

Cost Effective Temperature Control and the Diurnal Dilemma

By Richard Mollee

Flowering orchids can now be easily purchased at any time of the year, however, re-blooming these orchids is often significantly more challenging. Commercial growers commonly use artificial cooling to induce flowering in orchids outside of their typical blooming season. Such artificially controlled conditions are not usually available to most hobbyists, prohibited in large part due to high initial set up, and ongoing running costs. Fortunately, good culture is easily achievable without costly artificial heating or cooling if planned for appropriately. Most affordable temperature control techniques are centred upon the concept of insulation, slowing the absorption of heat to remain cooler, or minimising the loss of heat to remain warm. Each grower needs to determine which technique is best for their collection, as well as the scale that is necessary.

Few hobbyists are content to cultivate orchids considered 'easy to grow' in their locality. The majority of us have more typically assembled a mixed collection, including genera originating from vastly different climates, some of which have very different cultural requirements. Yet, despite providing the correct light, air flow, humidity, watering and fertiliser to these particular plants, their failure to thrive leads to the general consensus "you can't grow them here". The failure for growers to re-bloom otherwise healthy plants originally cultivated in a different region is often attributable to diurnal fluctuation.

Diurnal variation refers to the difference between night and daytime temperatures, and is believed to be crucial to induce flowering for a wide range of orchids. This factor is often overlooked when orchids are cultivated beyond their natural range. However, all is not lost, as even though the minimum-maximum temperatures may differ significantly throughout the year, the difference from month-month diurnal changes may not be as significant. Therefore, understanding the climate in an orchids' natural habitat can help us to better appreciate their temperature needs, and consequently, their expected flowering season. Furthermore, implementing cost-effective temperature control strategies can reward growers' efforts to re-bloom their orchids.



Dendrobium speciosum

Cooling

Passive cooling can be achieved through the employment of a range of cost effective techniques that can be implemented on a short-term or even permanent basis. Additional shading is perhaps the first method of reducing temperatures inside the orchid house during the day. As a temporary measure, palm fronds or similar branches can be laid on the roof to help reduce temperatures and help avoid sunburn to your orchids. A more seasonal approach is to add another layer of shade cloth over the roof and western side of the orchid house. Such measures may not be suitable as an all-year-round solution, because winter light levels may be adversely affected, warranting the removal of any added summer shading. If a high diurnal change is required in the summer months, be careful not to implement too many daily temperature-reducing strategies, or you risk having only small diurnal differences.

Most orchids can withstand short-term extreme temperatures when coupled with high humidity, which helps to reduce stress from high rates of evapotranspiration. Consequently, damping down the floor of the orchid house, where the floors are sprayed with water, can help to maintain humid conditions. To this end, care must be taken when considering the flooring material. Fine gravel is often preferred for this purpose, and is long lasting. An additional damping down at dusk can help to increase the diurnal variation in the summer months. An alternative or additional measure to this is to fill some containers, such as buckets with ice or cool water. The high specific heat capacity of water will help to keep the orchid house cooler as significant heat energy can be absorbed before the temperature of the water rises significantly. Such containers can also help to maintain high levels of humidity, especially when coupled with good air movement.

Air movement is particularly important during times of high temperatures, as stagnant air will heat up faster than free-flowing air. To avoid this, ensure cross ventilation, whereby fresh air enters one end of the orchid house and moves through to exit at the opposite end, is operating effectively. You can always check your orchid house for its air movement by cutting up strips of plastic from a shopping bag and tying them at various locations. This is an easy way to observe air flow, as even the slightest breeze will move them. Any strips that remain still, will reveal pockets of potentially stagnant air, and help you to identify where to address improvements in the orchid house such as reducing overcrowding. Any containers of water will be best placed towards the end of air inflow so that the moving air passes over the water, providing an evaporative cooling effect.

Finally, the positioning of any heat-sensitive orchids should also be taken into consideration. The ground level can be several degrees cooler than higher up in the orchid house. Exploiting these microhabitats, even seasonally in a mixed orchid collection, can be the difference between a growers' success and failure to bloom their plants. Further modifications can be made at an individual plant level by taking steps to ensure the roots remain cool. If high temperatures are an issue, then growers should consider avoiding the use of black plastic pots. Black objects absorb heat significantly more than lighter colours indicating that pale coloured or clear pots would assist in minimising heat absorption in the orchid house. Better still would be the adoption of porous terracotta pots that can be saturated to reduce the temperature of the root zone and the orchid house. This acts to provide a degree of insulation, protecting the roots from heating up and drying out, whilst simultaneously increasing the humidity around the plant. Even if the growing pot is placed inside a larger terracotta one, it is a technique that can also be applied at dusk to help to increase the diurnal variation to initiate flowering.

Heating

As the heat of summer passes into the autumn and winter months, many growers become concerned about the cold. As we are essentially dealing with the opposite problem of high temperatures, it makes sense to consider undertaking the reverse approach to the strategies outlined above, and employ a combination of heat absorption and insulation techniques. The most effective strategies will vary depending on individual locations, orchid house construction materials and orientation.

Regardless of the type of orchid house, winter is the time to maximise the amount of light entering it, within the tolerance limits of the orchids of course. This may mean removing additional shading that was needed to reduce the heat of summer. As the amount of daylight is reduced, there is less time for heat absorbing material to work. Additional material such as stone, brick, concrete blocks, containers of water and black pots can all be used to absorb heat energy during the day and release it slowly through the evening, warming the ambient temperature inside the orchid house. Maximising this heat absorption, should be coupled with effective heat loss minimisation techniques.

The opaque or transparent materials to insulate orchid houses have improved in quality considerably over the past decades. A range of more UV stable plastics and polycarbonate materials can be effectively used for longer periods outside than ever before. More and more growers now add plastic covers to their orchid houses, with the aim of keeping the internal air of the orchid house warmer for longer. A double layer is more than twice as effective as the trapped layer of air in-between remains fairly stable. An alternative to this is the installation of bubble-wrap type plastic. Less UV stable but more insulated than a single layer of plastic, it is worthwhile for growers to experiment in order to get maximum benefit for their efforts. A special note of caution is needed here as care must be taken not to limit air flow in the orchid house or to create an environment more suited to disease than to the growth of the plants. This may necessitate rolling up plastic sides or opening air vents or doors to allow fresh air in to the orchid house. Ideally this is done during warm periods or as observation and experience dictates.

A maximum-minimum thermometer is a great tool to help understand the variations of your growing conditions, and is recommended for novice and experienced grower alike. They will reveal if the diurnal variation is too small to initiate flowering, and help inform you of the effectiveness of any modified practices. If, however, all this seems like more trouble than it is worth for a handful of warmer growing orchids, then consider finding a suitable location inside the home for the cool winter months. Many orchids will be more than happy for a short time indoors if their basic needs are met, with their flowers lasting longer too.



Iwanagara Apple Blossum