PAPHIOPEDILUMS

Recommendations by Seong Tay, President of the Paphiopedilum Society of NSW

The easiest Paph to grow in Sydney is Paph. insigne, followed by villosum and gratrixianum. Novices should start growing these first.

With more experience, then proceed to hirsutissimum, fairrieanum, spicerianum, charlesworthii, the complex hybrids and the Parvisepalums, in that order. Parvisepalums like lower light levels than the others.

My advice is to keep Paphs fairly dry or just moist in winter to prevent root rot. The regions where the Paph species come from have little rainfall in winter, just some dew and condensation to keep the plants hydrated.

Paphiopedilum Culture by Keith S Bennett

With the exception of a few epiphytic and lithophytic species, the majority of the genus are terrestrial in their growth habit. Their home is the shaded dampness of the forest floor or leaf-mould filled rock crevices in areas where high humidity and rainfall ensure that their root systems always remain moist.

The word 'moist' may well be the key word to the successful culture of this genus, and it must be clearly understood that there is a vast difference in meaning between the words 'moist' and 'wet'. Under cultivation, efficient drainage is of prime importance, as no other factor will impede healthy growth as will wet and soggy roots. Pots must have adequate drainage holes, and a layer of coarse charcoal or bark between them and the growing medium will help in keeping them open.

The various merits of terracotta and plastic pots are still the subject of some contention among growers, but during recent years the quality of plastic pots has greatly improved and they are now being used in ever increasing numbers. Among their advantages are lightness, low cost, and eability to remain in one piece when dropped! They are also far less prone to the growth of algae, and, due to their non-porous qualities, dry out far slower thus requiring less frequent watering. Because of this last factor, however, extra care must be taken to ensure that the potting medium is well drained and 'open'. If it is not, 'souring' will occur more rapidly than it would in terracotta pots.

Irrespective of which type of pot is used, the basic requirement of the potting medium is that it retains moisture but not wetness, and that when the plant is watered, excess water will readily escape through the drainage holes.

The potting mixtures used by growers are too numerous to list in these notes. Some contain many and varied components while others, such as straight tan bark and pine bark, often produce good results. A

mixture of five parts of fir bark (Pinus radiata), two parts of charcoal, and one half part of coarse shell grit, is used by many growers, and produces good results.

In warm temperate areas, if watering is carried out daily during the months, I have found the following mixture to be most successful:
1 part coarse shell grit
1 part vermiculite
1 part charcoal
4 parts granulated plastic foam (Isolite)
15 parts 6-12 mm local fir bark.

If daily watering in summer is not possible, the above mixture may be modified by doubling the amount of vermiculite and adding two parts of German peat moss. It will then retain its moisture for a much longer period whilst still retaining its free-draining properties.

When potting, care should be taken that the compost is packed around roots only sufficiently to hold the plant steady. If the plant has insufficient roots to make this possible, it should be securely attached to a small stake until a new root system has formed. Tightly packed compost will prevent efficient drainage and rapid 'souring' and its attendant root-rot will soon follow. Over-potting must be avoided, and, within sensible limits, the smallest pot capable of holding the root system should be used. A plant with a total loss of roots may often be saved by planting in straight sphagnum moss.

The epiphytes, lithophytes, and semi-terrestrials such as P. lowii, P. parishii, P. randsii, P. philippinense, and some of the Cochlopetalum section, require a much more 'open' growing medium, and larger grades of fir bark and charcoal should be used. Due to their natural manner of growth, they respond well to being suspended in a high and airy section of the glasshouse.

The purely terrestrial members of the genus require a higher humidity, and are often staged upon a moisture-retaining bench. A successful method used by many growers is to cover the bench-tops with a layer of fibrous cement sheeting upon which is a layer of coarse sand topped with a layer of coarse shell grit. If the sand is kept moist, the pots resting upon it will benefit greatly by the extra humidity produced. Another good feature of this type of benching is that the moisture below the pot will induce the roots to grow downwards towards it. When overhead watering is used, the top level of the growing medium tends to retain more moisture than does the lower section of the pot, inducing the roots to grow upwards.

Some growers contend that this method of benching prevents full circulation of air around the pots and can lead to fungoid infection. However, adequate ventilation and a circulating fan will ensure that this possible source of trouble does not eventuate.

As the plants of this genus have no pseudobulbs to maintain a reserve of moisture, it is important that their root system is never allowed to become completely dry. A dehydrated plant will quickly sicken and rapidly lose all resistance to disease. Of most other orchid genera it is true to say that more plants die due to over-watering than to under-watering. However, provided that a free-draining growing medium is used, this old adage does not hold good with the genus Paphiopedilum, in fact, the reverse is more likely to be true.

As none of the components of normal potting mediums contain any available plant food, it is advisable to use a fertiliser fortnightly at about half the maker's recommended strength. Immediately the flowering season finishes, a higher nitrogen mixture fertiliser should be used to promote plant growth. Several months before the next flowering season begins, a low nitrogen, high potassium and high phosphorus mixture should be used to initiate flower development.

As well as carrying out a regular feeding program, a small amount of a slow release fertiliser such as hoof and horn, or blood and bone meal, added to the surface of the growing medium after re-potting will induce a more rapid growth rate. All of the mottled leaf and plain leaf species which grow in limestone areas (especially *P. fairrieanum*) respond well to a small amount of dolomite or lime sprinkled on the top of the compost once or twice a year.

With the exception of a few cool growing species such as *P. barbatum, P. insigne, P. spicerianum, P. villosum, P. venustum,* and *P. fairrieanum*, this genus requires a minimum temperature of at least 15°C

to ensure successful culture. Most of the tessellated leaf species and some plain leaf species appreciate an even higher temperature, and if a minimum of 22°C can be maintained, then optimum growth will result. Maximum temperatures should not exceed 33°C, and an evaporative type air cooler is the ideal way of controlling this limit. If the family budget forbids this 'extravagance', then upper and lower ventilators of adequate size, together with a small circulating fan, will help in keeping the maximum temperature down to a reasonable figure. Movement of air is of prime importance in successful culture.

Correct light intensity is a very critical factor in good cultivation. To fully understand its importance, the grower must understand the processes of photosynthesis and osmosis. Obviously, the great majority of growers are familiar with them, but, for the benefit of those who are not, the following brief and very elementary explanation may be of help.

Osmosis

The process whereby moisture in the potting medium (containing various salts and acids in minute amounts) is absorbed by the roots, transmitted through the rhizomes to the leaves, thus reaching the chloroplasts (chlorophyll cells). These cells are situated in the stomata, which are minute pores in the leaf surfaces.

Photosynthesis

During the hours when light is falling on the leaves, the chloroplasts extract carbon from the carbon dioxide present in the atmosphere and combine it with the chlorophyll in the cells. Light falling on the cells reacts with the carbon, chlorophyll, and moisture (from the osmosis process) to form carbohydrates that are essential to all plant life.

During the hours of darkness, this process ceases and oxygen passes through the stomata. This is known as carburising and it has the effect of cleaning out the chloroplasts in readiness for the next period of daylight.

Firstly, it can be seen that unless a healthy root system is present, the process of osmosis cannot function efficiently. Under these conditions no moisture can reach the leaves, thus greatly retarding the process of photosynthesis. Fortunately for those plants having a poor root system, provided they are growing in conditions of reasonable humidity, their leaves may absorb sufficient moisture from the atmosphere to ensure the chloroplasts are supplied.

Secondly, due to the photosynthesis process, it is clear that if insufficient light reaches the plants, their growth rate will be retarded due to a low supply of carbohydrates. As the genus in general is a shade-loving one, many novice growers tend to give their plants excessive shade. The first indication of over-shading is the loss, or partial loss of green pigmentation in the leaves. This is the result of the chlorophyll cells becoming inactive and is a prime cause of the plant losing its resistance to fungus attack. Over-shading is also one of the main causes of an otherwise healthy plant's failure to flower. As such, it may well be that a slight touch of 'sunburn' on the leaves is preferable to the dire results of over-shading. An old 'rule of thumb' states that no shadow should fall on the plant when one's hand is held at a height of 45 cm between it and the light source. This may be acceptable as a very rough approximation, but one wonders how much the shading could be reduced yet still cast no shadow? A much more reliable guide is an electronic device now available for less than $10.00 which not only measures light intensity in foot-candles, but also shows pH values and moisture content when its probes are pressed into the potting medium. I have found that a reading of between 400 and 600 foot-candles (4000-6000 lumens per square metre), at noon, gives satisfactory results.

Temperature is also a factor to be considered in the equation of light intensity. The higher the temperature maintained in the glasshouse, the more light is required to maintain the maximum rate of photosynthesis. For optimum growth then, it is necessary to maintain the lowest temperature possible that will suit the plant's needs. As with shading, it may well be a matter of trial and error to arrive at the most suitable figure.

To boost the rate of the photosynthesis process, some growers use the following methods:

Horticultural fluorescent tubes (Gro-Lux) are fitted at a height of about half a metre above the plants and used to either increase the available daylight or to extend the daylight hours. They are usually used for

periods of from 12 to 16 hours a day.

L.P. gas (such as Porta-Gas) is burnt in the glasshouse, not as a source of heat, but to increase the amount of carbon dioxide in the air. Unlike coal gas, which gives off carbon monoxide when burnt, L.P. gas gives off carbon dioxide. It is important, however, that the gas be allowed to burn continuously, as a gas harmful to plant life, ethylene, is produced each time the flame is ignited or extinguished.

When using the potting mixture described earlier, it is advisable to re-pot at two-yearly intervals, preferably in early spring after flowering has finished. Provided a plant has at least four or five growths, it may be separated into two pots, but it is not advisable to separate a plant into sections of less than two growths. Due to the fine root hairs peculiar to this genus, care must be taken to treat them as gently as possible. Shake off any old compost remaining on them and cut off any dead or damaged roots. As mentioned earlier, do not press the new potting medium tightly around the roots.

If it is wished to grow the plant into a large specimen, it may simply be placed into a new pot large enough to accommodate two years' future growth. When settled into its new home, the rhizome between the new growth and the growth that has just finished flowering may be severed and the cut sprinkled with sulphur. This will induce formation of a new growth and, if the process is repeated each year, will soon produce a large plant.

In retrospect, I believe the factor of greatest importance in successful culture is good air circulation. If it is not complied with even ideal conditions of shading, temperature, watering and feeding will not prevent unhealthy plants and the resultant fungus infection and bud-rot.