



Association Of Societies For Growing Australian Plants
Banksia Study Group Newsletter

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Dear all,

The *Banksias* book by Kevin and Kathy Collins, and Alex George, is out, as is a new edition of *Banksias: A field and garden guide* by Ivan Holliday and Geoff Watton. The new taxonomic developments covered in the former are one new subspecies for *Banksia incana* and two for *B. sphaerocarpa*, as well as the new species *B. croajingolensis* which has been covered in Australian Plants. I am fudging a bit in using *Banksia sphaerocarpa* but one of its subspecies, var. *latifolia*, is categorised as Priority Two - Poorly Known, and another, var. *dolichostyla*, is declared Rare but already covered in Issue 13.

Sorry to all about the delay – life has been very hectic for me, having moved house this year, but been involved in packing since mid last year it seems. My interest had waned and frustration had mounted in the last couple of years as I knew I was going to move and so was unable to plant any banksias in my garden. However that has now been remedied...But seriously I should get another newsletter out before June 2010.

Banksia Profile #13: *Banksia sphaerocarpa* – Cas Liber/Kevin Collins

Banksia sphaerocarpa, commonly known as the **Fox Banksia** or **Round-fruit Banksia**, is a species of shrub or tree in the plant genus *Banksia* (family Proteaceae). It is generally encountered as a 1–2 m high shrub, and is usually smaller in the north of its range. This species has narrow green leaves, and brownish, orange or yellow round flower spikes which may be seen from January to July. It is widely distributed to the southwest of Western Australia, growing exclusively in sandy soils. It is usually the dominant plant in scrubland or low woodland. It is pollinated by, and is a food source for, birds, mammals, and insects.

First described in 1810 by botanist Robert Brown, *B. sphaerocarpa* has a complicated taxonomic history, and several taxa once classified as part of a broadly defined *B. sphaerocarpa* have since been named as species in their own right. At present, most authorities recognise five varieties; the largest variety, *B. sphaerocarpa* var. *dolichostyla*, is sometimes given species rank as *B. dolichostyla*. *Banksia sphaerocarpa* is classified as Not Threatened under the Wildlife Conservation Act of Western Australia, although two varieties have gazetted status. *Banksia sphaerocarpa* var. *latifolia* has been declared a Priority Two – Poorly Known taxon, and var. *dolichostyla* has been Declared Rare Flora. None of the varieties are commonly seen in cultivation.

Description: *Banksia sphaerocarpa* is a variable species which displays differences in plant, flower and leaf size across its range. These are marked enough that five varieties are recognised. In general, plants are smaller in the northern parts of the range, and grow larger in the southeast (variety *caesia* and the even larger *dolichostyla* further east). It is generally a shrub 0.4–2 m tall, with variety *dolichostyla* and rarely *caesia* reaching 4 m in height. All subspecies bear a lignotuber, a swollen starchy root crown or trunk base which survives bushfire and resprouts new growth afterwards (as illustrated here with var. *latifolia* resprouting from lignotuber after Easter 2009 fires)



The new stems are finely hairy but become smooth with maturity. The stiff leaves are narrow and linear, measuring 2.5–10 cm in length, and 1–1.5 mm in width with a pointed tip. The leaves of variety *latifolia* are 2–2.5 cm wide and have a blunter tip. The leaves are perched on a petiole 2–3 mm long. The foliage is green, or a more pale blue-grey in the case of *caesia* and *dolichostyla*. The inflorescences are generally globular and measure 5 to 8 cm in diameter, although larger forms (*dolichostyla*) are more oval in shape. Flowering from January to July, the blooms are mostly generally orange or brownish in colour, while those of the eastern subspecies *caesia* and *dolichostyla* are yellow. Kevin Collins reported a roadside population of around 50 plants back in 1985, where pistils of different plants varied from yellow/gold to pink, red, mauve & almost purple. Sadly, this colony is much reduced, with only handful of plants remaining in a site heavily degraded by weeds.

The old flowers fade to brownish and grey hues and remain curled around the flower spike. Up to 60 follicles develop on the globular spikes, known as infructescences. The follicles are finely furred at first before becoming smooth and golden brown in colour, measuring 1.5–

3 cm long, 0.5–0.8 cm high, and 1–2.5 cm wide. The follicles are flat with pronounced 'shoulders', giving a rectangular appearance in cross section. Specimens of var. *sphaerocarpa* in the Whicher Range, Jarrah Forest and the vicinity of Nannup have larger follicles. The seeds are wedge-shaped (cuneate), and measure 2.0–2.6 cm in length, containing a smaller cuneate seed body measuring 1–1.4 cm long by 0.5–1.3 cm wide.



(above – inflorescence of plant from Frankland River region)

Kevin Collins has observed that var. *sphaerocarpa* generally have shiny red new follicles in cultivation, while var. *pumilio* fawn or green new follicles. Var. *caesia* are generally reddish brown and *dolichostyla* has not been fertilised on the Banksia Farm as yet. He is not familiar with the Whicher Range form. The Bridgetown population dispelled a consistent theory with some greenish new follicles and the majority red at the same stage in the same population.

Northern specimens can be quite small shrubs and hard to distinguish at times from *B. micrantha*, although the latter has smaller inflorescences and large flattened follicles

(right – inflorescence of plant from Mt Lindsay, Denmark – possibly ssp *sphaerocarpa*)



Taxonomy: The earliest known botanical collection of *B. sphaerocarpa* occurred in December 1801, during the visit of HMS *Investigator* to King George Sound. The specimen was collected from "A single plant observed between Princess Royal Harbour & Oyster Harbour on a heath", and is credited to English botanist Robert Brown, though it is not possible to be certain on this point, as Brown incorporated the collections of several expedition members into his herbarium without attribution. Neither Brown nor expedition horticulturist Peter Good mentions the collection in his diary.

Brown published a formal description and name for the species in his 1810 *On the Proteaceae of Jussieu*. He did not designate a particular specimen to be representative of the species, that is a type specimen, but the one specimen in his collection has since been formally declared the lectotype (or representative) for the species. He also did not explicitly give a meaning for the specific epithet, but it is accepted that the name derives from the Ancient Greek *sphaera* ("round"), and *carpos* ("fruit"), in reference to the shape of its infructescences.

Meisner published a variety, *B. sphaerocarpa* var. *glabrescens*, based on specimens collected by James Drummond; this is now considered a synonym of *B. incana*.

George Bentham's revision of *Banksia* for his 1870 *Flora Australiensis* recognised two varieties: Meisner's var. *glabrescens* was retained, and the newly described var. *latifolia*. The latter was discarded by Alex George in 1981, but reinstated by him in 2008. Bentham noted further variation amongst his specimens not accounted for by his varieties, stating "It is possible therefore that two species may be here confounded, but the specimens are insufficient for their distinction."

For many years following Bentham's arrangement, the circumscription of *B. sphaerocarpa* was widely recognised as unacceptably broad. William Blackall informally published two varieties, var. *pinifolia* (now known as *B. leptophylla*) and var. *violacea* (properly *Banksia violacea*) in his 1954 *How to Know Western Australian Wildflowers*; and in 1966 the nurseryman Fred Lullfitz predicted that there were as many as eight taxa within the species. Several of these were recognised in George's revision of the genus for 1981 "The genus *Banksia* L.f. (Proteaceae)": *B. micrantha*, *B. grossa*, *B. lanata*, *B. scabrella*, *B. telmatiaea*, *B. leptophylla* and *B. incana*. George placed *B. sphaerocarpa* in subgenus *Banksia* because of its flower spike, section *Oncostylis* because its styles are hooked, and the resurrected series *Abietinae*, which he constrained to contain only round-fruited species. He reduced variety *latifolia* to synonymy with variety *sphaerocarpa*, but conceded the species needed further review. Alex George reported *Banksia sphaerocarpa*'s closest relatives to be *Banksia micrantha* and *B. grossa*.

George's arrangement remained current until 1996, when Kevin Thiele and Pauline Ladiges published an arrangement informed by a cladistic analysis of morphological characteristics. They retained George's subgenera and many of his series, but discarded his sections. *Banksia* ser. *Abietinae* was found to be very nearly monophyletic, and so retained. It further resolved into four subclades, so Thiele and Ladiges split it into four subseries. *Banksia sphaerocarpa* appeared in the second of these, initially called the ' *grossa* clade' for its most basal member. As with George's classification, *Banksia grossa* and *Banksia micrantha* were close relatives.

This clade became the basis for new subseries *Sphaerocarpaceae*, which Thiele defined as containing those species with lignotubers, styles loosely curling around the infructescence (although this trait was reversed in *micrantha*), and "transversely aligned cells of the seed wing

inner face". Those more derived than the first offshoot *grossa* also had shouldered follicles. They announced that the Ironcap banksia (*dolichostyla*) warranted specific status, as cladistic analysis showed *B. micrantha* to be the sister group to the pair of *B. sphaerocarpa* var *sphaerocarpa* and *B. sphaerocarpa* var *caesia*, and noted that the Ironcap banksia, which was a sister taxon to this combined group, had stouter old styles on old cones which did not curl around, while those of the other varieties curled around the infructescence to form a ball.

Questioning the emphasis on cladistics in Thiele and Ladiges' arrangement, George published a slightly modified version of his 1981 arrangement in his 1999 treatment of *Banksia* for the *Flora of Australia* series of monographs. He added that he did not feel the characters of *dolichostyla* alone justified specific rank, and that otherwise the plant was merely larger in all parts to var. *caesia* but essentially similar (and hence kept it classified as a subspecies). He has also added that the old styles do in fact curl around the infructescences, at variance with what Thiele had stated in 1994. Kevin Collins adds that his *dolichostyla* and all he's seen do have curled pistils persistent on the fruiting cones. To date, this remains the most recent comprehensive arrangement.

A 2002 study by American botanists Austin Mast and Tom Givnish yielded a surprise when molecular analysis mapped out *dolichostyla* as a sister taxon to its geographical neighbour *B. violacea* in a larger group together with *B. laricina* and *B. incana*. *Banksia micrantha* and the two remaining *sphaerocarpa* varieties form a related group.

In a 2008 paper, George once again recognised variety *latifolia* as well as naming a new variety *pumilio*.

Varieties

Banksia sphaerocarpa is a widely distributed Western Australian species with four (or five if one includes the taxon *dolichostyla*) varieties. These are:

- *B. sphaerocarpa* var. *caesia*, first described by Alex George in his 1981 revision of the genus, is a larger shrub reaching 2 metres, or occasionally 4, in height. It has yellow blooms and bluish grey foliage and is found in the central and southern Wheatbelt between the towns of Piawaning, Kojonup, Newdegate and Corrigin. (This photo is of an older inflorescence at Bendering Reserve in December 2006)



- *B. sphaerocarpa* var. *dolichostyla*, first described by Alex George in his 1981 revision of the genus, is the largest form, encountered as a large shrub or small tree to 4 m (13 ft) high. It is larger in all parts than the other subspecies, and has been considered a separate species. It has been considered restricted to a small area from South Ironcap, east of Hyden, south to Mt Holland in the eastern Wheatbelt. Kevin Collins adds that when he

and Margaret Pieroni went to Soldiers Road north of Hyden, they found *dolichostyla* to be more prevalent than previously recorded in the Banksia Atlas and could be reclassified in status (restricted, isolated pockets) Huge tracks of bush reserve exist to the east of Soldiers road where there is bound to be more. The plants on Soldiers Rd. were typical, however as they went west of Hyden populations were growing in shallower sands on exposed road verges and were definitely smaller bushes looking more like *caesia*. The flowers were still larger than the latter, with long pistils, leaves shorter and bushes smaller. They appear to grade from one variant to the next. Kevin adds that DNA would certainly assist.

- *B. sphaerocarpa* var. *latifolia* was originally described in a manuscript by Mueller and published by Bentham in 1870. It grows as a small rounded shrub to 50 cm in height restricted to the vicinity of the south coast between Denmark and the Porongorup Range, where it is found in low, open forest of *Eucalyptus marginata* and *E. calophylla*.



(var. *latifolia* right)

- *B. sphaerocarpa* var. *sphaerocarpa* is widely distributed from the Darling Plateau east of Perth to the Whicher Range in the southwest and Stirling Range in the southeast. Populations north of Perth once referable to it are now classified as var. *pumilio*.

- *B. sphaerocarpa* var. *pumilio*, first described by Alex George in 2008, is a small shrub less than a metre high. It is found from Tathra National Park east of Eneabba south to the Chittering valley. Its subspecific name is derived from the Latin *pumilio* "small", relating to the flowers. The leaves are often shorter, more erect and the inflorescences smaller. Further it is often denser and more lignotuberous in habit. To complicate matters, progressive fires cause more branching, so one needs to see the whole plant, surrounding plants and have some idea of fire history.



(var. *pumilio*, in a gravel pit near Cataby)

Undescribed variants

Besides these, there remain distinctive populations near Bridgetown and Whicher Range - in the southwestern limits of the range. These are low growing shrubs with distinctive follicles and leaves. Alex George has added that *Banksia* taxon of *sphaerocarpa* still needs work and there may be still a couple of varieties yet undescribed. Better collections are needed for someone to study.

The populations of *sphaerocarpa* located west of Nannup and north and south of Bridgetown (newly recorded) are quite low growing with shorter foliage than var. *sphaerocarpa*. They grow in exposed heavy lateritic rocky gravel loams over clay. These to add to the confusion appear to be intermediate between *latifolia* and *sphaerocarpa*.

Another population high up on Mount Lindsey at Denmark are finer leaved than typical var. *sphaerocarpa* with smaller flowers and a little like *pumilio*. (*photographed above*)

Distribution and habitat

Banksia sphaerocarpa is distributed widely across southwestern Western Australia— from Eneabba in the north, south to the Whicher Range, Nannup, Albany and Jerramungup, and eastwards to the vicinity of Hyden. It is mainly found on sandy soils over laterite in flat or gently sloped areas in shrubland, mallee or open woodland.

Conservation

Overall, *Banksia sphaerocarpa* is classified as Not Threatened under the Wildlife Conservation Act of Western Australia. Of the five subspecies, two have gazetted status in Western Australia. *Banksia sphaerocarpa* var. *latifolia* has been declared a Priority Two – Poorly Known taxon. That is, it 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. *Banksia sphaerocarpa* var. *dolichostyla* has been declared Rare flora by the Western Australian state government; its status is deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State’s Endangered Flora Consultative Committee.

Ecology

Various animals, including mammals, birds, and insects such as bees, wasps, ants and beetles, have been recorded visiting *Banksia sphaerocarpa* inflorescences, including the colletid bee species *Hylaeus sanguinipictus*. Botanist Stephen Hopper found pollen of *B. sphaerocarpa* on New Holland Honeyeaters (*Phylidonyris novaehollandiae*) and Honey Possums (*Tarsipes rostratus*) at Cheyne Beach in a field study published in 1980.

Banksia sphaerocarpa is one of five closely related *Banksia* species that have highly unusual flower nectar. Whereas other *Banksia* species produce nectar that is clear and watery, the nectar of these species is pale yellow initially, but gradually becomes darker and thicker, changing to a thick, olive-green mucilage within one to two days of secretion, and eventually becoming "an almost black, gelatinous lump adhering to the base of the flowers". It was first

noted by Byron Lamont in 1980; he attributed it to cyanobacteria that feed off the nectar sugars. Noting that many of these cyanobacteria had heterocysts, he speculated that they aid the plant by fixing atmospheric nitrogen, which is then washed off the flower heads by rain, and absorbed by the proteoid root mat. This purported symbiosis was investigated by Barrett and Lamont in 1985, but no evidence of nitrogen fixing was found. Further investigation by Markey and Lamont in 1996 suggested that the discolouration is not caused by cyanobacteria or other microorganisms in the nectar, but is rather "a chemical phenomenon of plant origin". Their analyses indicated that the nectar had unusually high levels of sugar and free amino acids, but three of these species, including *B. sphaerocarpa*, have since been shown to have normal nectar sugar compositions.

Cultivation

Like most Western Australian banksia species, *B. sphaerocarpa* has been shown to be highly sensitive to dieback from *Phytophthora cinnamomi*. None of the subspecies are commonly seen in cultivation, and are difficult to grow in the wetter conditions of Australia's east coast. Trials with grafting have been very limited and results have been poor. Otherwise, they adapt well to gardens with good drainage, sandy soils and sunny aspects in drier and Mediterranean (winter moisture) climates, and are also frost tolerant. They are good bird-attracting plants, and flower when not much else is in flower. Seeds do not require any treatment, and take 20 to 48 days to germinate.

***Banksia seminuda* at Point Nuyts**

Kevin Collins writes,

We recently trekked to Point Nuyts east of Walpole where we observed large tracks of *B. ilicifolia* in sandy hollows approx. 3 kilometres inland from the coast. These were approx. 5-8m tall and up to 0.4m in trunk diameter. When we arrived at the rugged granite coastline we came across patches of *B. seminuda* that were growing in sandy granite rock areas just 20m from the shoreline. These had evolved with wind to be low 2m X 6m shrubs with smaller flowers. These are undoubtedly the form described by R. Hopper as *seminuda* var. *remanens*.

More unusual than the height difference to normal *seminuda* is the fact that they are in granite and coastal sand and nearby granite peaks growing together with *B. verticillata* in very shallow sand in cracks in the granite rock. The plants here are intermediate in size to those at the windy beach front and the inland rivers form. This is the only place I believe that *seminuda* and *verticillata* co-exist. *Seminuda* typically hugs river banks and extends into inlets as seeds have probably been washed down river courses.

The plants at Point Nuyts are certainly an outlier in non typical soil type and not on river courses. The trees also have a different



{*seminuda* as small tree (above)}

bark, smaller flowers and shorter leaves than the river form.

Whether var. *remanens* is restored as there appears good reason for the variation status or the form is just described as "low coastal - granite growing" is open for debate.

For anyone wanting to grow this majestic gold flowered species which flowers

April/May/June, the low form would be

ideal. It would make a great tub plant as well. Normal larger tree forms grow approximately 12 km north on the banks of a river, and have typically larger leaves and flowers.

To the west of Nuyts, *Banksia seminuda* grows right to the mouth of the Shannon River. This river runs into a land locked inland "Brookes or Broke Inlet" protected from the winds by coastal dunes. Here, they tend to maintain tree status.

(seminuda as low shrub(below), closeup of blooms (right))





(above) Kevin Collins among fire-killed *verticillata*, with new *verticillata* seedlings growing)

Snippet – young *integrifolia* follicle colour

Kevin Collins writes:

Variants of *integrifolia* appear to be consistent in new follicle coloration. *Monticola* always red. Var. *integrifolia* lime green to fawnish green. Var. *compar.* greenish silver brown.

How does this compare with other folks' observations?

Purple-foliaged *Banksia robur* seedlings

Kevin Collins writes,

When working on the *Banksia* book we had a look at and included the unusual reddish foliage *B. robur* plants growing at the Australian National Botanic Gardens in Canberra. Several red-foliaged plants with darkly pigmented inflorescences grow among stands of more green-foliaged forms. Gardens records indicate these plants are likely derived from material in Maroochydore on the Queensland Sunshine Coast.

I was given a fruiting cone from one of the red leafed plants which are growing side by side the normal green leafed plants in their garden.

I subsequently have grown the seeds and the results are interesting. (See right). The four seedlings on the left grading from red, to purplish, to green with purplish red new foliage, and totally green leafed came from the same cone. The seedling on the far right is from another batch of standard green leafed plants. It is fascinating that the colour has reproduced true to parent type from some of the seeds. Maybe other flowers on this cone were pollinated from the nearby green leafed plant....hence half and half coloration.

It would appear that should an orchard be established with just the very red foliated form that the progeny would most likely grow true to type as do the wind dwarfed coastal forms of so many species.



(below – seed-grown progeny in situ, in Cas Liber’s garden)



Banksia rosserae flowering in cultivation

Another item worthy of inclusion is that our *B. rosserae* plant, that budded up last season and had the flowers abort before opening, has twelve buds this year and the flowers are continuing to grow fully and open. It will be interesting to see if it is self pollinating as the bees have been active in it.



Old Banksia Study Group Newsletters

The first eight newsletters from my time as leader of the group are available at <http://anpsa.org.au/banksSG/index.html> on the internet, on the national website of the 'Society. Newsletters from the year just completed will go up there regularly.

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.