BREEDING BUSINESS

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Floricultura

ORCHIDACEAE & ARACEAE

Breeding your success

Phalaenopsis and the impact of day length on flowering

It has been a few years since we conducted research into the effect of increasing or decreasing day length on the flowering of Phalaenopsis. It was one of the topics in our Autumn 2016 and Spring 2018 newsletters. The topic was also discussed in detail at the Floricultura seminar during the 2017 FlowerTrials.

Trials in autumn 2016 and spring 2018

The idea was to investigate how a decrease or increase in day length as a natural result of the season affects spike initiation. The reason for this was the fact that, in the northern hemisphere, despite all the heavy-duty cooling equipment and more than sufficient artificial or natural light, spike initiation in varieties that flower from September to primarily Christmas is not as successful as in that in varieties that flower in time for International Women's Day and Mother's Day. In the southern hemisphere (e.g. in Holambra, Brazil or in Australia and New Zealand), the results are exactly the opposite.

Back in time

If we go back to a time before artificial lighting or cooling became common practice, Phalaenopsis always flowered in spring and hardly ever in autumn. At that time, you would only see Phalaenopsis spikes appearing around Week 40 in the northern hemisphere, while this would have been 26 weeks later (or earlier) in the southern hemisphere. Whether the plants were being grown in Naples (Italy), Amsterdam or in Denmark made no difference. That is strange, because if the lower temperature prompted the spikes to appear in Amsterdam or Denmark, then those spikes should have appeared 4 weeks later in Naples because the same drop in temperature occurs much later in Italy.

"In the past, Phalaenopsis always flowered in spring and hardly ever in autumn"

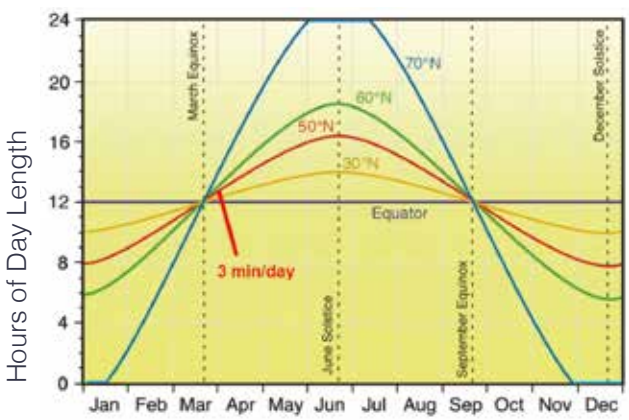
Northern hemisphere

Another point to take into consideration is that we, in the northern hemisphere, are seeing spikes starting to appear faster and more easily after Week 40. This can happen particularly quickly if there is a strong increase in light when, for example, whitewash is removed from the greenhouse roof. Or if there is a strong drop in temperature (e.g. due to a malfunctioning heating system or if the heating system fails to respond in time). In those days, we advised customers to keep plants that were not allowed to be cooled yet in darker and warmer environment from Week 34 onwards. The reason for this was that all the tests carried out at the time showed that 6 weeks of cooling and more light encouraged the formation of new spikes. So, if you don't want that, you should consider doing the opposite. But if you get the same drop in temperature in the period after the shortest day, then you see this sensitivity to pre-spikes (nodes) decrease and after Valentine's Day (Week 7) it will be gone. You could conclude from this that a lower temperature is not the only factor that influences spike formation.

A lot has improved following the introduction of assimilation lighting, but this effect remains. Because cooling with air-conditioning systems and lighting in warmer regions is more difficult, more expensive and sometimes even impossible - due to a lack of available energy - this difference in flowering is still a problem. In order to find a solution to this, we hit upon the idea of finding out is, based on the above experiences, increasing or decreasing the day length could be a factor to take into account. This was the basis for our research.

Current research

In the northern hemisphere, Week 34 starts 8 weeks after the longest day of the year. During this 8-week period, the day length decreases. The reduction in day length is greater in the Netherlands than in Italy, but the effect remains the same. Ultimately, in exactly the same week, day and time, the day length will be shorter than 12 hours in the northern hemisphere and therefore longer in the southern hemisphere. This was also the reason why we chose this 8-week period for our research. It can be this simple. The graph demonstrates this clearly:



Amsterdam 52,4

Napels 40,9

Los Angeles 34,0

Sao Paulo -23,6

Results

Our test results revealed that if you expose the plants to 12 hours of daylight rather than the customary 14-16 hours (depending on the region) and do this 8 weeks before the cooling date, you will obtain notable improvements with regard to both flowering and spike percentage. Here, you will need a blackout screen during the period when the day length exceeds 12 hours, as is the case with year-round Chrysanthemums. The advice is to close the screen one hour before sunrise, until 8 a.m., for example. After that, the screen can be reopened and closed again 12 hours later at 8 p.m. This can vary by one or two hours, depending on when the sun rises and your region. This approach will allow you to make the most of those 12 hours of daylight. An hour after sunset, the screens can be opened again, so that the climate in your greenhouse does not remain stuffy for too long.

> “The advice is to close your screen one hour before sunrise, until 8 a.m. or so”

Research Plant Lighting BV

Last year, this principle was tested under fully controlled conditions in the climate chambers at Plant Lighting BV. As both the climate and the light could be controlled with the greatest precision, it was possible to conduct a trial that examined purely if a shorter day length at the end of the raising period actually stimulated the formation of flower spikes. This study ‘Flower spike Phalaenopsis control using day length: better results with less electricity’ was conducted in 2020 by Plant Lighting. It was supported by the ‘Greenhouse as a Source of Energy’ programme and financed by the Ministry of Agriculture, Nature and Food Quality, the Netherlands Greenhouse Horticulture Association and the potted orchid crop cooperative. The trial was carried out in climate-controlled cells.

Four different varieties of young plants were divided over two climate cells 9 weeks before they were set to be cooled. After a week of acclimatisation, the lighting was set at a day length of 16 hours in one cell, and a day length of 12 hours in the other. Sunlight simulators were used to simulate the situation in May, when flower spike induction is most difficult. After those 8 weeks, the cooling period was initiated, in which both cells were set to a day length of 16 hours. At the start of the cooling period, the plants

were all 27 weeks old. The cooling period was 6 weeks (this is short), the 24-hour temperature was at least 20°C (this is high), and day length was 16 hours at 7.9 mol/day. Settings were deliberately chosen that were not conducive to the spike initiation. It is very striking that the spike initiation was equally successful in both cells. The scores achieved by these batches were higher than in the varieties about which information was published on the breeders' websites. The treatment involving a short day length produces better result than the regular long day length.

Results and conclusions

Last year, this technique was tested within the context of energy savings. Were energy savings achieved? You bet! Up to now, day lengths of 16 hours have sometimes been used in nurseries in parts of the year when the natural day length is much shorter. In the Netherlands, the day length in December is 7½ hours, in addition to the fact that the natural intensity is negligible. What we want to know, therefore, is if you can save energy if you apply a day length - lighting of 12 hours 8 weeks before you start cooling your plants. And if this has an effect on spike initiation.

Summary of the results and conclusion of the report:

- Applying a shorter day length increased the average number of flower spikes per plant.
- The percentage of double-spiked orchids in the Ferrara variety increased significantly (by 6%) at the expense of single-spiked ones.
- In the Lively variety, the percentage of triple spikes increased significantly (by 7%) at the expense of double spikes.
- In the Cambridge variety, there was a non-significant increase of double spikes (by 3%) at the expense of single spikes.
- The Limelight variety did not respond to the treatment. The treatment had no effect on the quality (number of flowers and spike formation of multi-spike orchids) or the uniformity, and a shorter day length resulted in an acceleration in development of no more than one day. A shorter day-length treatment thus offered an advantage in both plant quality and cost efficiency under the test conditions. Savings can be achieved in the number of hours of lighting per day in the growing stage. It may also be possible to achieve savings in cooling in summer with the same result.

In the trials conducted by Floricultura, there were still displacement influences, i.e. plants were moved from one location within the nursery to another. This was not the case in this trial. Therefore, the trial confirms the effect that reducing the day length prior to the cooling moment improves spike initiation. What was also apparent was that both treatments achieved good scores despite the deliberately less than perfect values. The scores were even better than the results obtained by the grower in his own nursery with the same varieties, in which the raising phase was extended by two weeks, as well as the cooling period. In this case, the plants were exposed to lower temperatures during cooling.

Another conclusion, which we fully endorse, is that if you can guarantee the perfect and, above all, consistent application of set values such as light, temperature, relative humidity, etc., this will produce better results in the long term. Therefore, a consistent approach like this can cause the plants to flower four weeks earlier, with better spike initiation, even with shorter day lengths. Improved long-term uniformity results in labour savings in the grading and delivery process.

Summer tips
Cymbidium 2021

Now that winter in the Northern Hemisphere is behind us, spring has sprung, and summer is on the horizon. In the short term (April to the end of May), the amount and intensity of light increases. This means that humidity can be too low, both outside and in the greenhouse, during this period.

If leaf temperatures (27°C or more), are too high because of the light the stomata will close, causing evaporation and CO_2 absorption to stop. In a number of cases, a light whitewash screen can result in a lower plant temperature and more favourable humidity for the plant. If you do this, you can - in some cases - allow more light to enter the greenhouse, as a light screen often takes away much more light. The best solution, however, is to deploy a misting machine for humidification. If you do not have this, Danpal nozzles also offer a solution. If neither options are possible, use a screen, cloth and/or whitewash to soften the light. If the plants are exposed to too much light or the relative humidity has been too low for too long, there is a possibility that flower buds in the early varieties, whether potted or cut Cymbidium, will dry out. This results in young shoots where there should have been spikes.

To measure is to know

Regularly check the weight of the plants to see if they are not too light. Also keep track of the percentage of drain you measure per day and/or week and its EC. If the EC drain exceeds the EC irrigation, give your plants more water. Please also note the daylight sum (the total amount of daylight plants are exposed to) radiation or weekly average in addition to this information. To measuring is to know, and leaving things to chance could result in a big mistake!

Temperature and lighting

Ultra-early varieties

In the Northern Hemisphere the 'ultra early' flowering varieties of cut flowers start blooming in August to September. These varieties must have been exposed to a 24-hour average of approx. 20°C from the beginning of February until now. You should start with this about a month later for potted Cymbidium.

As from the beginning of April, it is important that the 24-hour average does not exceed 21°C; preferably between 19.5 and 20.5°C. Temperatures above 21°C have an adverse effect on spike elongation if the flower spike bud is smaller than 2-3 cm and this causes a loss in quality. If the weather is very sunny and warm, you may need to start applying whitewash as early as the end of May. The nights may still be cool enough, but it will become too hot and too bright during the day.

> "If the weather is very sunny and warm you may need to start applying whitewash at the end of May"

If you have an outdoor screen and/or a misting system, you may start applying whitewash a bit later. A misting system can be used to lower the daytime temperature until mid-July, but after the third week of July this will become more difficult, particularly at night because this is when relative humidity increases. The substantial differences between day and night-time temperatures may cause red flushing and black pollen caps later on during the season.

Early varieties

The early varieties that flower in October require the same approach as the 'ultra-early' varieties. Here, too, it is important that the 24-hour averages are achieved as demanded. In cold, dark and rainy weather from June to August, you may need to switch on the heating system. Not doing so may save energy costs, but it will also delay the flowering period, preventing the plants from flowering until early November.

Christmas

'Christmas flowering' also depends on the temperatures achieved from July onwards. Hot summer temperatures may cause a delay in flowering. If the weather is normal in August and September, without too many extreme fluctuations, everything should go smoothly. However, if it is too cold, too wet or too dark during these months additional heating is imperative if you want to remain on schedule.

Mid-flowering varieties (Valentine's Day - Women's Day)

The mid-flowering varieties are the easiest to grow. The most important thing is to ensure that the plants can continue to grow in the summer. Therefore, it should not be too hot and/or too dark. Leaf temperatures above 27°C prevent the plant from assimilating, so allow light to enter the greenhouse, and do not apply whitewash to early - preferably as late as possible. Please note: if August and September are dark and cold, activate the crop by switching on the heat, if necessary.

We have mentioned heating a number of times in this edition. It may seem strange, because this was totally unnecessary in the Netherlands in the summer of 2020. However, there nothing is as unpredictable as summer weather!

Late varieties

Greenhouses in which late varieties are grown will need to have whitewash applied once more at this point in time (if they have not been re-whitewashed already). The night-time temperatures are no longer any cause for concern. A misting system will help you lower the daytime temperature. Thanks to the lower temperatures, the flowers will be even more beautiful.

> "If the weather is extremely nice, wait before removing the whitewash from the greenhouse, so that the transition will not be so extreme"

It is important that you do not remove the whitewash from greenhouses in which the late varieties are grown until early July. If the weather is extremely nice, wait before removing the whitewash so that the transition will not be so extreme. From August to the end of November or the beginning of December, the 24-hour average should be 20 - 21°C, so that the new and young shoots can continue to grow. After this, they can be exposed to colder temperatures again in winter for flowering in spring 2023. The higher autumn temperature in also ensures that spike development is blocked immediately for the 2022 spring flowering.

If the temperatures drop too quickly, the spikes will develop too quickly, and you will not be able to benefit from the delay at all. Keep monitoring water consumption by measuring the amount of drainage and/or the plants' weight.

Spider mites and snails

Spider mites

Scout your crops for spider mites on a weekly basis. Biological pest control is effective, provided that you conduct regular inspection rounds. This will tell you if it is time to use more predatory mites or will nevertheless need to apply a limited quantity of chemical agents locally. If you are applying biological pest control, increasing the relative humidity is important as predator mites thrive in moister climates while spider mites find this less attractive.

Slugs and snails

Slugs and snails are more common than you can imagine. Small snails feed on roots, while larger slugs may cause problems later in the season - with the flowers, for example. You will see more snails as soon as there is more light and greenhouse temperatures rise, particularly at the place where substrate and air meets, at the foot of the shoots. Make sure that your paths are clean and that weeds are given no chance to grow. Scatter slug/snail pellets in April and May, and again in August and September.

Adrie Smits

Cultivation consultant Phalaenopsis,
Cymbidium Miltonia,
Odontoglossum