

Growing Orchids 4 – Designing Mediums for Epiphytic Orchids (2024) by Jim Brydie

Here is an Amazing Scientific Discovery – not a single epiphytic orchid grows in a pot in its natural environment.

Epiphytic orchids grow on trees, rocks, and occasionally in the upper layer of organic detritus on the surface of soil. There are some orchids that genuinely grow in soils but these are called ‘Terrestrials’ as opposed to ‘Epiphytes’.

Orchid growers grow orchids in pots purely for their own convenience. AND, because of our desire to ‘pot’ orchids, we have also had to devise a range of materials to put in the pot that will accommodate the roots of each special kind of orchid. Various kinds of artificial root environments are acceptable to each kind of orchid.

There are many experienced growers who can offer you their accumulated knowledge and interpretation on this subject. Each is probably a little different in expression but they may all be sound because there is always more than one answer. For example, there is another excellent and extensive article on pots and mediums by Seong Tay here in Sydney if you can find it. I will try and get permission to put it up on our website.

This article is not a list of “if you have this use that”. Answers come from understanding, purpose, & reasoning.

Q1 - what kind of environment do Epiphyte Roots need?

The natural epiphytic environments that various wild orchids have made their own is almost ridiculously varied so it is impossible to generalise on needs or preferences. And even if we narrowed the discussion to one particular type of orchid, we can’t reproduce the wild root environment for that orchids in a pot or in any kind of man made culture.

But what we can do, in our artificial growing houses, is to provide “close enough”. Assess the kind of orchid you are working with and plan the root environment you are aiming for. You want a benign root environment that the orchid can tolerate, with an appropriate balance of air, moisture, and mechanical support. Luckily for us, orchids are pretty adaptive little devils and most will take to our pot culture without too much fuss.

A very small number of orchids seem to insist on being mounted on a wood or cork plank etc, and a few have rather narrow bands of tolerance, but these exceptions will only confuse the process I want you to follow so for the moment they are excluded. Once you gain experience at engineering orchid regimes, you can extend yourself to cover them.

The 3 Potting Medium Factors – AIR, Moisture, Physical Support

First - Physical Support - In nature each orchid has developed a root system that (usually) holds the orchid to face a direction (to light?) and not fall over or off. When we put an orchid into a pot, the roots will eventually bind to medium and to the walls of the pot, joining it all into one and sufficiently supporting the orchid as well as in nature. But a freshly potted orchid may well need temporary artificial support with stakes and ties.

On this basis, we rarely choose physical support as the factor upon which to design an orchid’s potting medium.

The other two factors (Air and Moisture retention) are the real key and are pretty much bound hand in hand. In general if you increase one you reduce the other, so what we are choosing is the make-up of the medium blend to get the balance suitable for the orchid we are potting.

The balance of air and moisture in the pot seems to be the critical factor. Orchid epiphytes will nearly all put up with being saturated temporarily when we water them, just as they would get drowned when it rains hard in the rainforest. But they need excess water to be shed pretty quickly. As the pot dries out in the days following watering, the medium needs to provide an airy but moist environment in which the roots can live and thrive and do their job of taking in water and minerals and sending the supplies up to the top parts of the plant.

The need for moisture hardly needs explanation but keep in mind that air is an equal necessity. Roots are a living organ of the plant and they have to breathe as they function. In a well functioning medium, fresh air will be drawn into the pot as the medium dries out, and will be exchanged evenly throughout the pot. Excess water draining out the bottom pulls in air at the top, and similarly, as air is used within the roots, more will be drawn in. Ideally there will be no stale pockets of air.

Different plants require different rates of drying out and it is this that we design into the various mixes we use. Any number of the commonly used potting materials will do the job provided that :

-) you get the air/water balance within bounds acceptable to the plant concerned,
-) you give the plant regular food and water. **Note:** the mediums we generally use have no food for the orchid. WE need to supply fertiliser to keep the orchid’s internal factory running.
-) the mix must provide a reasonable pH in which the roots can live and grow and have a capacity for ion exchange. Both of these are characteristics of the potting materials themselves.

Roots are still the vehicle for taking up water and nutrients and transporting them to the upper parts of the plant and those involve chemical processes which can be affected by pH. (for a better understanding of pH – see the article “Growing Orchids 5 - Understanding pH” on our website)

Which finally brings us to the discussion about the various potting materials.

I am going to describe 5 different key materials that I recommend that you regularly stock as supplies. These are Pine Bark, Peat Moss, Perlite, Sphagnum Moss, and Coconut Fibre. The latter is sometimes called Coco fibre or Coco Coir. However, although I call them “5” base mediums, many of these come in multiple forms or ‘chunk’ sizes so depending on the nature of your orchid collection you may well need to stock multiple different forms/sizes of each.

Pine Bark in particular, comes in a variety of chunk sizes. In addition, different brands process the bark in different ways before it is bagged for use and so different brands/types work slightly differently. I suggest that you stock at least 2 sizes of bark and if it is composted bark like Debco brand, then also stock a bag of less processed Orchiaata brand bark – perhaps 9-12 mm size. You are going to need a “shed” for all the tools and bags of supplies.

Why so many mediums? - In any reasonably sized, mixed orchid collection you will have orchids from vastly different natural environments (or orchids developed from those orchids). The scope is far too wide for any one medium to suit all. You need a wider choice of materials for that wider range of requirements. It’s as simple as that.

Each medium type has different characteristics and its own pros and cons. There are also a range of other “add-in” materials that are useful, such as styrene foam, pebbles, sand, etc, but I consider these to be fringe additives as opposed to major components and I am sure you can succeed without them until you decide you want them.

One complicating challenge in a mixed collection is that the plants are usually all jammed together in one growing area. Watering takes place for all at the same time, regardless of the different moisture requirements and drying times for different orchids. Some differences can be accommodated through choice of different microclimates within the growing area. For example, hanging specific plants higher, placing them in the bright end versus the shady end, or nearer the fan etc, but beyond that, it is by choosing particular design in your potting medium that can give the greatest difference in growing characteristics for different orchids. So, let’s have a look at each medium component.

Common Orchid Epiphyte potting Mediums

1 – Pine Bark

“medium” bark

‘Bark’ is readily available, relatively cheap, and comes conveniently graded by the size of the bark chunks. It is usually a byproduct harvested from huge man planted pine forests harvested for timber for construction works and for paper manufacture.

One brand grades their bark as ‘fine’, ‘medium’, or ‘coarse’. The ‘medium’ from that range is shown in the picture here and the coins are Australian 5, 10, 20 cents. In US coins, their ‘dime’ is about the same size as our 5 cents, their ‘quarter’ roughly the same as our 10 cents. That makes the chunk size in Medium as about 18 mm to almost 30 mm with most around 25, but as you can see, it has quite a wide range of particle sizes.



Another bark supplier (Orchiaata) lists their components by approximate chunk size in millimetres – such as 6 to 9 mm, 9-12 mm, 12-18 mm, 18-25 mm. There are also other brands and types. One specialised bark based mix is labelled “Miscellaneous Mix” (a combination of bark sizes and other components perfect for Australian native Dendrobiums). Another bark type is “Cymbidium Mix” (from various brands and in various forms).



In most forms the pine bark has been at least partially composted to reduce its tannin content, but Orchiaata brand looks quite raw (un-composted) and that can be a useful characteristic in blending components to extend the useful life of a blended mix. I am presently experimenting with Debco Coarse and it seems to be pretty much the same as an older ‘medium’ brand I had been using.

Bark is a good staple for orchid epiphytes - but with these qualifications. - Pine bark quality isn’t what it was 20 years ago. Most orchid barks come as a bagged product and the product in the bag is usually rather dirty. It carries far too much dust, useless fine materials, and other accidental byproducts like stone and wood chips. In my opinion all barks should be washed off and sieved before using them. In addition there are frequently accidentally included chunks of wood left from the originally harvesting off the felled tree trunk. If left in the mix these wood chips can become infested with wood decomposing fungi and will change the way the mix works as an orchid medium. Some growers ignore them and leave them in and I imagine that most of the time that works well enough provided you keep an eye on potted orchids for signs of the bark acting funny.

For me, although it is tedious and time consuming, once the bark is rinsed and sieved, you can easily see the wood chips by colour so I manually pick them out and discard them. I haven’t found any more clever way to do it but I still

think the effort is worth it. I also discard the odd stones mixed in by heavy 'bucket' equipment during processing.

I use medium and coarse grade barks as a base for Laelias, Cattleyas, Vandaceous, and other coarse rooted, dryer growers, and I use bark in a blended mix of smaller bark sizes and other components for various other orchids.

If you are a heavy waterer, highly composted bark can tend to go off in the pot more quickly. Depending on your watering and practices, it may go off even as quickly as just two years. The bark will gradually stay wetter and wetter after each watering as it begins to further decompose. However, there are ways to extend the life of the mix in the pot. The options, either alone or together are :

- including a good proportion of raw bark in the mix
- judiciously sprinkle just a little garden lime or dolomite over the top of the mix once a year. This not only extends bark life, it will also aid in balancing the pH. But care must be taken not to overdo the use of lime. Too much will end up creating an alkaline mix that may kill the roots or change nutrient uptake.
- Add other components like styrene foam. Especially in the bottom of the pot to ensure drainage.

With bark, the pH in the pot is a serious factor and it will gradually become more and more acid (lower pH) and can eventually sink down to as low (acid) as pH 4 in 4 years or so unless you are very clever with the addition of lime. For more information on Understanding pH, see the separate article on our website.

When you use bark, make sure you feed the plants regularly and watch the wetness of the pot. When fresh, the bark mix drains quickly so will need regular watering. As the bark ages, it holds water longer and longer, and so watering should be reduced to match. If the pot looks like it is staying too wet it almost certainly is. Either try to water less often or place the plants where they will dry out more quickly.

2 - Sphagnum Moss - Sphagnum Moss is an amazing medium. It has terrific remedial properties for sick plants and there is nothing better for striking back bulbs and divisions.

As little as 10 years ago (2015?) it could be obtained as freshly harvested live moss but nowadays it is generally purchased as dried compressed bales. The dried product keeps well for long periods, and you can just rehydrate the amount you need from your dry bale, portions at a time as needed. Our website has an article on how to properly rehydrate Sphag.

Every grower should have at least a small supply available. Even for healthy plants it is a very good medium in its own right but like all media, it has its drawbacks.

It is expensive and it is getting harder and harder to obtain good quality moss. Good moss lasts about 1 year being used wet in a pot. Perhaps a little longer if you are very careful with water and very dilute with your fertiliser. If it gets too much fertilizer or is over watered, the sphagnum moss dies and begins to quickly decompose. Dark green algae grows over the surface, the sphag looks a darkish brown and it goes airless. Once the sphagnum moss has "gone off", you need to get the plant out of it quickly. Its positive qualities reverse, it rapidly becomes untenable and roots die.

In summary, a great medium to have in your armoury for specific purposes but if used widely as a potting medium it needs care and an experienced eye.

3 – Peat and Perlite ("P&P") - Perlite is an expanded volcanic glass that is completely inert & pH neutral. The perlite most Aussie growers use comes from Chillagoe in Queensland and comes graded in particle sizes called "coarse", "super coarse", and "jumbo". Jumbo is the largest particle size (around pea size) and is most orchid grower's perlite of choice.



Perlite on its own doesn't provide any organic interchange buffer for fertilizer and once it starts to dry out, perlite by itself goes from moist to dry very quickly. As a result, perlite is used in combination with peat moss to provide the moisture retention management and the organics in the medium for ion interchange. The mix most people seem to use is 1 part high quality peat moss (Lithuanian) to about 5 or 6 parts jumbo or super coarse perlite. I have experimented with ratios of 12, 16, and 20 : 1, but I concluded that it doesn't work properly with less and

less peat.

Be Aware – there are many forms and types of 'peat'. Peat forms in wetland conditions where flooding or stagnant water obstructs the flow of oxygen, slowing the rate of decomposition. Peat properties such as organic matter content and saturated hydraulic conductivity can exhibit very uneven distribution within a wetland area. Peatlands,



particularly bogs, are the primary source of peat; although other wetlands types, also deposit peat. Peat is mainly the decayed remains of Sphagnum moss but it also contains many other species of decayed plant material.

Because the organic matter that forms peat accumulates over thousands of years, peat deposits provide important records of past vegetation and climate. But for horticulturists the interest is different. The best peat for use in potting mediums is what used to be called German peat or European peat and was probably laid down many thousands of years ago in sphagnum moss bogs when Europe was part of Pangea and the Earth was much warmer. This created a very evenly constituted stable peat product. The only peat of this type that seems to be available in Australia at present is sold as Lithuanian Peat and it comes in at least two or more grades, in large bales. Buy the coarser type.

P & P mixes are very stable. The perlite is inert and the ancient sphagnum peat has already reached a point of almost nil decay over thousands of years in the ground. The combination has a slightly acid pH around 6.0 (perfect for most orchids) and lasts virtually forever. However, you still need to repot relatively regularly because plants outgrow pots and because dead orchid roots eventually accumulate in the mix and need to be cleaned out.

Another characteristic to note is that peat and perlite mixes when used properly are generally wetter (comparatively) than fresh bark mixes. But if they get too dry they can initially be hard to wet again. As with any potting medium, the watering frequency depends on prevailing weather, your watering tendencies, and judgement. Don't dry it right out.

Variations – to get slightly different results for unusual plants you can vary the peat/perlite ratio, or use finer or coarse grades of perlite - add styrene foam or washed quartz pebbles to the mix. Each will give you some control over how quickly the mix dries. I use P&P mainly for finer rooted orchids like Pleurothallids, Dendrochilums, and others. Some growers use it successfully for everything.

4 - Coconut Fibre (often called **coco fibre**) -- Although commercial nurseries here and overseas have been using this product for quite a few years, coconut fibre is a relatively new medium to many. It obviously has potential.



There are two types of coco fibre products. For epiphytes we use the version chopped into more or less cubes as shown in the picture at the left. However, Cymbidium growers often use a version called Coco mulch – see the picture below the chipped version pic.

As a medium, either product is fairly long lasting, slow to bio-degrade, and depending on the brand and the washing process, has a pH of about 6.0 – 6.5. The material comprises two natural materials which form the husk of the coconut. A coarse, stiff, woody, thread like material we call coir, which is the same fibre used to make coir doormats etc., and a peat like material that fills the spaces between the coir fibres in the coconut husk.



The commercial orchid potting material, is basically the chopped up fibrous husk off coconuts. It is a byproduct of the copra production plantations in India and Sri Lanka among other places. It comes in dried, compressed blocks of either chopped cube like chunks or of more finely ground up material. There are various brands available. Bunnings hardware stores used to sell both types but may not have the cube chipped version these days. The chipped type can be found online from various other suppliers but avoid niche, blended 'multi component' versions. Buy the compressed 4.5 kg brick form. (ie the

solid thing, far left, lower pic)

Coco material needs to be soaked and rinsed before you use it. Stories are told that some supplies are contaminated with sea salt from the discarded coconut husks being stored too close to the ocean before they are processed and compressed for horticultural use. Hence there is a need to wash and rinse to remove high levels of Sodium..

To prepare the material for use, I soak a **half of a compressed dry block** (or the whole block if you are in a hurry) in a garbage bin for one to three days to let it thoroughly stew, then tip it out through a sieving process to get rid of the stewed water. I have tried several ways to do this but the method described to our members by Cymbidium guru Geoff LeMarne sounds the winner to me. He uses a 70 litre garbage bin for the soaking and a second 70 L bin with holes in the bottom and a big plastic sieve jammed in its bottom as the drain off. Just tip the soak bin into the other so the water is disposed of, rinse it through with fresh water, then tip the drained coir back into the first bin for a second soak. He has found that two 1 day soaks and rinses is sufficient to clean out contaminants. Be careful when you rinse it however, especially the cube chipped version that we use for epiphytes. All these coconut fibre products include a significant proportion of the fine peaty material. It continually sheds from between the coir stands and you need to retain a decent proportion of these fines as an integral part of the mix. If you remove too much of the fines by washing and sieving, the mix dries faster than is practical for most orchids and doesn't retain sufficient water. A dry mix can be a useful trick for one or two oddball orchids, but it isn't suitable for most.

Another good tip that Geoff gives us is that after cleaning, the coir product needs to be ‘buffered’ before it is used. Buffering is the addition of the macro minerals that are missing for the washed product. It simply means adding a tablespoon of so of a quality soluble fertiliser like Peters Calmag Finisher to a final soak to let the coir absorb a base dose of minerals. This stops it buffering itself by sucking the life out of the mix when you apply your first fertiliser after putting an orchid in the mix.

As with bark, or perlite mediums, you can adjust the moisture content of your coconut fibre potting medium by choosing the coarse or fine grades (size of chunks), or by reducing the peaty component, or by adding other components like perlite or crumbled styrene foam.

I have only used the cubed version but have experimented with mixes of various size cubed coco-fibre, with added coarse perlite and styrene foam. I was very impressed with results in the first 6 months or so but after that I began to experience rots killing off some plants and others just suddenly stopping their forward progress. I am not sure why, but I suspect that part of the problem was the finer, peaty materials gradually washing out from between the coir strands and accumulating in the bottom of the pot creating an airless bog zone and leading to root decline. Perhaps this could be solved by improving drainage mechanisms at the bottom of the pot but I am only guessing.

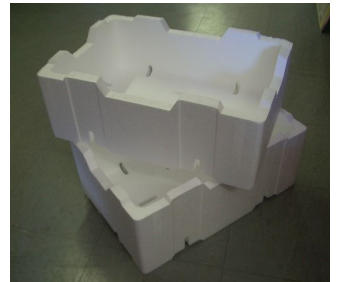
At present, I have just about cut out my use of coco-fibre. I only use it as an additive to some of my specialist mixes aimed to deliberately retain a little more moisture – eg for Paphs. However, I know many nurseries and other growers are still getting excellent results in coco-fibre mixes. Perhaps my problem was just be the way I was using it.

Concerning the excellent results obtained by commercial orchid nurseries, I am suspicious that part of their success may be because they raise very large batches of deflasked plants, all potted at the same time, and frequently potted on to larger sizes. They are growing forward so quickly they never sit in the old mix too long.

Additional Fringe Materials - As I mentioned earlier, there are dozens of side components that experienced growers use as additives or even as major components. For example: shell grit, charcoal, pebbles or stones, wine corks, crumbled cork. Over the years, I have tried just about all of them as each wave of “new discovery” swept the orchid grower world. I probably still have half bags of some of the stuff stashed away in the shed somewhere.

Many are useful, and have their place, but none are the new magic potting material that they were once thought to be. For example, shell grit is fossilised micro shell husks and can be very useful in supplying a slow release source of Calcium to delay acidification of bark mixes.

However, there is one ‘side material’ I do use in nearly every blend, and that is crumbled styrene foam. I use it in quantities from 10% to 25% in nearly every combination and I am convinced it provides a substantial positive benefit - mainly in improving drainage and air content in the pot.



However, before you rush off to smash up one of those white foam boxes the fruit stores carry produce in (see above), or to buy a bag of bean bag balls, let me stress that there are many types of styrene foam. The fruit boxes are very dense, heavy, strong foam with little air space between the styrene particles. They are unsuitable for my purpose. Nor do I like bean bag balls. Their roundness and shiny surface makes them too hard to blend with other components and their hardened surface seems to repel water.

The foam I use is the softer more easily crumbled type that is often used as packing material in glassware, or electrical equipment. But even this more easily crumbled foam can vary a lot. I search out the types made from ‘larger’ rather than ‘finer’ bubbles of styrene, and that can be fairly easily broken up by hand, or shredded on the equivalent of a cheese grater.

note size of styrene ‘granules’ – the sheet is 4 cm thick

The one big problem when handling styrene foam, smashing it up, or when grating blocks or sheets of styrene, is electrostatic attraction. It makes the stuff cling all over you and can be very annoying. But there is a practical solution and that is water. You do your shredding or crumbling directly into a tub of whatever bark or potting mix you are adding it to and make sure the mix is adequately moist. You need to keep mixing the foam into the moist mix as you shred or crumble the styrene. Just take your time. The moist mix will absorb and balance the electrostatic charge.



sheets of soft, coarse textured styrene

Next? - So Now you have an understanding of a reasonable range of options for core Potting Mediums

What you need next, and finally, is how to go about choosing which for what and why. I think I will call it : - ***“Growing Orchids 5 – being the Orchid Potting Detective”***. It is about understanding and interpreting physical characteristics in an orchid, signs of the plant’s health, and understanding statistical info that you read about for each orchid.