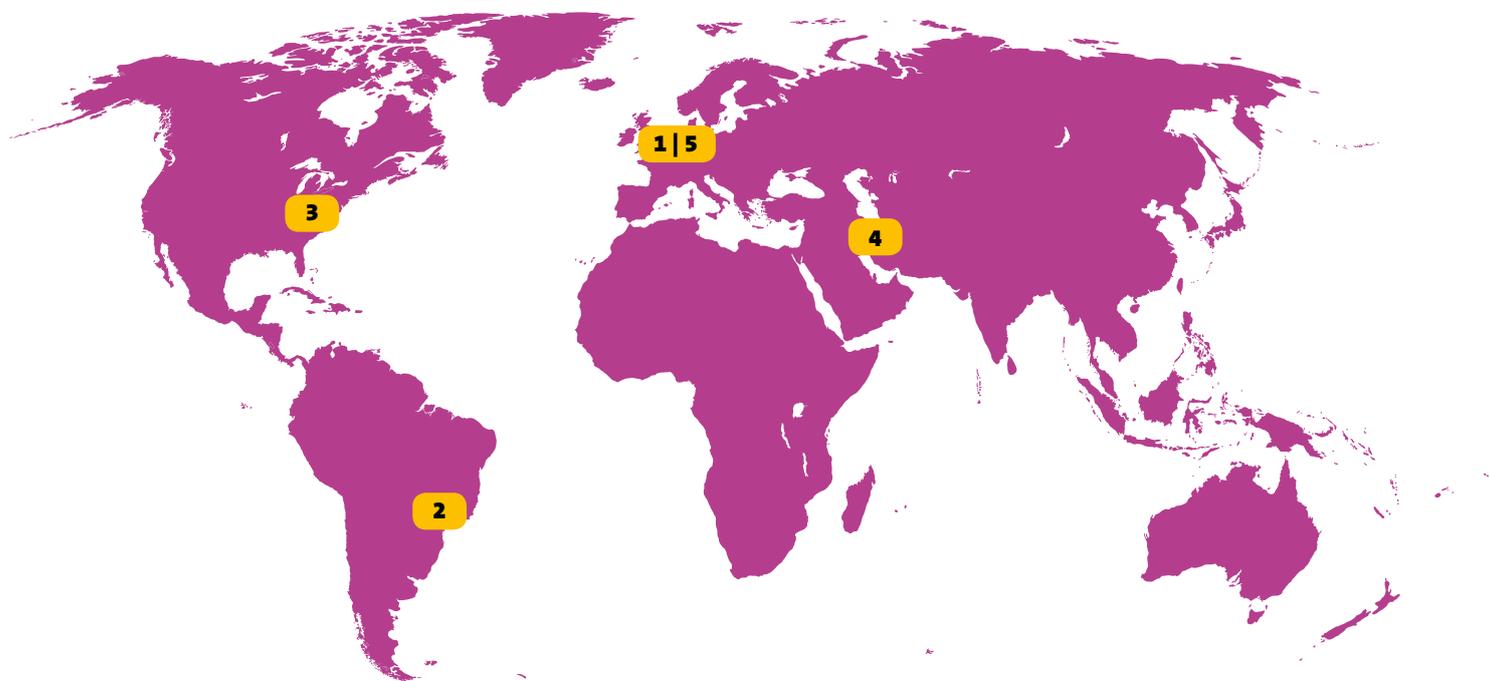
By applying the abovementioned ways of cooling, you ensure an optimal and regular transition from the growth to the flowering phase.

Should you have more questions on this subject or want to receive additional information, please contact Bureau IMAC.

### Menno Gobelje

Bureau IMAC Bleiswijk B.V.

# Trade fairs from June to November 2016



## 1. Flower Trials 2016

Bleiswijk, The Netherlands  
14/06/2016 – 17/06/2016

## 2. Hortitec

Holambra, Brazil  
22/06/2016 – 24/06/2016

## 3. Cultivate '16

Columbus (Ohio), USA  
9/07/2016 – 12/07/2016

## 4. Iran Green Expo

Teheran, Iran  
03/09/2016 – 06/09/2016

## 5. FloraHolland Trade Fair

Aalsmeer, The Netherlands  
02/11/2016 – 04/11/2016

## Colophon

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