



Association Of Societies For Growing Australian Plants
Banksia Study Group Newsletter

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Dear all, many apologies for the lateness of this newsletter – ‘Life’ has been intervening in a more obtrusive way than usual. Anyway, the Spring newsletter has taken till nearly Christmas to collate! I cannot stress how important it is to receive feedback and articles or stories from other people. Please, if you have seen (or grown) anything you think may be interesting, contact me.

Rare & Threatened Banksia #7 – *Banksia aculeata*

The Prickly Banksia (*Banksia aculeata*) has been listed as Priority 2 plant by CALM in 2005, that is a taxon which is known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as ‘rare flora’, but are in urgent need of further survey. It is a narrow range endemic, only occurring in the Stirling Range National Park where dieback (*Phytophthora cinnamomi*) is prevalent.



(*Banksia aculeata* in bud – CALM; photos of inflorescences can be found in the Banksia Book)

Introduction: Originally collected by Alex George in 1972 and officially described in 1981, *Banksia aculeata* is one of three (or four) closely related species in the series Tetragonae, the others being *Banksia caleyi*, *B. lemanniana* and, according to Thiele's analysis, *B. elderiana*. All have markedly distinctive pendulous inflorescences, a feature seen elsewhere in *Banksia* in the unrelated *Banksia nutans* and newly discovered *Banksia rosserae*. The name *aculeata* is derived from the Latin word *aculeatus* that means sharp or furnished with prickles and refers to the pungent leaf lobes. This prickly shrub however provides important habitat for birds and small marsupials and these animals are known to pollinate the flowers. It is killed by fire and regenerates from seed stored in its huge woody cones. Like other banksias it is a major food source for honeyeaters and honey possums throughout the summer period when less food is available.



Description: The plant is a dense wide rounded woody non-lignotuberous shrub to 2 m high with dark green foliage. Leaves are 'saw-edged' and channelled longitudinally, 4–9 mm long and 8-30 mm wide. The teeth are up to 10 mm long and densely hairy when young. Its pendulous inflorescences are low to the ground and partially hidden within the plant. The blooms, flowering in February and March, are cylindrical to barrel-shaped, cream to pale yellow in colour grading to pink near the centre. They can be up to 9 cm in length and width. The fruit is a cone that contains up to 20 follicles. Each follicle is 30-45 mm long and 20-25 mm wide, thereby creating a massive sized fruit (see left – photo by Kevin Collins)

Prickly banksia is similar in form to *Banksia caleyi* but may be distinguished by its leaves which are folded either side of the mid-rib to form channels while the latter has flatter leaves, red flowers and occurs mainly east and south-east of the Park.

Distribution & Habitat: This plant is endemic to the Stirling Range where it is found on the lower foothills in the western part of the Range. It may be readily seen on Red Gum Pass Road not far south of Salt River Road. Prickly banksia grows in loam soils on sandstone in mallee-heath.

Phytophthora cinnamomi is prevalent in Stirling Range National Park - therefore not 'secure' although one large population known as well as 2 smaller more scattered ones in relatively healthier habitat.

Banksia aculeata is currently being tested for susceptibility to *Phytophthora*, and while it may not be as susceptible as other species such as *B. brownii* - depending on its substrate, drainage, length of infestation - it will undoubtedly succumb to disease ultimately if challenged.

In one population this year lots of dead plants were observed, however further sampling is needed to determine cause.

Seed has been collected for CALM's threatened flora seed centre

Cultivation: *Banksia aculeata* has been grown successfully on well drained soils in Victoria and South Australia. At Banksia Farm in Mount Barker, Kevin Collins has it doing well on deep acid sandy soil as well as gravelly loam over ironstone rock with deeper clay subsoil. The latter location is partly shaded by *Eucalyptus calophylla* & cultivated *Banksia integrifolia* and has flowered and set seed very well. *B. caleyi*, *aculeata* and *lemanniana* all perform well as understory shrubs on his property.

Banksia praemorsa as a bonsai

Recently I attended a bonsai exhibition and saw a 9 year old *Banksia praemorsa* in flower which would have been all of 30cm high. Grown by Margaret Bowden, it is fed 3 times a year with blood and bone, as well as seasol, and potted in a mixture of potting mix, sand and gravel in equal parts.



Issues in *Banksia* (and *Dryandra*) Classification : 3 Interpretations

This is a summary of a talk I gave at the Fred Rogers seminar in 2004. I am presenting it here for all those unlucky enough not to have gone or been able to get the seminar notes.

Banksias have been subject to 3 recent overviews: one by Alex George, one by Kevin Thiele using cladistic morphology and a recent molecular study by Austin Mast.

In 1981, Alex George published his classical taxonomic treatment on the genus *Banksia* in *Nuytsia*, the WA herbarium journal, a culmination of over two decades of work. This also formed the basis for the *Banksia Book*, which remains the standard text on the genus, and the treatment on banksias in *Flora of Australia*, vol. 17B, published in 1999.

Alex described his basic principle regarding distinction on a specific level (i.e. what constitutes a discrete species rather than a variety, form or subspecies) has been to require a **significant and consistent difference in the morphology of flowers and/or fruit**. He added that generally such differences are accompanied by others in habit, seed, flowering time, etc.

Alex added that some taxa – *Banksia marginata* and the *spinulosa* complex in particular required further investigation which may yield new taxa.

In 1996 Kevin Thiele published a cladistic analysis of morphological and anatomical characters to resolve relationships in the genus. Cladistics is a method which systematically groups organisms which share derived characteristics (i.e. those of recent origin), with those sharing many characteristics placed closer together than those which don't. Thus, it is a rigorous way of discovering how features of organisms evolved, and hence how the organisms themselves evolved, so they can be arranged into evolutionary (family) trees. Overall, the classification was similar to George's treatment. Interestingly, he noted the best supported region of the tree to be a clade comprising what Mast would term */Phanerostomata*. Also, some of the morphological data on follicles and cotyledon leaves foreshadowed Mast's work.

Here too, the results of differing methods in classification can be seen:

One such example is *Banksia tricuspis*, initially held by Alex to be in the series *Spicigeræ* on the basis of the similarity of its inflorescences, however Kevin transferred it to *Abietinæ* on the basis of a number of characters – inflorescence insertion, floral development, floral and fruit morphology and entire seedling leaves. In Flora of Australia, Alex agreed that this then precluded its placement in *Spicigeræ* and proposed a series of its own, *Tricuspidæ*.

In 1998 and 2002, Mast published data from sampling of DNA of almost all species of banksia plus a 5 dryandra taxa and came up with a table which differed from previous classifications on several points:

In summary it showed that there were two large groups, which he named */Cryptostomata* ("hidden stomates") and */Phanerostomata* ("visible stomates"). In the former, stomates occur in crypts with constricted entrances, while in the latter they often occur superficially or in shallow, open pits. Note that are not validly published names; Austin reports they are (perhaps temporary) names that he uses to refer to the two clades formed at the basal split of the subtribe Banksiinae. The forward slash is a convention suggested in the late 90's for naming clades. The idea is taken from the convention for naming a folder hierarchy on the internet. For example, if all of the taxa involved are monophyletic (which appears to be the case with minor revisions), an "address" for *B. serrata* might involve */Proteaceae/Grevilleoideae/Banksieae/Banksiinae/Banksia/Cryptostomata/serrata* (and there would be more at the front-end of this to go down to the root of the tree of life). As can be seen, the */Phanerostomata* comprise all eastern taxa of the series *Salicinae* and *Spicigeræ* (i.e. all except *serrata*, *aemula* & *ornata*) with all these being more closely related to one another than other taxa, the western *Spicigeræ*, *Quercinae*, *Grandes* and *Abietinæ* as well as *Banksia dryandroides*. Many taxa in this group have also developed needle-like leaves with revolute margins as an adaptation to dry climates. Mast summarises them as "typically tall shrubs and trees that occupy moister coastal mountains, especially in south-eastern Australia and produce short-lived leaves that are thin soft and less strongly toothed." Again, the main exceptions are *Abietinæ* which have become small shrubs in their invasion of dry, infertile sandplains.

The */Cryptostomata* contains, then, all the rest; that is, all other western taxa, Banksias *serrata*, *aemula* & *ornata* and (so far) the 5 dryandras tested, which nest within this clade. Mast summarises them as "typically short-statured shrubs that occupy dry infertile sandplains, especially in south-western Australia and produce long-lived leaves that are thick, tough, serrate, and bearing deep stomatal crypts reinforced by sclerenchymatous boxes. As well as the molecular evidence several other features distinguish the two groups, the most notable being the cotyledon leaves and follicles. Cotyledon leaves in

/Phanerostomata are narrowly to broadly spatulate with more or less evenly curved sides, while those in the */Cryptostomata* are narrowly to broadly flabellate with relatively straight sides. The follicles are beaked in the */Cryptostomata* and unbeaked in the */Phanerostomata*. Interestingly, Kevin Thiele made these two observations in his published 1996 analysis before Mast's publication!

It is important to note that the dryandras were not studied at all in Kevin Thiele's analysis and only sparingly in Austin Mast's, however the latter author has informed me that he is currently adding exemplars for each series of *Dryandra* to the data sets to test its monophyly. As a final note, Mast has published this year a further study – with genetic material from different areas providing 'strong molecular support for paraphyly of *Banksia* with respect to *Dryandra*'

So where does this leave us? Alternate names for dryandras are likely to be published in the near future, some 22 taxa of which would require new specific names which they share with dryandras (eg. *D. praemorsa*, *D. speciosa* the newly described *prionotes* among others.) See Austin Mast's summary last newsletter for his views. A scientific name shows the relationships of particular plants to others. The fact that they have become de facto common names further complicates changes which may be necessary when combining cladistic data into our Linnaean classification system. Ultimately, whether or not the changes occur, our members of the subtribe Banksiinae will still be the same wonderful plants and my main hope is that all players continue to collaborate and discuss opinions without acrimony as has happened in far too many other areas of botany, palaeontology, psychiatry etc. etc.

Seedling variance from a prostrate *Banksia integrifolia*

I have cultivated a series of seedlings from a single pod of prostrate *Banksia integrifolia*, from a cultivated plant from Dunkeld Victoria. Right from the outset (i.e. cotyledon stage) the habit can be seen, with prostrate forms curling over with the first set of post-cotyledon leaves. The seedlings grew in a proportion of 4, 3, 3, 6. (L to R) 4 being the most prostrate plants. One can hypothesize whether they are genetic throwbacks or from cross pollination from shrubby *integrifolias* growing 30m away in the same garden. The intermediate ones have some prostrate branches and some upright ones and appear more like *Banksia integrifolia* "Austraflora Roller Coaster"....



Seedling Similarities between northern Australian banksias

From differences to similarities now, I visited Ken Culp in Rydalmere, Sydney, who had a young plant each of *Banksia dentata* (left in the photo below) & the obviously more pigmented *B. plagiocarpa* (right) and I was struck by their similar appearance, with leaf margins showing a similarity in margin tooting in terms of outward facing teeth – though the *dentata* were more dentate and *plagiocarpa* more serrate. These plants grow to markedly different adult plants but I thought this was interesting nonetheless. Also, not visible in this photo, the *dentata* was developing a markedly thickened base, previously reported by Jo O’Connell who had grown *dentata* seedlings in California.



Banksia marginata sightseeing in Tasmania

Jim Kitchin reports from Tasmania;

‘About 90 min west of Hobart lies Mt Field National Park. We saw *Banksia marginata*, mostly growing to about 5m, becoming shorter in more exposed areas. The squat variety were quite common around Platypus Tarn. Which was magnificent, especially given the low cloud at the time we visited there. It was quite a wet weekend which spoiled our trip a little but Platypus Tarn will always be etched in our memory.



At Wineglass Bay on the Freycinet Peninsula, the spikes of *Banksia marginata* can reach to 20 cm. To find them from Coles Bay one takes the track up to the top of Mt Amos overlooking Wineglass Bay below to the east, you then proceed down to Wineglass Bay, many banksia can be seen in the area.

The one pictured is on the track from Wineglass Bay to Hazards Beach to the south.



Celia Rosser Prints for sale

Sue Gwyllim reports;

'At APS Victoria's last quarterly meeting we were made aware of a gentleman in South Australia who was selling Celia Rosser prints from the Banksia Book Vol. 2. He has either the full books of Vol 1 and 3 to sell or if there is a demand, he will break them up as he is doing with Vol 2. The prints are roughly between \$80 and \$250 depending on the picture and there should be a full list of what is available shortly. If anyone in the Banksia Study Group is interested they can contact Max Waterman (Ph – (08) 8362 3665)
303 Payneham Road Royston Park SA 5070

Also, because the prints would be flat packed the postage is quite expensive and would be more affordable if a group of people could order together and split the cost.

Correspondence

Brendon Stahl has written asking me to print a request for information on growing Banksias from cuttings. This is something I have been meaning to do for some time as there is a dearth of information specific to banksias in this area. It would be handy to know which banksias have been grown from cuttings, what time of year they were taken and methods used. **So please, anyone who has had luck can you please write in and let us know what worked.**

Lorraine Mathews of Koraleigh (near Swan Hill) has written an update in June 2005;

"We were fortunate enough to get over 40mm of rain in June giving all the plants in the ground a boost and an ideal time for further plantings. The soil here is extremely free draining on the red sandhill while the lowland is heavier grey clay. Although the summers are very hot we do not get the humidity. The winters are cool with a few frosts.

At present we have the following:

Banksia ashbyi (5 years, flowers well)

attenuata – dwarf form (4 years, first flowered last year)

baxteri (5 years, flowering since 3)

blechnifolia (5 years, plenty of flowers)

brownii (4 years, flowered this year)

burdettii (5 years, flowers well)

caleyi (seedling in pot)

coccinea 'Waite Flame' & 'Waite Crimson' (suffer from flower deformities occasionally

(possibly frost)

dryandroides (seedling in pot)

ericifolia (newly planted in the ground)

integrifolia (both established 5m tree and prostrate)

hookeriana (newly planted)

lemanniana (4 years, one flower)

media (5 years, flowering)

menziesii dwarf (4 years, flowered at 3)

occidentalis (4 years, prolific flowers)

praemorsa (5 years, many flowers at 4)

saxicola (5 years, hasn't flowered yet, suffers sunburnt leaves)

sceptrum (5 years, slow to flower)

tricuspis (4 years, hasn't flowered yet)

violacea (seedling in pot)

Waite Orange (*hookeriana* x *prionotes*) (doing well)

John Armstrong of Rye wrote an update on his garden, adding he has *Banksia pulchella*, *nutans*, *lemanniana*, *pilostylis* and *burdettii* flowering, and has just planted *goodii*, *media* 'flat out', *epica*, *lanata*, *laricina* and *scabrella*.

Seed Bank

If you have a large excess of seeds, consider donating some to your local seed bank (or even another state!) as banksias are popular and the Regional seed banks rely on donations. Alternately, why not let me know and I can leave a memo in the next newsletter.

- Nindethana Seeds (08) 9844 3533
 - Banksia Farm (08) 9851 1770 phone/fax
 - Your Region seed bank will usually have a selection of species
- If you are unable to find a particular species, please contact me and I may have some ideas.

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