



Dendrobium

Introduction:

The following is a guideline for growing *Dendrobium* commercial varieties of orchids in Orchiata and Spagmoss; it is aimed at helping ensure that any areas of concern have some guidance or referral. There is also a quick guide available for ease of use. Note that pot sizes and climate conditions will change according to growers. Adjustments will have to be made depending on their conditions; especially for the different varieties grown. Remember this is just a guide.

Dendrobiums are an interesting group of orchids as there are a great many types and their natural origins cover a wide area from New Zealand and Australia through to Japan and other East Asia countries. There are two main types of *Dendrobium* used in culture: *Dendrobium nobile* and *Dendrobium phalaenopsis*. Many *Dendrobium* species have extreme various requirements, from *Dendrobium cuthbertsonii* from Papua New Guinea that grows in very cool conditions, to sunburn *Dendrobium antelope* type in Papua again, to Himalayan *Dendrobiums* that can survive a deep freeze.



Nobile Dendrobiums are able to withstand cooler conditions; they have cane like pseudobulbs and flowers appear along the leaf axis. A lot of effort has been made to get a wide range of flower colours. They are bred from the eponym wild *Dendrobium nobile*, combined with various other species to improve flower count, size, shape, colours, etc. They have a distinct growing period, and a dry cooler rest, during which the flower buds are initiated.

Phalaenanthe Dendrobiums: are a more tropical type *Dendrobium* which produces relatively large *Phalaenopsis* looking flowers on stiff upright canes. Flower spikes usually occur on new canes and can occur at any time of the year. These plants prefer warmer conditions and if temperature gets too cold leaves will drop off. The Antelope and 'cut flower' types from Thailand and Hawaii are quite similar in their requirements, with extra light and feeding.

Many aspects of growth are similar for both types however there are differences which are important and these will be detailed below.

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Pot Type:

Almost any type of pot can be used for *Dendrobiums*. Plastic pots are usually recommended in temperate climates, where tropical climates will have better results in Terracota pots, especially for the giant Antelope types that are popular in the Tropics. *Dendrobium* must be potted in pots that are cost-effective to allow a maximal quantity of plants per square meter. A former legend wanted *Dendrobium* to grow better in tiny pots however it has the result of dwarfing the plants. It would however allow the roots to dry between watering and correct disease problems that today are non-existent or easily controlled by drenches. The pots must also have good drainage (as well as the media) and anchor as plants will become top heavy. Pots are generally placed in stability trays to prevent them from falling over.

Pot size used:

Typically *Dendrobiums* are grown in a very short and simple system for potted plants for export. Some automated growers are able to use a two-step system however growers growing *Dendrobium* for cut flower are likely to use a 3 step system:

1. Potting from flask or first transfer of cuttings: 1 inch or 2 inch pot or cell tray
2. Second vegetative growth and flowering: 2-3 inch (5-7cm) Optional, as it is possible to pass to a 4 inches pot directly.
3. Large plant to flowering: 4 inch (10cm)
4. For cut flower production the final potting may be into a 6 -8inch (15-20cm) pot.

Plants from flask are at their most vulnerable and must be cared for to encourage strong root growth which will create strong plants later on. It must be noted that *Dendrobium* have a growth cycle and as a result the flasks must be carefully watched. When a new growth is about to appear it is the right time to deflask. Failure to deflask at the proper time can result in extended delays to establish the plant and even eventually plant losses. Use of an anti-transparent such as a menthene or paraffine based compound, at a concentration of 1/10, is advisable as a dip to avoid stress.

After deflasking, Ridomil can be used at 2g/L to avoid pythium and phytophthora and provide a mild control of other pathogens.

Grades to use:

Initial planting and/or propagating:

For initial plantings from flask direct into small pots and plug trays 1 – 2 inch in size, New Zealand Sphagnum moss is a good medium to use for Nobile types. Using moss will allow sterility as well as retain moisture for the more vulnerable plants and help keep high humidity for the initial growth of roots for anchorage. Moss should not be compacted too hard as good aeration is required. If plants are being potted directly into 2inch (5cm pots) then Orchiata can be used. A grade of Classic Orchiata will suit this pot type as it will allow good aeration to the roots and allow the media to dry out well between watering. Orchiata mimics the natural environment in which some of the *Dendrobiums* are found. If using Orchiata then irrigation may need to be closely monitored for the first 2 weeks to ensure wetting and drying is occurring properly.

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Second potting:

For plants being transferred from 1 inch pots, plug trays and/or propagation trays into 2-4 inch pots, Classic Orchiata must be used for the Nobile type, whereas the Phalaenopsis or Antelope types can be grown in Power Orchiata. These grades will provide good amounts of air, dry out sufficiently as well as offer plenty of room for new roots to grow. Remove older media if possible before re-potting to help encourage new roots, especially if Sphagnum or coconut products have been used to deflask the seedlings. The potting must be done again when there is a new growth started and root tips appearing at its base. Failure to repot at the proper time can increase the growing time by 2 or 3.

Cut flower potting:

For cut flower or large flowering plant production plants may be transferred into 6-8 inch pots. Power or Power+ Orchiata can be used. Larger grades such as these will last for many years allowing plants to easily grow in hot humid climates without re-potting for long periods of time (3+ years).

The following are the approximate amounts of Orchiata which will be required at re-potting:

Pot Size	Previous media removed (L)	Approx grams/ pot (40% moisture)	#40L bags per 1000 pots
1 inch/plug trays	0.060	30 – 60g	1.0
2-3 inch	0.100	100 – 125g	2.5
4 inch	0.550	180 – 200g	13.75
6 inch	1.000	380 – 450g	25.00

Time at re-potting:

Timing of potting and re-potting will depend on the climate and variety. With *Dendrobium* for sales of young plants the re-potting is minimal with only 1 re-potting (into the 5-7cm pot) taking place. Plants then stay in those pots throughout growth, through to export. Since *Dendrobiums* can be grown in small pots, this method of growth allows for minimal labour expenses. Growing time from first pot to export is 8-12 months for the Phalaenopsis types, 12-18 months for the Nobile, and 18-24 months for the huge landscape types (such as *Dendrobium lasianthera* hybrids)

Plants which are kept for larger flowering plants and/or cut flowering production should be re-potted at the sign of new root growth.

Spacing's at planting:

When plants are small and canes are less than 3-4 inches, plants can be placed directly next to each other. Once canes start to significantly elongate and/or grow side shoots, then space plants with one pot space in between. Canes may need to be staked as they grow taller.



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The following table is approximate plants per m2 of bench space:

Pot Size	Plants/m2	Spaces between pots	Time in pot
1.5-2 inch	200 – 300	-	2-4 months
2.5-3 inch	100+	0 – 5/7cm	12-14 months
4 inch	60 - 70	1 pot space	12-14 months
6-8 inch	30 -35	1 pot space	6-8 months
Total time			16-18 or 24-30 months

Light, Fertiliser, Temperature, Irrigation & Humidity:

Dendrobiums are plants which love light, they are generally adapted to higher light levels than *Phalaenopsis* or *Cymbidium* however they are also used to dryer winters and wet summers, especially the *Nobile* types. Good air movement is important for *Dendrobiums*. *D. nobile*. *D. phalaenopsis* are different in their requirements for light, water, temperature and rest periods due to their different natural habitats. As these requirements are different the requirements are set out below in a table. In both cases a "rest period" is required by both types where the canes are allowed to develop. Irrigation is also reduced in winter and fertilisation is virtually not applied in winter as plants are not actively growing. The Antelope or large cut-flower types are similar to the *D.phalaenopsis* types for their requirements, simply with more light and more fertilizer.

The following table outlines the requirements for the different *Dendrobium* types:

<i>Dendrobium nobile</i>	<i>Dendrobium phalaenopsis</i>
Humidity Approx 80% in summer, reduce to 60% in winter. <i>D. nobile</i> are used to dry winters with lower humidity with heavy rain in the summer.	70-75% in Summer, 65 – 70% in Winter/early Spring. <i>D. phalae</i> are used to habitats where there are less extremes between summer and winter. Still dryer in winter but not as harsh rains in summer.
Light requirements: 680mmol (3500fc) – 880mmol (4500fc). Higher light levels can be tolerated in winter especially with good air movement. A slight yellowing of the leaves indicates ample light levels. If heat and light become too high or too low, leaves may begin to drop off.	580mmol (3000fc) – 880mmol (4500fc). <i>D. Phalae</i> also like high light levels as however at the higher light incidences strong air movement is very important, 35 – 50% is sometimes required in winter and during flower formation. If light levels become too high leaves and flowers may fall off, and nodes may bare kiekies rather than flowers. Also poor winter light can lead to bud drop.

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Temperature requirements:

Winter temperatures of 25–28C and 9–10C night are preferred. *Nobile Dendrobiums* are able to withstand slightly higher temperatures than *Phalaenopsis Dendrobiums* during summer time. As temperature drops it is important to reduce irrigation also. Diurnal differences of 15C (difference between day and night temperatures) can be tolerated.

Phalaenopsis Dendrobiums are used to more even conditions when compared to *Nobile Dendrobiums* therefore their extremes are less tolerable. During winter temperatures of 24 – 26C day and 17 – 19C night are required by the plant. Generally a diurnal difference of 8C is tolerated by the plant. During Summer temperatures should be 28–30C down to 20– 22C. Misting will help reduce temperatures above this. If temperatures at any stage become too low leaves will drop off. Slight drops in night time temperatures can initiate flowering rather than a complete rest period.

Irrigation:

During summer, irrigation may occur every 1 – 2 days, reducing as the temperature cools in autumn to 7 – 10 days and then ceasing in winter. If required, plants can be morning misted during rest periods to keep humidity at required levels. *Dendrobiums* require good drying out between watering at any stage. This will also reduce disease pressure.

Plants must be provided with ample water during summer and early autumn while plants are actively growing. Reduce water in winter and during rest periods cease to apply. A light misting can be applied all year round to keep humidity constant. Plants must be able to dry out during winter but can be kept moister in summer.

Fertiliser application:

Dendrobiums growing vigorously during warm periods require a regular 5 – 7 day fertilisation schedule. Liquid feed of equal parts NPK (e.g. 20-20-20 + trace elements) can be applied. From late autumn or the beginning of the cool period to the end of the cool period, fertigation should be halted or reduced to a minimum. On resumption of growth and into flowering – late winter through spring a fertiliser less in nitrogen and higher in potash is recommended. Up to 2 grams per litre can be used during the growing period. A better feeding schedule is a high nitrogen from new growth emergence until expansion and a high potassium when the growth length is suitable, to fatten the bulb. *Dendrobium nobile* especially needs to have enough potassium to ensure proper blooming of every node.

Slow release fertilisers are not generally used as they may continue to release fertilisers during rest periods when the plants are dormant. This can lead to fertiliser wastage and an excessive increase in EC. When plants begin to grow again roots may be burnt and flushing will be required

One important note with *Dendrobium nobile*. During their rest period the flower buds will appear at every node on the newest mature bulb. Some countries require a total defoliation before sale, as a tradition, but many equally prefer plants with all their leaves.

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To ensure that result, the plants must be sprayed, without runoff on the roots, with 0.5g urea and 0.5 KH₂PO₄ every week. It will keep the leaves alive and green whilst not blocking the blooming.

Flower initiation/ rest periods:

As late autumn is reached, plants require a 4 month rest period with cool, dry, high light. This can also be artificially encouraged. To delay flowering to a required sale time, low light levels can be maintained until flower spiking is to occur.

Rest periods are required from mid winter to mid spring before shoots start to actively grow again. The rest period is for 4 months with high light, not too cooler winter temperatures and dry weather. A slight drop in temperature can initiate flowering however *D. phalae* naturally initiate late winter to spring and flower in late summer to autumn. Generally a drop to winter temperatures, high light and no water will encourage flowering.

Air circulation:

All *Dendrobiums* require very good air movement. Air circulation is very important especially in the rest period where canes are being initiated for flowering. Increased air circulation helps to reduce humidity, allow much higher light levels to be applied and help dry out the canes/media. This helps the flower initiation and disease control.

It is said that *D. phalaenopsis* are harder to control and grow than Nobile *Dendrobiums* as light levels, humidity, temperature and rest periods are more strict however many growers are successful in growing both these orchid types together. *Dendrobium phalaenopsis* tend to bloom whenever the bulbs are ready to, and it can be difficult to perfectly schedule the blooming.

General:

Dendrobiums are generally short rotation plants and are grown in a relatively short time frame; they are then sold virtually as cut flower potted plants used in displays. Their flowers can last a good length of time. Generally only a small amount of media is used and growing time is short including the rest period, there are only a few miscellaneous areas which need to be kept in mind.

Media:

Sphagnum or Orchiata can be used. This said, Orchiata is preferred for the *Phalaenopsis* types. Sphagnum is a traditional media for the nobile types, though Orchiata gives better results. *Dendrobium* are very primitive, they need to make an extensive root system in a clean media, and get as much fertilizer as possible to make large healthy bulbs. Once achieved, they will bloom easily.

Pests and diseases:

Few problems do occur with *Dendrobiums* however soft rots can be a large problem in new growth and shoots, if plants are kept too wet for too long. Ensure good drying is occurring. Calcium chloride sprays on the newer growth can prevent a calcium deficiency, especially when

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nobile types are grown in too warm conditions. This needs to be repeated every week as a calcium deficiency is the main reason for bacterial rot.

General pests include slugs and snails which do like to feast on *Dendrobium* canes but also scale and mealy bug can become a problem. Use standard control means to reduce these problems.

Discolouration of leaves and flower drop: this can be caused by many things e.g. cooler temperatures too high or low light and lack of air circulation. It must be noted that from Thailand many varieties today test positive for the CyMV and ORSV virus. These two viruses, apart from having consequences on flower lifespan and colour, will as well make the plant more susceptible to diseases, and slower growing. *Dendrobium Sonia* is a famous example where virus infected plants will take twice the time of virus-free plants to reach blooming size. Some growers recommend for virus-infected plants that a heavy feeding program, including foliar feeding, is to be used. Several of those formulations include as well antibiotics, fungicides and insecticides, with a base fertilizer of 4-6g/L. We do not adhere to such practice, as it is only a palliative to attempt to grow virus infected plant.

Water Quality:

This is another aspect which must be checked. Water can affect the plant growth by diseases present, lack of Calcium and Magnesium and build-up of bicarbonates in the irrigation lines.

Water should also be tested for the Ca and Mg content as well as the hardness. If Ca and Mg are not present in the water then these must be applied in fertiliser solution. If the water is hard and contains high amounts of bicarbonate then lime scale may build up in irrigation lines and white marks may occur on leaves of the orchids. This can be corrected by applying an acid such as Phosphoric Acid to the application water.

Troubleshooting with Orchiata:

Orchiata is not a sterilised media; it is in fact packed with natural beneficial organisms which will aid against pathogenic species. In some cases fungal growth may appear. If this is a concern then take good photographs of the fungi and send for ID or send media to a local laboratory for ID. In most cases it may mean that the media is not being allowed to dry out sufficiently therefore reduce irrigation rates.

White build-up on media: this is usually lime scale and is cause by the bicarbonates in the water. Check water pH and add acidifying agents if pH is too high.

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