

Paphiopedilum culture in the Riverina region of NSW

Paphiopedilums (paf-ee-oh-ped-i-lum) are commonly known as slipper orchids. There are over 90 species of this orchid and are found in southern China, Himalayas, India, south-east Asia, Bougainville and New Guinea (3). Although they come from tropical regions, most grow in mountainous areas at higher altitudes that are relatively cool and humid (2). They are mostly semi-terrestrial in their natural environment with their hairy roots growing amongst the leaf litter on the forest floor (5,6). Paphiopedilums thrive in conditions soft ferns such as maidenhair ferns enjoy.



They are sub divided into 3 sub genera, namely *P. Paphiopedilum*, *P. Brachypetalum* and *P. Parvisepalum* (2). The 3 subgenera vary greatly in their growing requirements. While most produce a single flower per shoot, others may have many (multifloral) such as *P. rothschildianum* and *P. philippinense*. Flowers can be very long lasting. If you want the flowers to face the same direction, do not turn the plant once flower stems commence elongating (14).

Leaves vary from plain green to mottled and although most warm growers have mottled leaves, it is not a reliable guide as to whether the plants are warm or cool growers.

Subgenus *Paphiopedilum*-

-Section Paphiopedilum

Species within this group are some of the easiest to grow and are generally cool growing. Many in this group will grow with just some protection from the sun and cold and can grow rapidly to form specimen plants (2). The easiest species to grow is *Paphiopedilum insigne* that comes from an altitude of 1300 to 1700 m and will tolerate temperatures down to 0°C. Other cool growers worth trying are *P. gratixianum*, *villosum*, *spicerianum*, *barbigerum* and *hirsutissimum*. Hybrids of this group are vigorous and relatively easy to grow (2) and tolerate similar conditions to cymbidiums (10).

-Section Barbata

This group includes *P. barbatum*, *collosum*, and *venustum*. They have very thin leaves that are heavily mottled. They require very low light and high humidity (>70%) year round (2) and except for *P. venustum* are all warm growers requiring a glasshouse in the Riverina region (2).

Subgenus *Parvisepalum*

These originate in south China and Vietnam and coming from higher altitudes are more cold tolerant (13). They have stiffer mottled leaves and large rounded flowers. This genus contains miniature to medium sized plants and includes *P. armeniacum* which has bright yellow flowers and is sometimes called the golden slipper orchid. Another species in this group is *P. micranthum* which has pink flowers with a large lip. They are intermediate to warm temperature growers and prefer low light to partial shade (15).

Subgenus *Brachypetalum*

This is a small group of dwarf Paphiopedilums from south-east Asia that grow on limestone derived material. They are warmer growers and require slightly more light than most other Paphiopedilums (13). They are regarded as the most difficult group to grow. They must be kept much drier in winter than other Paphiopedilums and dislike being disturbed (2).

This subgenus has colourful leaves with flowers having a characteristic dark spot on light flowers which can be fragrant which is rare in slipper orchids (15). *P. concolor* is the most widely grown representative and has mottled leaves with dark spots on light green leaves and white flowers with purple spots (15). They are terrestrial and are said to require limestone in the potting mix (15).



P. concolor

Subgenus *Sigmatopetalum*

The “Maudiae type” hybrids belong to this subgenus and are a cross between *P. callosum* and *P. lawrenceanum*. They have bright mottled leaves and have big showy flowers which are often dark purple. They are intermediate temperature growers requiring low to medium light (15).

Subgenus *Polyantha*

They have solid green leaves with spectacular multiple flowers per stem. Petals are long as with *P. rothschildianum*. As they are epiphytes they need very good drainage and more light (15). They are warm to hot growers and require a glasshouse in the Riverina.

P. rothschildianum was first described in 1889 from specimens collected in Sabah Borneo. It can have up to 6 large flowers per inflorescence. It has been used in 284 first generation hybrids and 908 different hybrids.

Subgenus *Cochlopetalum*

These slippers have green leaves with flowers that open one by one. These are warm growers and can flower at any time. A popular representative is the hybrid Pinocchio (15).



P. rothschildianum

Temperature requirements

The optimum temperature for Paphiopedilums is around 15-26°C (1, 9) and maximum temperatures should ideally not exceed 30°C (2,6) but higher temperatures up to 45°C will be tolerated for short periods if humidity is raised by misting or other techniques and good airflow is maintained (1, 6, 7). The minimum temperature requirement varies with species. Paphiopedilums will stop growing in summer if they become heat stressed and also in winter if temperatures are low (13). A shorter growing season due to temperatures being either too high or low can lead to inconsistent flowering (13).

For **cool-growing** slippers such as *P. barbatum*, *P. insigne*, *P. spicerianum*, *P. villosum*, *P. venustum*, and *P. fairieanum* the minimum is about 6°C but they will tolerate just above freezing for short periods (1,2). The hardy *P. insigne* will tolerate 0°C if protected from frost.

For **intermediate growers** the minimum is about 10-14°C (11) and for **warm growers**, such as the multifloral and tessellated leaf species, about 16°C (2) although others suggest a minimum of 22°C is optimal (11).

Due to their temperature requirements, Paphiopedilums from warmer origins should be grown in glasshouses or indoors in the Riverina where temperature and humidity requirements are more easily satisfied.



Cold tolerant species and hybrids with cool growing parents such as *P. insigne*, may be grown in a protected shade-house or against a protected northern facing wall under a verandah in the Riverina region. Where protection in winter is needed, plants may be brought indoors and placed outside as the weather warms up. Plants will often tolerate low night temperatures around 2-4°C in winter in a shade-house if the daytime temperatures are substantially warmer (6, 12) and they are kept drier (7). Prolonged periods of low temperatures are not advisable. If plants are kept warmer with a minimum of 12-16°C they grow faster and are more likely to produce 2 new growths instead of one (10).

The multifloral *P. parvisepalum* species and their hybrids require a drop in temperature to about 6°C in autumn for about a month to ensure good flowering (2,3).

Light

They generally require low to medium light (9) (1000-1500fc) and your hand should throw nil to only a slight shadow when passed just over them (1,2,6, 11). The exception are the multifloral types, such as *P. philippinense* and *P. chamberlainianum*, that require higher light levels and temperatures (2, 5, 10). All species must be kept out of direct sunlight.

It should be noted there is some disagreement amount the optimum light levels for paphiopedilums with some growers saying very low light is essential around 400-600 fc (1, 7, 9, 11) or plants will grow poorly, in contrast others say bright light is desirable with 1500-2000 fc (5, 10). Growers will need to make their own judgment although the majority seem to favour low light.

The shade-house should receive good light for most of the day, not just half a day. Plants receiving insufficient light produce shorter flower stems and fewer new growths (10). Shade-houses should be covered with 70% shade cloth although additional shade up to 90% may be required in the middle of summer (6, 9). Alternatively have 2 layers of shade-cloth so that one layer can be removed in autumn and replaced in spring (1). As a group they require less light than Cymbidiums, Cattleyas and Dendrobiums. Too much light is said to be a common cause of failure of plants to thrive (1).

Humidity and air movement

They prefer a humid environment. Cold tolerant species are best grown in a shade-house and tend not to flower as well in a heated glasshouse. The optimum relative humidity for all species is about 50-70% (2), however hardier species such as *P. insigne*, will tolerate lower

humidity levels for short periods, particularly if misted periodically. Fans to promote air movement may be required if there is not good airflow, particularly in glasshouses (6). Keeping plants close to the floor of the shade-house will increase humidity levels as will damping the floor in hot weather. Good air circulation is regarded as essential and key to success (11). Small seedlings will benefit from higher humidity levels which can be achieved by putting a plastic cover or dome over them (12). They could also be placed in a fish tank with a cover to increase temperature and humidity.

Water

As they have no bulb to store water, plants should be kept moist (but not wet) and not allowed to dry out, but not over watered (2, 6). They are very prone to fungal disease and rotting. They should be watered in the morning so the leaves are dry by afternoon. Do not water on cloudy days in winter when they will not dry by evening. When watering, try to avoid water sitting in the centre of the crown of the plant, especially in the evening, as this can cause bacterial and fungal problems (2). Plants need to be grown under a solid cover such as a polycarbonate roof in southern Australia to avoid them becoming too wet over winter (5,6,9).

In summer plants can be watered every 2 to 3 days in hot weather but in winter they may require watering only every 7 days or less depending on the potting mix and weather conditions (5, 6, 7). Rainwater is preferable to treated town water.

Many of the multifloral species need a dry rest over winter (3) and a significant temperature drop in winter.

Potting medium

They are poor root growers and only grow roots if encouraged to seek water. It is very important not to overpot Paphiopedilums, the pot should only be large enough to accommodate the roots snugly (3). Plants placed in too large a pot will stay too wet and are susceptible to fungal rot (3). When planting, locate the plants slightly buried in the pot as exposed new roots will not develop further if they dry out (3). The plant should have compost coming up the base of the leaves.



Deeper nursery shape pots are used for Paphiopedilums rather than the squatter shallow pots preferred for other orchid species (2).

Healthy plants can be left in the same pot for up to 2 years but they can be repotted or moved into a larger pot each year if necessary (1,9).

Potting mixes must be free draining and are typically medium size bark (5-10mm) mixed with perlite with some charcoal added (5). Do not use bark larger than 15 mm (1). Some growers also add shell grit, gravel or coconut chips (1, 5). Smaller seedlings may have a finer bark (9).

Another free draining mix suggested by Keith Bennett (11) suitable for daily watering in summer is 1 part coarse shell grit, 1 part vermiculite, 1 part charcoal, 15 parts 6-12 mm fir bark.

A mix for *Paphiopedilums* recommended by Ray Clements is: 40% perlite, 20% bark, 20% charcoal, 10% coco chips, 10% pumice/gravel.

Plants should be repotted after they finish flowering in October/November before active root growth commences (7). They should be repotted annually or at most every two years (13). Seedlings can be repotted at any time except winter and summer (6).

When subdividing large plants it is important to have at least 3 strong growths or leaders in each division (11) as these will grow more vigorously than new plants with only one or two growths. Keep the pot size as small as possible, just large enough to accommodate the roots. Divisions should be kept as large as possible as larger plants flower better.

Small seedlings

Seedling losses can be high, particularly when transferred from a flask. Some growers have found that "double potting" young seedlings increases their survival where temperatures are below optimum in cooler months in a shade-house. The pot containing the seedling is placed inside a slightly larger pot and the gap filled with styrene beads or bark. This insulates the root system from the cold. Double potting is only likely to be beneficial in shade-houses and is not necessary in a heated glasshouse.

Transplanted seedlings may also benefit from having a plastic dome placed over the pot to increase the humidity around the seedling during the day and better simulate the conditions present in the flask. This may reduce the shock from transplanting. It also reduces the need to water the seedling as often. The dome should be removed at night as excessive humidity overnight can cause damping off. Fungal dressings may reduce the problems from fungal diseases.

Some growers have found the periodic application of liquid root growth stimulants assist seedlings develop a healthy root system more quickly.

Small seedlings benefit from a longer growing season. If growing seedlings in a shade-house, they can be placed on a growing mat or heating pad at night during winter and is an economical way of keeping them warmer and promoting quicker growth (12).

Pests and Diseases

Root diseases caused by *Pythium*, *Phytophthora* or *Rhizoctonia* fungi are a major problem, particularly in young seedlings. Plants that are loose in the pot or with poor root systems should be repotted immediately irrespective of the season. The compost should be removed by washing the roots and removing dead or diseased roots. The plants should be soaked in a Fongarid antifungal solution for two hours before repotting (12).

Bacterial rot on the leaves can also be a problem resulting in plant death in a few days. The fungus develops on the leaves or leaf axils, usually as a result of overwatering. Avoiding water on the leaves for extended periods and ensuring good airflow is important to reduce its incidence. Mancozeb is suggested for control of fungal diseases by the Brisbane Orchid Society. Decreasing water and increasing air circulation will reduce problems with fungal diseases.

Slippers appear to be resistant to orchid virus. They are relatively free of insect pests although mealy bug can sometimes affect leaves and roots and a regular spray of Metasystox or Malathion will reduce the risk (14).

Fertilizers

Paphiopedilums are not gross feeders (6) but require large amounts of Ca and Mg (2) and special fertilizers have been developed for them. If these are not available additional Ca and Mg may need to be applied as Epsom salts and calcium nitrate along with normal fertilizers which are applied at quarter to half strength (1). Too much high N fertilizer can result in excessive vegetative growth and poor flowering (13).

The potting mix can be dusted with hydrated lime or dolomite twice a year to keep the mix slightly alkaline (6). This is particularly important for mottled leaf species that grow in limestone areas (11). All paphs are said to benefit from yearly application of lime but especially *Paph. bellatulum*, *concolor*, *delantil*, *godefroyae*, *niveum*, *charlesworthii*, *fairieanum* and *spicerianum* (14).

A sprinkling of blood and bone on the surface once or twice a year is beneficial to boost growth (11).

Some growers find slow release fertilizers cause poor root growth and prefer liquid fertilizers (5). Generally soluble fertilizers are preferred to solid fertilizers and should be applied about every third watering (1). Alternating soluble fertilizers with seaweed extracts has proven very successful for many growers. A high potassium and phosphorus, low N fertilizer can be applied in from late summer, autumn and winter to promote flower production (9, 11).

Cultivars for the Riverina region of NSW

New growers should start off with hybrids and avoid starting with straight species as, except for *P. insigne*, they are more difficult to grow.

If growers are planning to grow them in an unheated shade-house in the Riverina they should ensure they have cool tolerant parents, such as *P. insigne*, *P. hirsutissimum*, or *P. villosum*, in the breeding.

Other cool growing species listed by Ibrahim Muharrem on the Bankstown Orchid Society web site (11) include; *P. armeniacium*, *P. micranthum*, *P. malipoense*, *P. hirsutissimum/esquirolie*, *P. charlesworthii*, *P. barbigerum*, *P. spicerianum*, *P. fairieanum*, *P. venustum*, and *P. wardii*.

Paph. parishii is the most cool tolerant multifloral type.

Ron Boyd in his paper recommends the following *P. insigne* clones as easy to grow; var "Harefield Hall", var "Royalty", var *Sanderae* (yellow flowers). He also lists *P. villosum*, *P. sukhakulii* and *P. primulinum* (a yellow variety) as easy species to grow.

For a detailed list of the best varieties for cool growing conditions experienced in the Riverina region of NSW refer to the excellent books, "Growing orchids in cool climate Australia" (2) and "Australian Gardening Flora's Orchids" listed in the references below (3).

To obtain cool growing plants suitable for growing in a protected shade-house in the Riverina region, plants should be sourced from local growers or those in Victoria or South Australia who grow their plants without additional heating.

All available varieties are potentially suitable for growing in a glasshouse where humidity and temperature is controlled although they will vary greatly in their difficulty of cultivation and the experience of local growers should be sought when selecting species.

Paphiopedilum insigne is one of the few species that is very hardy and can be easily grown on a verandah or in a shade-house. *P. hirsutissimum* and the Maudiae hybrids are said to make good houseplants.

Care should be taken when purchasing seedlings as the loss rate can be high. They are slow to develop roots and very susceptible to rotting. Keeping the humidity high and the leaves dry will be important. Water the potting mix, not the plant. Larger plants are generally easier to grow, even though they may cost more.

Hybrid varieties generally have increased hybrid vigour and are more likely to be vigorous growers than species.

Month by month cultural guide (southern hemisphere)

Jan –Feb (mid to late summer)

Keep well shaded (70-85% shade), maintain humidity, don't allow water to sit in heart of plant. Water every 2-3 days. Apply light dressing dolomite and blood and bone to potting mix.

March (early autumn)

Avoid overhead watering on cloudy days. Switch to high P and K bloom promoting fertiliser.

April (mid autumn)

Reduce watering frequency to every 5-7 days and avoid watering on cloudy cold days. Warm growing paphs may need extra warmth (min>16°C), cool growing paphs (>10°C). Start guiding flower stems. Increase light (50% shade). Light fertilizer applications.

May-July (winter)

Eliminate overhead watering, only water potting mix. Extend fertilising interval. Ensure plants are protected from frost. Water potting mix (not plant leaves) every 7-10 days and not on cloudy cold days.

August- September (early-mid spring)

Plant growth becomes more active. Repot all plants that have finished flowering. Recommence regular balanced fertiliser application. Apply light dressing dolomite and blood and bone to potting mix surface if not already added to mix when repotting. Increase watering frequency to every 5-7 days.

October (late spring)

Increase watering frequency to every 4-5 days. Increase shading to 70-80%. Fertilise regularly.

November-December (early summer)

Water every 3 to 4 days in hot weather. Increase humidity. Increase shade to 70%. Fertilise regularly.

Top tips to grow Paphs by Gary Hart (15).

- *Environment.* 70% shade cloth and don't overcrowd
- *Repot regularly.* Seedlings every year and mature plants every 2 years into new mix. Repot and subdivide (if necessary) in October/November.

- *Watering.* Don't overwater in cold overcast weather.
- *Fertilizer.* A weak fertilizer at every watering, even in winter.
- *Growing medium.* Repot all new plants into the same medium so watering is easier.

Another good source of growing tips is the article by the Brisbane Orchid Society listed below (14). It describes the different temperature, light and lime requirements for the different Paph. species.

Acknowledgements and further reading:

This growing guide has drawn on information by local growers and references listed below.

1. How to grow slipper orchids by Nicky Zurcher.
http://www.nickysslippers.com.au/?page_id=272
2. Growing Orchids in cool climate Australia (2nd Edn) by M Fraser, J Wright, W Ferris (2013).
3. Gardening Australia Flora's Orchids. ABC Books (2005).
4. Orchids, A practical handbook. By B and W Rittershausen (2001).
5. Paphiopedilums and their cultivation by Stephen Early.
<http://www.oscov.asn.au/articles/paph2.htm>
6. The cultivation of modern Paphiopedilum hybrids by G. S. Banks.
<http://www.oscov.asn.au/articles5/paphculture.html>
7. Royal Orchids Culture Notes. <http://www.royaleorchids.com/culture.html>
8. Growing Paphiopedilums, my way by Ron Boyd.
<http://www.waggaorchidsociety.org/wp-content/uploads/2015/03/Paphiopedilum-growing-by-Ron-Boyd1.pdf>
9. Robertson Orchids. Paphiopedilum cultural tips.
<http://www.robertsonorchids.com.au/fact-sheets.htm>
10. Paphiopedilums-different but not so difficult by Robert Willmott.
<http://www.oscov.asn.au/articles2/paph2.htm>
11. Paphiopedilums by Keith Bennett. Bankstown Orchid Society.
<http://www.bankstownorchidsociety.org.au/Paphiopedilum.htm>
12. Paphiopedilum orchids by Nicky Zurcher. Bribie Island Orchid Society web site.
<http://www.bribieislandorchidsociety.com/introduction-to-native-orchids>
13. Growing Paphiopedilums in temperate climates.
<http://www.orchidsocietynsw.com.au/Paphiopedilum.htm>
14. Paph. culture. Brisbane Orchid society.
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15. Looking after orchids. Lady slipper care.
<https://www.lookingafterorchids.com/useful-articles/lady-slipper-orchid-care/>

Your comments and suggestions on cultural guide are welcome.

Email your comments to dearconsultingservices@gmail.com

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