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Seed Notes

for Western Australia

No. 4 Adenanthos

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This issue of **Seed Notes** will cover the genus *Adenanthos*.

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Adenanthos

The name *Adenanthos* (family Proteaceae) comes from the Greek *aden*, a gland, and *anthos*, a flower. The reference is to the four scales around the ovary. Labillardiere, the French botanist and explorer, named the genus in 1805 from a specimen of *A. cuneatus* he found when visiting Esperance Bay in 1792. The common name woolly bush is due to the generally soft woolly look and feel of the foliage of many species, in particular the Albany woollybush, *A. sericeous*.



The rare spikey *Adenanthos pungens*.

Photo – Anne Cochrane



Description

Plants of the genus *Adenanthos* are generally shrubs that range in size and habit from prostrate mat-like sub-shrubs to stoutly-trunked bushes to six metres tall. Many species are worthy of cultivation and are grown either for their attractive pink to red solitary flowers, their interesting foliage (leaves are entire to very deeply divided) or as dense mat ground covers. Plants for the nursery industry are traditionally propagated from cuttings, due to the difficulty of collecting large quantities of seed and the trouble involved in its germination.



Adenanthos obovata.

Photo – Babs and Bert Wells/DEC



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Geographic distribution and habitat

The genus *Adenanthos* is endemic to southern temperate Australia, largely confined to south-western Australia. There are 33 species in the genus.

Two species are known from the south-east of South Australia and Victoria. One of these is endemic to Kangaroo Island, South Australia.

The remaining 31 species are known from south-western Australia from Shark Bay to east of Esperance. Some species have a widespread distribution, although many are restricted to specific sites such as the Stirling Range and Fitzgerald River National Parks (e.g. *A. venosus*) and to areas east of Esperance (e.g. *A. forrestii*). Plants are generally found growing in deep siliceous sands, although a few grow in laterite gravels and clay. *Adenanthos* are found in many different vegetation communities including open woodland, forest and heathlands, although most are found in kwongan heathlands. *Adenanthos* are considered susceptible to the dieback disease *Phytophthora cinnamomi*.



Approximate distribution of *Adenanthos* in Australia.

Reproductive biology

Many species flower on and off throughout the year, with peak flowering during spring. Flowers are bird or insect pollinated with honeyeaters and bees feeding on nectar. Extra-floral nectaries on the tips of leaves attract ants and it is thought that fruits have elaiosome bodies that are ant-attracting. Many *Adenanthos* are obligate seeders, being killed by fire and relying on soil-stored seed to regenerate (e.g. *A. cygnorum* and *A. sericeus*). They may be considered as disturbance opportunists and pioneer species in regenerating native vegetation. A number of other species can resprout from rootstocks after fire (e.g. *A. cuneatus*, *A. meisneri* and *A. flavidiflorus*).



Bee pollinating an *Adenanthos* flower.

Photo – Anne Cochrane

Seed collection

The fruit of *Adenanthos* is a dry, indehiscent nut or achene. It is ellipsoid in shape and is released when the bracts dry and spread out. Fruits range in size from three to eight millimetres long and one to two millimetres wide. The outer fruit wall is hard and brittle and coloured light to dark brown when ripe. The endosperm is white, moist and firm. The seed is highly nutritious and it is likely that birds and rodents predate fruits. Ant dispersal of the seed to nests protects the seed from predation until soil disturbance results in mass regeneration of obligate seeding species.

Plants that exhibit flowering and fruiting over long periods of time make cost-effective and efficient seed collection difficult. *Adenanthos* seed is often difficult to find due to the concealed nature of the developing fruits in the tips of whorled branchlets. Repeated and lengthy site visits are required to enable adequate collection of seed, and collection methods generally involve many hours bent over plants looking carefully for hidden seed. A successful seed trap has been devised by DEC's Threatened Flora Seed Centre that provides a low-cost, time-efficient method for seed collection. Traps are constructed from four aluminium fence droppers inserted into the ground around individual plants. The tops of the droppers are joined with light fencing wire.



Top: The elusive seed . . .

Above: An alternative method for seed collection is a seed trap specially designed for *Adenanthos*.

Photos – Anne Cochrane



Seed trap with aluminum fence dropper and flyscreen in place.
Photo – Anne Cochrane



Emptying a seed trap at the Fitzgerald River National Park.
Photo – Anne Cochrane

The ends of the flyscreen are then stapled together and the base of the flyscreen is carefully gathered up underneath the plant to allow subsequent seed fall to be captured within the trap. Traps are not 100 per cent effective for collection as some seed will be blown away from the trap by wind and other seed will fall through the small aperture beneath the plant, but the traps will collect much more seed with much less effort than by hand picking. In addition, the seeds that fall through the traps will join the soil seed bank and provide seeds for natural regeneration. The traps can be left in place for many years without detrimental effect to the plants. The major problem experienced with this method of seed collection is the need to clear traps on a regular basis to prevent seed predators, such as bush rats, reducing the number of seed retrieved. Individual plants may produce large quantities of seed.

Seed quality assessment

Parthenocarpy, or the production of fruit without seed, is a common phenomenon in the genus *Adenanthos*. Seed abortion is also widespread. This may be due to limiting factors such as resources (e.g. nutrients, pollen), pollinators or genetic reasons (for instance, self-pollination in outcrossing species).

It is very hard to determine whether fruits contain a seed just by observation alone. Weighing is a simple technique to determine the presence or absence of seed within the fruit.

Because the seed is quite small and light (filled seed is generally little more than 0.015 gm) a micro-balance is required to weigh the seed. By cutting open fruit in a range of weights it is possible to confirm a figure as the cut-off point between filled and empty fruit.



Adenanthos detmoldii seed cut to reveal the firm white endosperm of a potentially viable seed.

Photo – Anne Cochrane



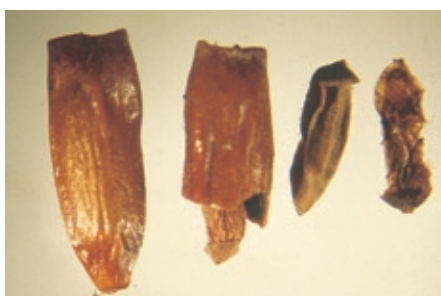
Adenanthos seed traps can be left in place for many years.

Photo – Anne Cochrane



The difference between good (right) and bad (below) seed is noticeable when fruits are cut.

Photos – Anne Cochrane

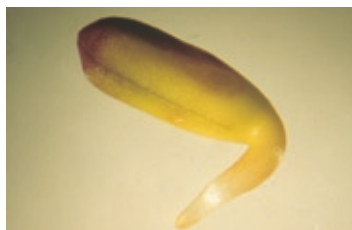


Germination of seeds



The hard dry fruit wall around the *Adenanthos* seed means that germination of fresh seed, without treatment of any sort, will take up to one to two years. To speed up the process it is necessary to completely remove the fruit wall (seed coat) from the seed before putting the seed in a sterile medium (agar, vermiculite or filter paper). This is best done by hand using a scalpel, forceps and a microscope. The addition of Gibberellic Acid (as GA₃ at 25 mg L) will help germination. Up to 70 per cent should be achieved under these conditions. If you don't mind waiting a long time, *Adenanthos* seed will germinate in soil after natural weathering.

Alternatively, burn dry leaves or other litter on the top of a non-flammable pot or tray (concrete or terracotta). The heat will help break down the fruit wall and stimulate germination.



Germinating *Adenanthos* seed.
Photo — Anne Cochrane



Above and below: A seed in the hand . . .
Rare *Adenanthos* seed destined for long term storage for conservation purposes.
Photos — Anne Cochrane

Right: *Adenanthos*.
Photo — Babs and Bert Wells/DEC



Recommended reading

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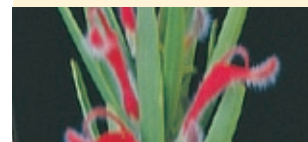
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Seed Notes

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

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