



## Seed Notes

for Western Australia



These **Seed Notes** aim to provide information on seed identification, collection, biology and germination for a wide range of seed types for Western Australian native species.

THREATENED FLORA



SEED CENTRE

They have been written and compiled by Anne Cochrane, Manager of DEC's Threatened Flora Seed Centre.

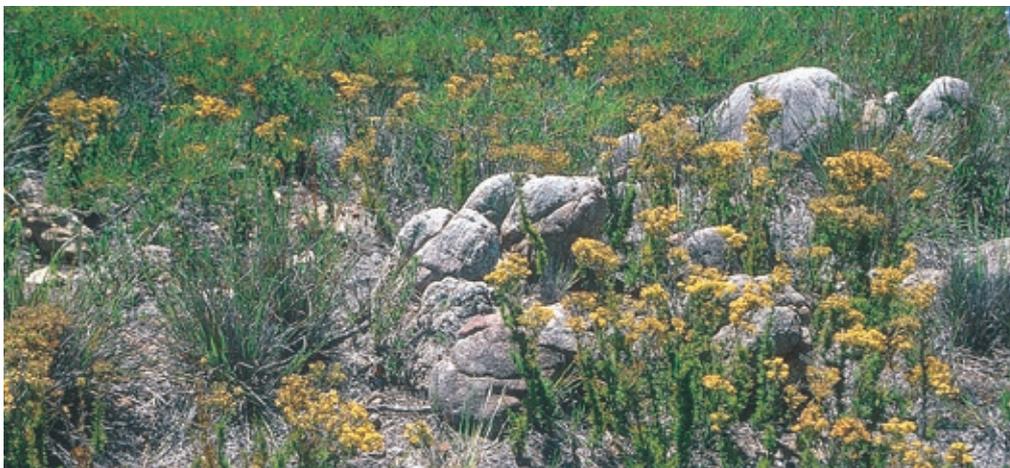
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The **Seed Notes** are available from [www.naturebase.net](http://www.naturebase.net)

## Seed Notes

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Top left: *Chamelaucium* sp. Gingin. Top right: *Verticordia aurea*. Above: *Verticordia endlicheriana* var. *angustifolia*.  
Photos – Anne Cochrane

## Recommended reading

Blake, T. L. 1981. *A Guide to Darwinia and Homoranthus*. Society for Growing Australian Plants, Melbourne.

Cochrane, A., Brown, K., Cunneen, S. and Kelly, A. 2001. Intra- and inter-specific variation in seed production and germination in 22 rare and threatened Western Australian taxa in the genus *Verticordia* (Myrtaceae). *Journal of the Royal Society of Western Australia* 84, 3.

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# Seed Notes

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No. 10 Darwinia, Chamelaucium and Verticordia

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This issue of **Seed Notes** will cover the genus *Darwinia*, *Chamelaucium* and *Verticordia*.

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## Darwinia, Chamelaucium, and Verticordia

The three genera, *Chamelaucium*, *Darwinia* and *Verticordia* form part of the tribe Chamelaucieae belonging to the Chamelaucium alliance of the family Myrtaceae. They share many distinctive characteristics and will be treated in this publication as a group. The genus *Darwinia* was named after Dr Erasmus Darwin, the grandfather of the naturalist Charles Darwin. The meaning of the name *Chamelaucium* is not very clear, although in Greek, *chamai* means dwarf or on the ground and *leucos* means white. *Verticordia* was named after the Roman goddess Venus due to the beauty of the flowers.



Above: *Verticordia aurea*. Below: *Verticordia fragrans*. Photos – Anne Cochrane

### Description

All three genera consist of woody perennials. They range from dwarf shrubs suitable as groundcovers, to medium shrubs reaching several metres in height. Their leaves, which are more often than not opposite, small and narrowly linear, all exhibit the distinctive aromatic smell of the family Myrtaceae. Many species within the Chamelaucium alliance have attractive, long lasting ornamental flowers, in particular the bells of the *Darwinia* and the small waxy flowers of the *Chamelaucium*. Many species have great potential for ornamental horticulture, presenting an important future for floriculture (e.g. *Chamelaucium uncinatum*). Flowers of the genus *Darwinia* come in green, yellow, pink and red while those of the *Chamelaucium*



occur in a range of colours from white to pink and to red. *Verticordia* flowers are feathery and often prominently displayed, borne singly but appearing as heads or spikes. They are generally brightly coloured, ranging from yellow to red and to purple. Inter-generic hybridisation may occur between different species within the genera.

Above right: *Verticordia albida*.  
Left: *Verticordia penicillaris*.  
Photos – Anne Cochrane



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## Geographic distribution and habitat

These three genera are endemic to Australia, with a large proportion of species of *Darwinia* and *Verticordia* found in south-western Australia. *Chamelaucium* is entirely endemic to Western Australia. There are more than 150 species in the genus *Verticordia*; more than 20 in *Chamelaucium* and more than 60 in *Darwinia*. All these plant genera occupy a prominent place in many shrub and heathland communities together with other myrtaceous genera such as *Callistemon*, *Agonis*, *Leptospermum*, *Melaleuca* and *Calothamnus*. Most species appear to have a need for well-drained soils, although many grow in a wide range of soils and climatic conditions. *Darwinia* are found in sandy coastal heaths and in the species rich mountains of the Stirling Range National Park. *Verticordia* and *Chamelaucium* can be found on laterite, granites and in deep siliceous sand. Many populations of these genera are at risk of local extinction in the near future due to a range of threatening processes. These include disease, weed invasion, salinity, small population sizes, habitat fragmentation and/or continued land clearing. Over-picking of flowers from the wild also has impacted wild populations of several species, common and rare. In addition, *Darwinia* are considered susceptible to the dieback disease, *Phytophthora cinnamomi*.



Approximate distribution of *Darwinia*, *Chamelaucium* and *Verticordia* in Australia.



Above: *Darwinia citriodora*.  
Photo – Andrew Crawford

## Seed collection

Species in the *Chamelaucium* alliance have indehiscent fruits, or nuts, that usually contain only one seed and are shed annually. They are never discharged but the entire flower dries and breaks off below the receptacle. Seed must be collected when mature and timing of collections is important. It is possible to collect seed of each of the three genera from below plants but insect predation may be higher in such collections. Old flowers of *Verticordia* form the fruit and hence old faded flowers are collected when they easily come off the plant. Both *Darwinia* and *Chamelaucium* form fruits that appear different from the flowers and turn brown and leathery to hard when ripe. For most species in the three genera several months from the beginning of flower initiation to seed collection are needed. Most *Darwinia* and *Chamelaucium* are spring flowering with summer fruiting, whereas *Verticordia* may be either spring or summer flowering and seed is ripe for collecting mid summer.



Above: Collecting seed of the rare *Verticordia staminosa* ssp. *cylindracea* var. *erecta*.  
Photo – Anne Cochrane

## Reproductive biology

Most species in the *Chamelaucium* alliance are likely to be pollinated by either specialised or unspecialised insects, and may include native bees and wasps. *Darwinia* species that have a confluence surrounded by bracts may possibly be bird-pollinated whereas most other members of the genus are thought to be insect-pollinated. It has been postulated that *Verticordia grandis* may be bird pollinated due to the flower structure. Apparent pollinator mutualisms also have been reported for some other species of *Verticordia*. Profuse flowering in some species indicates intense competition for pollinators. Honey eating birds are frequent visitors to the flowers of all three genera.



Single flower of *Verticordia carinata*.  
Photo – Anne Cochrane

## Seed quality assessment

It is very difficult to determine from a cursory visual assessment whether or not a seed has formed within the fruits of *Darwinia*, *Chamelaucium* or *Verticordia*. Seed set is often low, particularly in *Verticordia*. To determine whether seed has set, it is necessary to perform a cut test on a representative sample of fruit. Simply dissect the fruit with a scalpel blade. If you wish to keep the seed for germinating then care is needed not to damage any seed found. It is preferable to use a microscope for this job. Seed needs to be white, firm and translucent for it to be considered healthy and potentially viable. In *Darwinia* and *Chamelaucium*, it is far easier to determine whether seed has formed within the fruit. The fruit will be slightly swollen at the base and in the case of the latter, it may be glossy and not shrivelled.



*Darwinia collina* seed dissected from fruit (above) and whole fruit (below).

Photo – Anne Cochrane



Whole fruits of *Chamelaucium aorocladus*; central right fruit coloured and plump indicating good seed.



*Darwinia chapmaniana* seed and fruit.



*Darwinia leiostyla* seed and fruit.



*Chamelaucium aorocladus* seed and fruit.



*Verticordia albida* partially dissected flower revealing seed.



*Darwinia acerosa*. Fruit on right swollen and holding seed; fruit on left shrivelled with aborted seed.



*Darwinia oxylepis* seed and fruit.

Photos – Anne Cochrane

## Seed germination



*Verticordia fimbrilepis*.



*Chamelaucium griffinii*.



Species in all three genera are considered difficult to grow from seed. Plants have traditionally been propagated by cuttings. It is likely that seed dormancy in *Verticordia*, *Darwinia* and *Chamelaucium* is influenced by a complex interaction of factors. The breakdown of seed dormancy and the transition of dormant seed to germinable seed appears to require not only the removal of the seed coat, which acts as a barrier to water uptake, but also the addition of growth hormones to overcome an after-ripening requirement. It is possible that the hypanthium (floral tube) and perianth (sepals and petals of a flower) might help protect the seed from weathering, thus maintaining dormancy. Dormancy breaks down naturally over time because of weathering and soil disturbance. Many species in these three genera appear to have a strong reliance on fire to stimulate germination, indicating heat and/or smoke may help alleviate dormancy in seeds. Recent research has demonstrated smoke responsiveness for some species. Naked seed from the cut test mentioned under Seed Quality Assessment can be grown in the jelly-like substance agar, or put into small dishes with filter paper and kept moist. Some seed will germinate after several weeks. If access to the growth hormone gibberellic acid is available then additions of this to the agar or filter paper at 25 mg per litre will greatly assist germination.



*Verticordia staminosa* ssp. *cylindracea*.



*Chamelaucium uncinatum*.



*Verticordia spicata* ssp. *squamosa*.

Germinating seeds of *Chamelaucium*, *Darwinia* and *Verticordia*.

Photos – Anne Cochrane

