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Banksia Study Group
Newsletter

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From the Editor – Cas Liber

This issue we focus on both species of the New South Wales endemic *Banksia paludosa*. Again I apologise for the (lengthy) delay. Thanks to Rhonda Daniels for layout (why this issue looks better) and thanks for holding in there everyone, and please write to me about your observations of banksias.

Banksia Profile 15: *Banksia paludosa* – Cas Liber*

*Compiled from various sources including *Flora of Australia*

Description: *Banksia paludosa* is comprised of two subspecies that have similar if not identical foliage and flower spikes, but different habits and responses to bushfire. *Banksia paludosa* subspecies *paludosa* is most commonly encountered as a spreading multistemmed lignotuberous shrub generally under 1.5 m high, or rarely 2 m. In heathland habitats such as Nadgee or Barren Grounds Nature Reserves, it may not exceed 1 m in height. At an exposed area such as Green Cape on the far south coast of NSW, it is reduced further to a 30 cm prostrate shrub. At the other extreme, old plants in cultivation can exceed 2 m, and one very old specimen next to Leura Oval in the Blue Mountains was around 3 m high with a 70 cm base. This plant is senescent and its branches have been breaking and falling. *Banksia paludosa* subspecies *astrolux* is a more open non-lignotuberous shrub which reaches 5 m high.

The bark and foliage is smooth, although the new growth is covered in fine hair. The stems are generally less than 2 cm (0.8 in) in diameter, and may be red or yellow when young. The leaves are alternate or whorled along the stems, and lanceolate to obovate in shape. They measure 4–13 cm long and 1–3 cm wide. The leaf margins are entire or have occasional serrations, particularly distally. The leaf undersurface is white, with a midrib. Flowering occurs over autumn and winter (April to July) and the inflorescences arise from stems that are three or more years old. They are 3.2–4 cm wide and 7–13 cm

high. The individual flowers are more openly spaced than those of other banksias, and this is especially evident in late bud. This, coupled with the tall thin shape of the flower spike, is a key distinguishing feature. The flower spikes are pale to golden brown in bud, and open to a more gold colour after anthesis. Variations are seen: forms with a slate-grey limb in bud (opening to pale yellow) are seen at Mt Victoria, Leura and Colo Vale, and plants with particularly tall flower spikes have been recorded near Huskisson at Jervis Bay. Subspecies *astrolux* has more brownish-hued buds, sometimes with a pink tinge.



Banksia paludosa subsp. *astrolux* at Hilltop, NSW

As with most banksias, anthesis is acropetal; the opening of the individual buds proceeds up the flower spike from the base to the top. The process from bud to the finishing of flowering takes six to eight weeks. As they age, the flower spikes fade to grey, with the old flowers remaining for years. Up to 60 woody follicles develop on each spike. Narrow and elliptic, they measure 0.9–1.8 cm long, 0.1–0.5 cm high, and 0.3–0.7 cm wide. Some follicles open spontaneously, but most remain closed until burnt by bushfire. Each follicle contains one or two fertile seeds, between which lies a woody dark brown separator of similar shape to the seeds. Measuring 1.3–1.8 cm in length, the seed is obovate, and composed of a dark brown 0.8–1.3 cm wide membranous “wing” and falcate seed proper which measures 0.8–0.9 cm long by 0.3–0.4 cm wide. The seed surface can be smooth or covered in tiny ridges, and often glistens. The resulting seedling first grows two asymmetrical obovate cotyledon leaves measuring 0.9 cm long by 0.7 cm wide, which may remain for several months as several more leaves appear. The first pairs of leaves are oppositely arranged on the stem, have 3–4 “teeth” on their margins, and are narrowly obovate in shape. They are around 1.2–1.4 cm, and each following pair of leaves is slightly larger.

The cotyledons of *Banksia paludosa*, *B. marginata* and *B. integrifolia* are very similar in appearance. The foliage of larger shrubs of both *Banksia paludosa* subspecies resemble those of *Banksia conferta* subsp. *penicillata*, but the latter has a wider inflorescence, and the buds are more crowded in appearance on the inflorescence before anthesis. *Banksia paludosa* also bears a superficial resemblance to *B. oblongifolia*, but the latter has a prominent midrib on the leaf underside, the new growth is covered in rusty fur, and the old spikes are bare of flowers. The latter grows on dryer rocky soils while the former is on wetter sandy soils.



Banksia paludosa with gold spikes at Colo Vale, NSW

Taxonomy: *Banksia paludosa* was first described by Robert Brown in his 1810 *On the Proteaceae of Jussieu*, and given its current name. In 1870, George Bentham demoted it to a variety of *B. integrifolia*, but in 1981 Alex George restored it to species rank. Its specific epithet is derived from the Latin noun *palus* “marsh”, but is somewhat misleading, as it more often grows on sandstone ridges and heathland. Its common names, marsh banksia and swamp banksia, echo its scientific name. Subspecies *astrolux* was described in 1996 by Alex George.

Genetic sampling at subspecies level has not been undertaken to date. This could prove interesting, not only to clarify the relationship of subspecies *astrolux* to the other populations but also to examine *Banksia (conferta) penicillata* which grows in similar sandstone habitat not far to the north on the Newnes Plateau. Although closely resembling *Banksia conferta*, the latter grows exclusively on volcanic soils. *Penicillata* and *astrolux* have some similarities in foliage and habitat.

A further query is hybridisation with *integrifolia* with swathes of plants with properties intermediate between the two taxa growing in Booderee National Park in the Jervis Bay region. These are rangy erect shrubs growing alongside *integrifolia*, notable for persistent floral parts on old flower spikes and a darker leaf with more prominent venation underneath. Hybrid forms with a lower habit have also been reported on the NSW far south coast.

Distribution and habitat: Both subspecies of *Banksia paludosa* are endemic to NSW. The nominate subspecies *paludosa* is found from Glen Davis through to the Sydney region and then south to Ulladulla on the south coast, with a separate population in the vicinity of Eden just north of the Victorian border. It occurs inland as far as Taralga on the Southern Tablelands. It was collected in 1966 from Hat Head on the Mid North Coast by Lawrie Johnson, but has not been found there since despite field work in the area. This record aside, the northernmost historical coastal record is from what is now Centennial Park and La Perouse in Sydney’s eastern suburbs, where it is now locally vanished. Subspecies *astrolux* is restricted to Nattai National Park in the Southern Highlands. Plants from Colo Vale, a few km to the south, are completely typical of subspecies *paludosa*, with no especial similarity to the *astrolux* subspecies.

Furthermore the northwestern occurrences at Leura and Mt Victoria (Blue Mountains) and Colo Vale (Southern Highlands) are all scattered with no records between them. The late Bill Cane had proposed that *Banksia paludosa* might extend into Victoria, and a search by Bill Molyneux led to the discovery of *Banksia croajingolensis*.

Both subspecies grow in nutrient-poor well-drained sandstone soils, in open woodland such as *Eucalyptus piperita*, *E. sieberi*, *E. punctata*, *E. sparsifolia*, *Corymbia gummifera* and *Angophora costata*, and in heathland with species such as *Banksia oblongifolia*, *Epacris microphylla*, and *Hakea teretifolia*.

Ecology: Subspecies *paludosa* is a slow-growing shrub which regenerates from bushfire by resprouting from its lignotuber. After fire, plants take around three years to flower significantly, but are flowering well by five years afterwards. Flowerhead numbers dwindle by 14 years post bushfire. Plants are estimated to live to around 60 years of age. Seedlings also appear from seed dispersed after bushfire.



Large lignotuberous base (~70 cm diameter) of *Banksia paludosa* at Leura, NSW

The flower spikes of *Banksia paludosa* are unable to self-pollinate and require pollinators to set seed. Nonflying mammals are important pollinators in heathland habitat, with the Brown Antechinus (*Antechinus stuartii*) a frequent visitor to flower spikes. The Sugar Glider (*Petaurus breviceps*) is another mammal pollinator. Bird species that have been observed foraging and feeding at the flowers include the Red Wattlebird (*Anthochaera carunculata*), Yellow-faced Honeyeater (*Lichenostomus chrysops*), White-eared Honeyeater (*L. leucotis*), Crescent Honeyeater (*Phylidonyris pyrrhoptera*), New Holland Honeyeater (*P. novaehollandiae*), and Eastern Spinebill (*Acanthorhynchus tenuirostris*). Insects recorded visiting flower spikes include the European Honey Bee and ants.

Cultivation: *Banksia paludosa* was first introduced into cultivation in England in 1805. The species was grown at Kew, Cambridge Botanic Gardens, Woburn Abbey, Loddiges nursery in Hackney, John Miller's nursery in Bristol and George Hibbert's garden at Clapham Common. It was also grown in the Villa San Donato in Italy, in the collection of Anatoly Nikolaievich Demidov, 1st Prince of San Donato.

Banksia paludosa is fairly regularly sold in Australian nurseries – not as often as other eastern species, which is a shame as it is a reliable garden plant which does not grow to tree proportions. It does best with a sunny aspect and good drainage, in soils with a pH from 5.5 to 7.5. Slow growing, it flowers in 6 to 10 years from seed. It can be propagated by seed, which take around two weeks to germinate, or cutting. Low growing coastal (dwarf) forms which grow to 60 cm (2 ft) are also commercially available, and should be propagated by cutting to preserve features. Noting the flower spikes to be “rather dull”, plant author John Wrigley has described the species as “not a spectacular garden plant”, although its foliage has been described as “attractive”.

A form from Jervis Bay with large orange flower spikes was deemed by amateur botanist and banksia enthusiast Alf Salkin to have horticultural potential. This would appear an ideal place to investigate for further interesting forms to bring into cultivation.

***Banksia* ‘Lemon Glow’: a plant rarely seen – Tony Cavanagh**

Banksia ‘Lemon Glow’ was registered by the Victorian banksia enthusiast Alf Salkin on 5 October 1982. It was selected from a small population of *Banksia spinulosa* var. *cunninghamii* growing on French Island in Victoria’s Western Port. What was so different about this population was that the flower spikes were a deep golden yellow, rather than the usual form which has black or deep red styles. I also believe that the spikes are somewhat longer than those found on the other forms; certainly, they are around 30 cm on my plant which is having its first flowering (June/July) after one of our best rainfalls for many years.

My plant is less than three years old and was grown from cuttings. It is about 1.5 by 1 m, a neat, compact shrub so far although I believe that some forms can reach 6 m in the wild. Holliday and Watton, in *Banksias: A Field and Garden Guide*, suggest that ‘Lemon Glow’ grows to 2-3 m by 2 m which would make it a good garden plant. The typical *B. spinulosa* foliage is bright green and so far, the flowering spikes are well displayed. I often think when I look at many of our eastern banksias that we very much tend to under rate them as compared with their western cousins. Sure, many of the western ones are spectacular and colourful but they are often a challenge to keep alive over here in the east. In general, this is much less of a problem with the eastern species. I have been very impressed with ‘Lemon Glow’ and highly recommend it – if you can find a plant! It may sometimes be available as *B. spinulosa* French Island form or similar but I would be interested in learning if anyone else is growing it or where it can be obtained from nurseries.



One final puzzle. In botanical descriptions, one of the distinguishing features of this plant is “flat leaves with serrate to entire margins, the lower surface evenly tomentose and pale brown”. Close examination of leaves from my plant show that while they are (very) faintly tomentose, the colour is a silvery white. Given that var. *cunninghamii* grows from the Lamington Plateau in Queensland, through much of eastern NSW and through southern Victoria to Wilson’s Promontory, is it possible (even likely) that there is some variation between the different populations? Someone may like to comment on this.

Cas Liber replies:

The disparate taxa of *Banksia cunninghamii* need further investigation. Alf Salkin reported he could distinguish the cotyledons of NSW and Victorian populations, which I think is quite significant given their usefulness in keying out taxa and possible signifying of quite divergent status. Lamington Plateau populations are not classified as *cunninghamii*. I also picked up one of these marketed as ‘French Island Gold’ and have it growing happily away in my garden.

Banksia diversity at Victoria Falls Road, Mt Victoria – Cas Liber

During April I briefly explored the surrounds of Victoria Falls east of Mt Victoria in the Upper Blue Mountains. Here, there is some interesting habitat and great banksias to see. It is accessed via Victoria Falls Road, which runs north off the Great Western Highway around 300 m east of the town. The dirt road is a bit bumpy the first 10 m or so but then fine for a 2WD. It runs about 5 km long. About halfway in, one emerges into low exposed heathland, with shrubs ranging from around 40 cm to 1 m high. This whole area has had a hazard reduction burn some four years previously. Here, *Banksia spinulosa* is growing – lowish spreading forms but with some quite sizeable spikes up to 15 cm or so high, with one yellow-styled plant seen, others having darker styles.

A little further along, the landscape slopes and descends a little with some open eucalypt woodland, and *Banksia paludosa* and *B. cunninghamii* appear. The *cunninghamii* have very prominent black styles (much more so than the *spinulosa*) and wider more grey-green leaves than the *spinulosa*. This is an area where the two taxa are growing metres apart. I saw no intergrades (though didn’t conduct an exhaustive search). This also marks the northwesternmost occurrence of *paludosa*. The form is a typical low-growing (and quite slow comparing the regrowth with other taxa over four years!) many-branched lignotuberous shrub. These have silver-grey or slightly bluish-tipped spikes in late bud opening to a pale yellow spike. The nearest herbarium records from this point are Colo Vale south and Leura to the east.



Banksia paludosa at Victoria Falls showing new growth



and spikes with silver-grey perianths in bud

Grafted banksias in Peter Olde's garden – Cas Liber

Along with many other native plant enthusiasts, I visited Peter Olde's garden "Silky Oaks" in Oakdale southwest of Sydney on a weekend in April 2012 for the plant sale. It was great to see various grafted banksias thriving in garden beds. These included *Banksia grandis* (around 3 m high and flowering), *B. solandri* (lush foliage and plenty of buds), *B. media* (3 years old and flowering well), *B. brownii* and *B. prolata* (= *Dryandra longifolia*).



Banksia prolata in Olde garden



Banksia solandri in Olde garden

Grafted banksias in Don Burke's garden – Cas Liber

I visited Don's garden in April 2013. His large garden in northern Sydney is on gentle slopes – sandstone-based with good drainage and ample use of crushed sandstone as a growing medium. Most notable were around 12 or so *Banksia media* grafted onto *integrifolia* – almost all flowering and looking healthy.

There was a dead specimen of *Banksia baxteri* that was around 2.5 m tall and had flowered, so must have persisted for a few years at least, as well as a *Banksia sceptrum* that looks like it had perished over one summer while in flower. Most unusual was a *Banksia grandis* on *integrifolia*, which had become overgrown with rainforest plants and presumed lost, when it grew upwards and emerged out of the canopy. The upright trunk was around 9 m tall, with branches and flower spikes emerging from the top surrounding trees. Interestingly, it flowers through the year. It was in late bud in April and is usually a summer-flowering plant back in Western Australia.



Grafted *Banksia media* in Burke garden



Grafted *Banksia media* base in Burke garden

***Banksia croajingolensis* anthesis: the mystery deepens – Kevin Collins**

Plants grown from seed collected in 2009 have grown to flowering with some flowering in 2012 and the remainder this year in 2013. Three distinctive plants were observed and collected at the Shipwreck Creek site in Croajingolong National Park in eastern Victoria in late 2009:

1. Standard *croajingolensis* as described.
2. A 2 m upright branching shrub form (maybe a hybrid with *integrifolia*). It has mauvish new foliage.
3. A smaller leaf dwarfing form (possibly a cross with *marginata*).

All of these forms have grown true to type and have flowered. The 2 m form has produced heavily fertilised distinctive cones with tiny follicles containing very small seeds compared to standard *croajingolensis*. *Croajingolensis* has some cones but are not yet mature. The dwarfing *marginata* like form has not produced seed as yet.

Unfortunately all are acropetalous in flower opening sequence. This is a mystery and I have spoken to Bill Molyneux about it. It would appear his early assessment of the site and the plants there is that they appear to be hybrid swarms. Indeed the original basipetalous parentage may be extinct (?) A grafted specimen on *integrifolia* grown by Phil Trickett of Morton NSW is flowering profusely and is basipetalous. Further on-site investigation needs to be done in flowering season with all forms and individual plants inspected for the flowering sequence. I intend when seeds are available to test a larger sample from seeds to see if **some** do grow and **open** basipetalously.

Bill said he had had reports of *B. marginata* flowering both acropetalous and basipetalous on the same shrub. I promptly inspected various plants of *marginata* in my arboretum to find some forms are totally basipetalous. Others are totally acropetalous whilst another indeed had a mixture on the same shrub. Some individual inflorescences, as I also observed on one of my typical *croajingolensis*, appeared to extend pistils equally over the whole inflorescence and open fully at the same time. This aspect of flowering sequence certainly needs more study. Maybe DNA could be utilised to see if they are indeed new species in the case of *marginata* or whether it is a step in an evolutionary process.

Notes on coastal dwarf *Banksia serrata* on excursions to Green Cape 2009 and Ulladulla headland and Beecroft peninsula 2013 – Kevin Collins

The amazing variable forms of *Banksia serrata* collected at Green Cape on the far south coast of NSW, all growing side by side, have grown **true to type** from seed. Collections were made from very prostrate 0.2 m, cascading clumping 0.8 m, open upright sparse branched 1.5 m, bushy 3 m and semi-prostrate with very small leaves 1.6 m. The flower colour was also variable with ginger/grey, mauve/grey and standard silver/opening pale yellow. My plants have yet to flower to see if the colour variants are retained.

My theory on the Green Cape plants is that they have evolved from cross-pollination over many years from plants of varying sizes grading taller the further inland. Fire has killed the original plants on several occasions and the progeny are hugely varied. Possibly climate change has come into play with more moderate wind events enabling the establishment and survival of the varied forms alongside one another.

Banksia paludosa has similarly evolved to have different forms growing side by side. In fact a tall shrub form there, 2.5 m x 4 m, is non-lignotuberous like subsp. *astrolux*, but unlike *astrolux* sheds dried florets. Phil Trickett has a superb specimen of this form growing at Morton NSW which he utilises for grafting.

My recent visit to Ulladulla headland and Beecroft peninsula on the south coast of NSW showed a more typical size progression of *B. serrata* becoming smaller and smaller closer to the cliff tops/beach front. The smallest plants are typically 1.5 m x 4 m retaining an upright habit. A few plants of *B. ericifolia* in the same area are extremely windswept low growing approx 0.2 m x 3 m. What was markedly different at these locations with *B. serrata* was the inflorescence colour and leaf colour. Some bushes had rich yellow inflorescences not unlike a yellow flowered *B. menziesii*. Others had some ginger pistils and a few yellow pistils with grey/mauve presenters. The majority of plants had a lovely silver/bluish foliage with a few with green leaves. The plants at Green Cape are predominantly green leafed.



Banksia serrata from Ulladulla coastal cliffs



Banksia serrata from Beecroft peninsula

The *B. serrata* trees at Burnie, Tasmania, also visited in 2013, have predominantly silver/bluish foliage with a few green leafed plants. Inflorescence colour in Tasmania is typical pale yellow pistils with grey presenters.



Trunk of *Banksia serrata*, Tasmania

Banksia Farm snippets – Kevin Collins

Two garden and one potted plant of *Banksia rosserae* flowered well again this year. One garden plant has produced seeds despite the plant only being 1.2 m tall and 0.5 m wide. A potted 10 year old plant of *Banksia elegans* that has flowered in the pot appeared to die after a nursery watering shift failed. The majority of other species on the bench did die. The plant was not discarded and some six weeks later has produced new shoots from the leafless branches. It is obviously a survivor! Phil Trickett from Morton, NSW, is currently trialling cutting grafts of *B. elegans*, I sent him, onto non-lignotuberous *B. paludosa*.

Cas Liber replies:

I think these are *B. paludosa* x *integrifolia* hybrids and have asked Phil to note the offspring/seedlings to see if any return to the form of either possible parent. If the seedlings are homogeneous, however, it reduces the likelihood of it being a simple hybrid swarm.

Seed production of *Banksia elegans* in the wild – Kevin Collins

Recently speaking to Kings Park Botanic Gardens seed collector, Luke Sweedman, I learnt he had found good seeds on *B. elegans* recently near Lake Inoon, north of Perth in Western Australia. I asked him if this was a recently burnt area (past 2-3 years) and he said it was. This aligns with my theory that 20 years ago when I found *elegans* seed it was likewise in the Lake Inoon area two years after a fire then on another occasion on Beekeepers Road post fire. Luke and myself had searched some 1000 plants on another occasion on Mount Adams Rd where an aqua flowered form was reported to grow, only to find two cones that ended up having nonviable seeds. This was an old unburnt area.

It appears that as *B. elegans* resprouts from a lignotuber, sometimes epicormic buds and occasionally from roots, it must produce more nectar in the first or second year after a fire as a result of the mineralised ash bed and produce cones. Subsequent flowers are rarely pollinated. Further as the seed cones are very heavily insect predated the fires possibly wipe out the insects which take a year or two to multiply and re-infest the area.

Note: Photos are provided by the author of the article, unless noted.