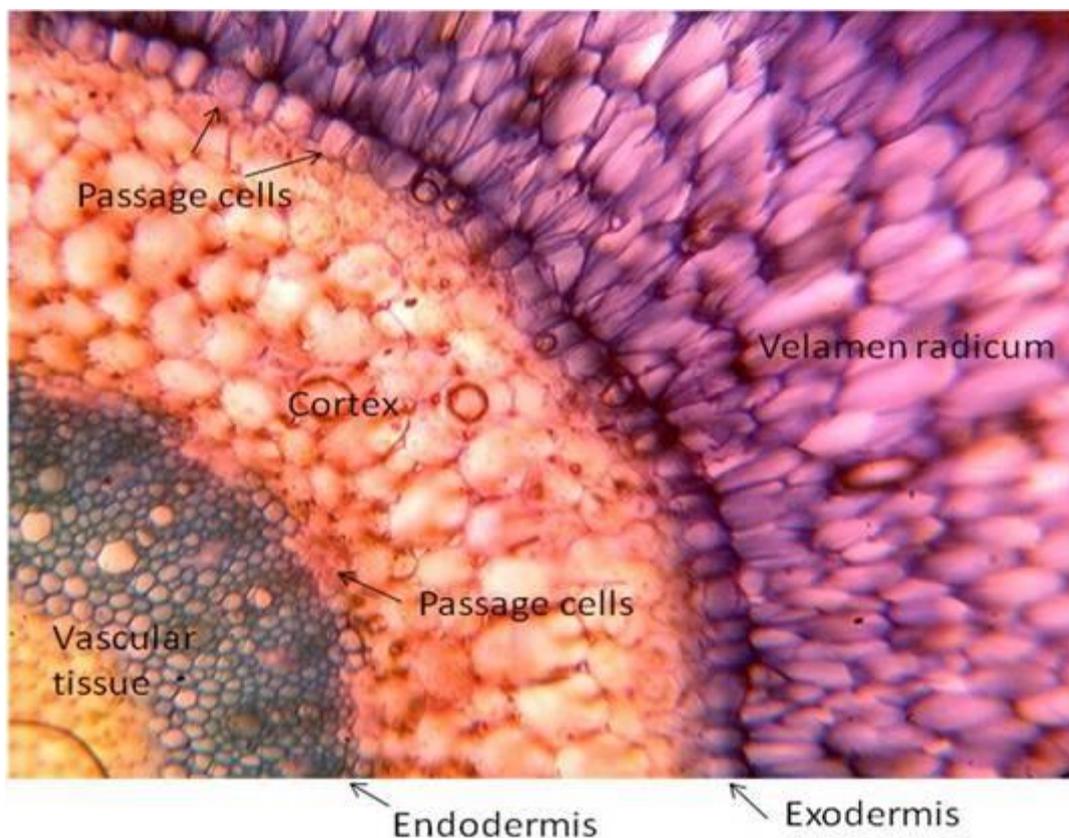


Water first then fertilize or just fertilize and water at the same time?

Ever since enthusiasts began cultivating orchids growers have pondered on the subject of watering and fertilizing. At first, cultivators thought that orchids needed a hot and continually wet environment, so they tried to imitate the hot wet tropical climate within "hot Houses". As a result, many plants were lost through root rot and other fungal problems. As growers became more proficient in their methods, plant loss was reduced to more acceptable levels.

Orchid roots are uniquely different from other roots in the plant kingdom. It has adapted itself to store water and nutrients within the (**Velamen radicum**) just underneath the external cell layer of the root. The nutrients are passed through passage cells into the Cortex and then into the Vascular tissue for transportation throughout the plant. See [diagram A](#)

Diagram A



Velamen radicum

"The velamen radicum in Orchidaceae, a spongy, multiple epidermis of roots with dead cells at maturity, is a textbook example of an "adaptation" to the epiphytic life style. There are numerous allusions to its function in the literature since the original description in the 19th century, but at close inspection solid information is extremely limited. We have already evaluated a hypothesis put forward by Went (Ann Jard Bot Buitenzorg, 1940), who had suggested that the

primary function of the velamen is the capture and immobilization of the first solutions arriving at the onset of a rainstorm, which are the most heavily charged with nutrients. We found that all necessary prerequisites for this notion were given, i.e. rapid uptake of solutions into the velamen, retention of charged particles within the velamen and fast uptake into living tissue.” (Zotz and Winkler 2013).

Unlike most other terrestrial plants which enjoy having their root system continually within a moist soil environment, the epiphytic orchid root system is designed to meet its environmental situation of wet and then complete dryness. Lithophyte orchids are similar to epiphytic. Both epiphytic and lithophyte gather their nutrients mainly from animal droppings on their supporting tree or rock that are washed down when it rains. This would be when the water is saturated with these animal droppings. I cannot elaborate upon the roots systems of Australian native terrestrial orchids as I have not had experience in growing these genus. Other terrestrial orchids such as Paphiopedilum and allied species have few roots but the roots do have hairs and it is my understanding this is to allow the take up additional moisture quickly. Of course Phragmipedium enjoy having their root system continually in a very moist environment and would be exception and not the rule.

It was mentioned at the last meeting that cropping agronomical advice was given that it is best to water and then fertilize. A good reason for this is that when ground moisture is exhausted and becomes relatively dry, the lack of accessible moisture would begin to place stress upon the plant tissue and to fertilize when the plant is under stress would not be the best practice. On the other hand, orchid roots have evolved to have periods of dryness and will take up water quite rapidly. Zotz and Winkler (above) have recently confirmed (2013) that the Velamen will absorb 82% of its moisture intake within 15 seconds and be fully saturated within one minute. So it would appear that we, the growers of orchids, are using more water than necessary when we water our plants. My own observations over recent times have shown that if you water a plant for one minute then you have a continual flow of water from the bottom of the pot. Putting this into perspective it is therefore apparent that the root system would have well and truly taken up all of the water and fertilizer that it may possibly absorb. Continued watering therefore is not warranted. Bearing this in mind, to fertilize after you have watered would be a fruitless exercise and a waste of fertilizer, time and effort. I know that some fertilizers are designed to be taken up by foliar absorption but on reflection, I believe this is not the preferred way to fertilize your plants as the cells within the leaf are closed during the day. The stomata based on the underside of the leaf do not open until night when the take up of CO₂ is in progress.

When and how often to Water

This is a question that has many and varied answers but I will give you an insight into what I do.

Bundaberg is situated at latitude of approximately twenty five degrees south. As such we are in a Sub-tropical area. I divide the year up into three sections: Winter, Summer and Spring/Autumn. Usually Summer covers the period November to about mid April; Autumn Mid April to early June; Winter mid June to mid August and Spring mid August to end October.

The table below shows, the mean temperatures of Bundaberg since 1959 when the Bureau of Meteorology weather station was shifted to Bundaberg Aero port.

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	Plot	Map	
Temperature																	
Mean maximum temperature (°C)	30.2	30.0	29.2	27.5	24.8	22.6	22.1	23.4	25.5	27.0	28.5	29.5	26.7	38	1959 2016		
Mean minimum temperature (°C)	21.4	21.4	20.0	17.6	14.1	11.7	10.2	10.8	13.7	16.5	18.8	20.5	16.4	38	1959 2016		

Winter. From these BOM Statistics it can be seen that June and July have the lowest minimum and maximum temperatures. Your orchids will need less water during this period. However, you need to increase irrigation during the months of October through April.

Most orchid plants are dormant in the winter. To fertilize your plants at this time wastes fertilizer and increases the salts within your potting mix. Although here in Bundaberg, most miniature Cattleyas with cool growing Cattleyas in their background like *C.coccinea*, *C. walkeriana* *Laelia pumila* and other cold growing Cattleyas are not dormant. These orchids do enter into a growth period during the winter months so I do not reduce my fertilizing regime during this time for them.

Except for hard cane and soft cane Dendrobiums, I would water all other plants about every five days or so depending on the weather conditions at the time, and only on clear sunny days between 8 am and 9 am. (Watering of Dendrobiums from time to time is only to prevent the shriveling of the bulbs.) I also add Seasol concentrate (white bottle) at the rate of 2mls per liter every three weeks for all plants. This helps the plants against cold weather and acts as an antifreeze).

Autumn/Spring. As the temperature drops during the Autumn I reduce the watering/fertilizing to about every three days and then to five days in winter. With rising

temperatures during the spring, watering/fertilizing is increased to every three days by 8:30 am.

Summer I have quite a different approach. I change completely my watering/fertilizing times to the evening and on a more regular basis depending upon the day time temperatures and the visual condition of any exposed roots. If the roots are white and dry looking I will water/fertilize that evening, otherwise the watering is held off for an additional day. So it is more by visual means that determines when I water during this time of the year. Applying moisture of a night assists the plant to take up the nutrients through the stomata which opens on the leaves of a night.

I do not use slow release fertilizers at all. Some may say that this is not the best way to go. However, my experience has been that this type of fertilizing has more disadvantages than benefits. Firstly, slow release fertilizers are temperature activated usually from about 21 degrees. The warmer the temperature the higher the amount of fertilizer is released. The drawback of this activation method is that during the hotter weather the amount of fertilizer that has been released is sufficient to burn and destroy the roots within the pot. The additional release also shortens the amount of fertilizer that is available for the plant during the growing season, leaving the grower with a false impression that the plants are receiving nutrients, when in fact they are not.

Humidity

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	Plot	Map				
Temperature																				
Mean 3pm relative humidity (%)					61	62	59	57	54	52	49	47	49	54	57	60	55	32	1943 2010	

I use under bench misters timed for a 15 second application every 30 minutes to increase humidity throughout the year, timed to commence at 10:00 am and cease at 3:30 pm during the winter or at 5:30 pm all other seasons.

In Summary

The evolution of the epiphytic orchid root has made it unique in the plant kingdom. It has been designed to act like a sponge to immediately take up the nutrients washed down from its hosts during the first flush of waters. Once the root has taken up sufficient moisture to fill the **Velamen radicum**, it basically shuts down further intake until such time as it has absorbed the liquids into the **Vascular tissue** for distribution to the rest of the plant.

So ... bearing this in mind it would appear that it is better to water and fertilize the plant at the same time when the roots are dry or at least nearly dry.

It would appear then, to fertilize the plant with a weaker solution of fertilizer on a regular basis, would be better than to irrigate you collection with a higher concentrate on a less frequent basis.

Naturally, it is better to introduce this method into any collection of orchids on a trial basis on a few plants to assess how it will affect your growing success.

Photographic source.

<https://www.uni-oldenburg.de/en/biology/functional-ecology/projects/velamen/>

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Weather statistics BOM.

http://www.bom.gov.au/climate/averages/tables/cw_039128.shtml