

= Banksia ericifolia =

Banksia ericifolia, the heath @-@ leaved banksia (also known as the lantern banksia or heath banksia), is a species of woody shrub of the Proteaceae family native to Australia . It grows in two separate regions of Central and Northern New South Wales east of the Great Dividing Range . Well known for its orange or red autumn inflorescences , which contrast with its green fine @-@ leaved heath @-@ like foliage , it is a medium to large shrub that can reach 6 m (20 ft) high and wide , though is usually half that size . In exposed heathlands and coastal areas it is more often 1 ? 2 m (3 @. @ 3 ? 6 @. @ 6 ft) .

Banksia ericifolia was one of the original *Banksia* species collected by Joseph Banks around Botany Bay in 1770 and was named by Carl Linnaeus the Younger , son of Carolus Linnaeus , in 1782 . A distinctive plant , it has split into two subspecies : *Banksia ericifolia* subspecies *ericifolia* of the Sydney region and *Banksia ericifolia* subspecies *macrantha* of the New South Wales Far North Coast which was recognized in 1996 .

Banksia ericifolia has been widely grown in Australian gardens on the east coast for many years , and is used to a limited extent in the cut flower industry . Compact dwarf cultivars such as *Banksia* ' Little Eric ' have become more popular in recent years with the trend toward smaller gardens .

= = Description = =

Banksia ericifolia grows as a large shrub up to 6 metres (20 feet) in height , though often smaller , around 1 ? 2 metres (3 @. @ 3 ? 6 @. @ 6 ft) , in exposed places such as coastal or mountain heathlands . The grey @-@ coloured bark is smooth and fairly thin with lenticels ; however it can thicken significantly with age . The linear dark green leaves are small and narrow , 9 ? 20 mm (1 ? 4 ? 3 ? 4 in) long and up to 1 mm wide , generally with two small teeth at the tips . The leaves are crowded and alternately arranged on the branches . New growth generally occurs in summer and is an attractive lime green colour .

Flowering is in autumn , or in winter in cooler areas ; the inflorescences are flower spikes 7 ? 22 cm (2 @. @ 8 ? 8 @. @ 7 in) high and 5 cm (2 @. @ 0 in) broad or so . Each individual flower consists of a tubular perianth made up of four fused tepals , and one long wiry style . Characteristic of the taxonomic section in which it is placed , the styles are hooked rather than straight . The styles ' ends are initially trapped inside the upper perianth parts , but break free at anthesis , when the flowers open . The spikes are red or gold in overall colour , with styles golden , orange , orange @-@ red or burgundy . Some unusual forms have striking red styles on a whitish perianth . Very occasionally , forms with all yellow inflorescences are seen . Though not terminal , the flower spikes are fairly prominently displayed emerging from the foliage ; they arise from two- to three @-@ year @-@ old nodes .

Old flower spikes fade to brown and then grey with age ; old flower parts soon fall , revealing numerous small dark grey to dull black finely furred follicles . Oblong in shape and 15 ? 20 mm (9 ? 16 ? 13 ? 16 in) in diameter , the follicles are ridged on each valve and remain closed until burnt by fire . *Banksia ericifolia* responds to fire by seeding , the parent plant being killed . As plants take several years to flower in the wild , it is very sensitive to too @-@ frequent burns and has been eliminated in some areas where these occur . With time and the production of more cones with seed @-@ containing follicles , however , plants can store up to 16 @, @ 500 seeds at eight years of age . Some plants produce multiple flower spikes , possibly of varying sizes , from a single point of origin .

= = Taxonomy = =

B. ericifolia was first collected at Botany Bay on 29 April 1770 , by Sir Joseph Banks and Dr Daniel Solander , naturalists on the Endeavour during Lieutenant (later Captain) James Cook 's first voyage to the Pacific Ocean . However , the species was not published until April 1782 , when Carolus Linnaeus the Younger described the first four *Banksia* species in his *Supplementum*

Plantarum . Linnaeus distinguished the species by their leaf shapes and named them accordingly . Thus the species with leaves reminiscent of heather (at the time classified in the genus *Erica*) was given the specific name *ericaefolia* , from the Latin *erica* , meaning " heather " , and *folium* , meaning " leaf " . This spelling was later adjusted to " *ericifolia* " ; thus the full name for the species is *Banksia ericifolia* L.f. , with the initials L.f. identifying Carolus Linnaeus the Younger .

While many *Banksia* species have undergone much taxonomic change since publication , the distinctive *B. ericifolia* has remained largely unchanged as a species concept . Consequently , the species has no taxonomic synonyms ; it does , however , have three nomenclatural synonyms . The first synonym , *Banksia phyllaefolia* Salisb , was published by the English botanist Richard Anthony Salisbury in his 1796 *Prodromus stirpium in horto ad Chapel Allerton vigentium* . It was intended as a replacement name for *B. ericaefolia* , but Salisbury gave no reason why such a replacement was necessary . The name was therefore superfluous , and hence illegitimate . The second synonym arose from Otto Kuntze 's 1891 challenge of the name *Banksia* L.f. , on the grounds that *Banksia* J.R.Forst & G. Forst had been published before it , for the genus now known as *Pimelea* . Kuntze transferred all *Banksia* species to the new genus name *Sirmuelleria* , in the process publishing *Sirmuelleria ericifolia* (L.f.) Kuntze . The challenge failed , however ; indeed , his entire treatise was widely rejected . Finally , in 1905 James Britten mounted a similar challenge , proposing to transfer all *Banksia* species into *Isostylis* ; *B. ericifolia* L.f. thus becoming *Isostylis ericifolia* L.f. (Britten) . This challenge also failed .

A recent change to the species ' taxonomy is the recognition , in 1981 , of an infraspecific taxon . The existence of different forms of *B. ericifolia* was first recognised in 1979 by the amateur botanist Alf Salkin , who noted three distinct forms of the species , with one being a possible hybrid with *Banksia spinulosa* var. *cunninghamii* . Salkin gave his northern form the provisional infraspecific name " *microphylla* " , but when Alex George published a formal description in his 1981 *The genus Banksia* L.f. (*Proteaceae*) , he named it *B. ericifolia* var. *macrantha* . In 1996 , it was promoted to subspecific rank as *B. ericifolia* subsp. *macrantha* .

= = = Placement within *Banksia* = = =

Banksia ericifolia has traditionally been described as lying within series *Spicigerae* of *Banksia* , together with *Banksia spinulosa* and various western Hairpin @-@ like *Banksias* such as *B. seminuda* and *B. brownii* . This series is placed in *Banksia* sect . *Oncostylis* according to Alex George 's taxonomy of *Banksia* , but directly into *Banksia* subg . *Banksia* in Thiele 's arrangement based on cladistic analysis . Kevin Thiele additionally placed it in a subseries *Ericifoliae* , but this was not supported by George .

Under George 's taxonomic arrangement of *Banksia* , *B. ericifolia* 's placement may be summarised as follows :

Genus *Banksia*

Subgenus *Banksia*

Section *Banksia*

Section *Coccinea*

Section *Oncostylis*

Series *Spicigerae*

B. spinulosa - *B. ericifolia* - *B. verticillata* - *B. seminuda* - *B. littoralis* - *B. occidentalis* - *B. brownii*

Series *Tricuspidae*

Series *Dryandroidae*

Series *Abietinae*

Subgenus *Isostylis*

Molecular research by American botanist Austin Mast suggests that *B. spinulosa* and *B. ericifolia* may be more closely related to *Banksia* ser . *Salicinae* , with includes *Banksia integrifolia* and its relatives .

In 2005 , Mast , Eric Jones and Shawn Havery published the results of their cladistic analyses of DNA sequence data for *Banksia* . They inferred a phylogeny markedly different from the accepted

taxonomic arrangement , including finding *Banksia* to be paraphyletic with respect to *Dryandra* . A full new taxonomic arrangement was not published at the time , but early in 2007 Mast and Australian botanist Kevin Thiele initiated a rearrangement by transferring *Dryandra* to *Banksia* , and publishing *B. subg . Spathulatae* for the species having spoon @-@ shaped cotyledons ; in this way they also redefined the autonym *B. subg . Banksia* . They foreshadowed publishing a full arrangement once DNA sampling of *Dryandra* was complete ; in the meantime , if Mast and Thiele 's nomenclatural changes are taken as an interim arrangement , then *B. ericifolia* is placed in *B. subg . Spathulatae* .

Hybrids with *B. spinulosa* var. *spinulosa* have been recorded in the wild , at Pigeon House Mountain in Morton National Park . *Banksia* ' Giant Candles ' was a chance garden hybrid between *B. ericifolia* and *B. spinulosa* var. *cunninghamii* .

== = Subspecies == =

Two geographically distinct forms are recognised :

Banksia ericifolia subsp. *ericifolia*

The nominate race is found in the Sydney basin , south to the Illawarra and north to Collaroy , as well as the Blue Mountains . The seedling leaves have 2 ? 6 teeth on each margin , while the perianths are 19 ? 22 mm (3 ? 4 ? 3 ? 4 in) long and pistils are 30 ? 35 mm (1 1 ? 4 ? 1 1 ? 2 in) long . Salkin noted that this subspecies often grew in association with *Banksia spinulosa* var. *cunninghamii* and that there were plants with longer leaves some 20 ? 25 mm ($\frac{3}{4}$? 1 in) long with entire , curled margins . He gave them the name " *longifolia* " and suspected these may have been hybrids .

Banksia ericifolia subsp. *macrantha*

The northern race is found on the New South Wales north coast , from Crowdy Head northwards to the Queensland border . Described as a distinct subspecies in 1996 by Alex George from material he collected at Byron Bay in 1975 , it is distinguished by finer foliage , more crowded leaves and larger flowers , with the perianths 26 ? 28 mm (1 @.@ 0 ? 1 @.@ 1 in) long and pistils 46 ? 48 mm (1 3 ? 4 ? 2 in) long . The seedling leaves have one , or occasionally two teeth on each margin . Salkin observed that the inflorescences tended to be terminal rather than axial , and others have noted them to be sometimes taller than the nominate subspecies . Crowdy Bay , in particular , hosts specimens with spikes up to 26 cm (10 in) in height .

== = Name and symbolism == =

In 1992 , *B. ericifolia* was adopted as the official plant of Sydney , and is sometimes seen in amenity plantings and parks around the city . It was known as *wadanggari* (pron . " wa @-@ tang @-@ gre ") to the local Eora and Darug inhabitants of the Sydney basin .

== = Distribution and habitat == =

In nature , the variety *ericifolia* is found on acidic sandstone @-@ based soils ; either in elevated heathland within 2 kilometres (1 @.@ 2 mi) of the coast around the Sydney basin , from Collaroy south to Jervis Bay , or elevated sandstone soils in mountainous areas such as the Blue Mountains and the Budawangs . These heathlands are often moist , with access to some form of underground water , and can even be quite swampy . It can form dense thickets with the Dagger *Hakea* (*Hakea teretifolia*) and Scrub She @-@ oak (*Allocasuarina distyla*) . Other plants it associates with include the Coast Tea @-@ tree (*Leptospermum laevigatum*) and smaller plants such as *Woollsia pungens* . The inflorescences are a feature of autumn bushwalking in sandstone areas , such as the Kings Tableland walk in the Blue Mountains , Jennifer Street Boardwalk in Little Bay , and Royal National Park .

The northern subspecies *macrantha* is found in two distinct regions on the far north coast of New South Wales ; the first from Crowdy Bay on the Mid North Coast northwards to Hat Head National

Park north of Port Macquarie , and then from Yuraygir National Park north to Kingscliff just south of the Queensland border . This variety is more strictly coastal with most populations being found within two kilometres of the coast , or in swampy areas . It may be associated with *Banksia oblongifolia* .

= = Ecology = =

Like other banksias , *B. ericifolia* plays host to a wide variety of pollinators and is a vital source of nectar in autumn , when other flowers are scarce . It has been the subject of a number of studies on pollination . A 1998 study in Bundjalung National Park in Northern New South Wales found that *B. ericifolia* inflorescences are foraged by a variety of small mammals , including marsupials such as *Antechinus flavipes* (yellow @-@ footed antechinus) , and rodents such as *Rattus tunneyi* (pale field rat) and *Melomys burtoni* (grassland mosaic @-@ tailed rat) . These animals carry pollen loads comparable to those of nectarivorous birds , making them effective pollinators . A 1978 study found *Rattus fuscipes* (bush rat) to bear large amounts of pollen from *B. ericifolia* and suggested the hooked styles may play a role in pollination by mammals . Other visitors recorded include *Apis mellifera* (European honeybee) .

A great many bird species have been observed visiting this *Banksia* species . A 1985 study in the Sydney area of *B. ericifolia* var. *ericifolia* found numerous birds visiting the inflorescences , including the honeyeaters eastern spinebill (*Acanthorhynchus tenuirostris*) , white @-@ cheeked honeyeater (*Phylidonyris nigra*) , New Holland honeyeater (*Phylidonyris novaehollandiae*) , white @-@ naped honeyeater (*Melithreptus lunatus*) , yellow @-@ faced honeyeater (*Lichenostomus chrysops*) , red wattlebird (*Anthochaera carunculata*) and little wattlebird (*Anthochaera chrysoptera*) , as well as the Silvereye (*Zosterops lateralis*) . The beautiful firetail (*Stagonopleura bella*) also associates with this species . Some mammals were recorded in this study but were found to bear no pollen . Exclusion of certain pollinators showed that birds and insects were important for fertilisation . Additional species seen in The Banksia Atlas survey include white @-@ eared honeyeater (*Lichenostomus leucotis*) , white @-@ plumed honeyeater (*Lichenostomus penicillatus*) , crescent honeyeater (*Phylidonyris pyrrhoptera*) , noisy miner (*Manorina melanocephala*) , and species of friarbird for *B. ericifolia* var. *ericifolia* and brown honeyeater (*Lichmera indistincta*) , tawny @-@ crowned honeyeater (*Gliciphila melanops*) and black @-@ faced cuckoo @-@ shrike (*Coracina novaehollandiae*) for *B. ericifolia* var. *macrantha* .

Insects recovered from inflorescences include the banksia boring moth (*Arotrophora canthelias*) , younger instars of which eat flower and bract parts before tunneling into the rachis as they get older and boring into follicles and eating seeds . This tunneling itself damages the architecture of the spike and prevents seed development . Other seed predators include unidentified species of moth of the genus *Cryptophasa* , as well as *Scieropepla rimata* , *Chalarotona intabescens* and *Chalarotona melipnoa* , *Brachmia trinervis* , *Carposina hyperlopha* and an unidentified weevil species .

Like most other Proteaceae , *B. ericifolia* has proteoid roots ? roots with dense clusters of short lateral rootlets that form a mat in the soil just below the leaf litter . These enhance solubilisation of nutrients , allowing nutrient uptake in low @-@ nutrient soils such as the phosphorus @-@ deficient native soils of Australia . The species lacks a lignotuber , and so is killed by fire and regenerates from seed .

Banksia ericifolia depends on fire for regeneration ; if fires are too infrequent , populations age and eventually die out . However , too @-@ frequent fires also threaten this species , which takes around six years to reach maturity and flower . One study estimated an optimum fire interval of 15 ? 30 years . For a large part of its distribution *Banksia ericifolia* grows near areas of human habitation on Australia 's eastern coastline . Bushland near urban areas is subject to both arson and prescribed burns , drastically reducing fire intervals and resulting in the disappearance of the species from some areas . The hotter a fire the more quickly seed is released ; timing of rains afterwards is also critical for seedling survival .

Banksia ericifolia is listed in Part 1 Group 1 of Schedule 13 of the National Parks and Wildlife Act 1974 ; this means that as a common and secure species it is exempted from any licensing or

tagging requirements under the 2002 ? 2005 management plan to minimise and regulate the use of protected and threatened plants in the cut @-@ flower industry in New South Wales .

= = Cultivation = =

Banksia ericifolia was one of the first *Banksia* species to be cultivated , having been introduced into cultivation in England in 1788 . By 1804 , it had flowered in several collections . That year a painting of the plant by Sydenham Edwards was featured in Curtis 's Botanical Magazine , accompanied by text describing the species as " a handsome shrub [that] thrives freely " .

Banksia ericifolia inflorescences attract a variety of birds to the garden . Tough enough to be used as a street plant in parts of Sydney , *B. ericifolia* is a fairly easy plant to grow in the conditions it likes , namely a sandy , well drained soil and a sunny aspect . It requires extra water over dryer periods until established , which may take up to two years , as it comes from an area with rainfall in predominantly warmer months . It is resistant to *Phytophthora cinnamomi* dieback , like most eastern banksias . As it grows naturally on acid soils , *Banksia ericifolia* is particularly sensitive to iron deficiency . Known as chlorosis , this problem manifests as yellowing of new leaves with preservation of green veins ; it can occur on plants grown in soils of high pH . This can happen especially where soil contains quantities of cement , either as landfill or building foundations , and can be treated with iron chelate or sulfate .

Flowering may take some years from seed ; a minimum of four years is average . Buying an advanced plant may hasten this process , as will getting a cutting @-@ grown plant . *Banksia ericifolia* can be propagated easily by seed , and is one of the (relatively) easier banksias to propagate by cutting . Named cultivars are by necessity propagated by cuttings as this ensures that the plant produced bears the same attributes as the original plant .

Regular pruning is important to give the plant an attractive habit and prevent it from becoming leggy . Hard @-@ pruning below green growth is not advisable with this banksia ; since it lacks a lignotuber , it does not have dormant buds below the bark that respond to pruning or fire and therefore is unable to sprout from old wood as readily as commonly cultivated lignotuberous species , such as *B. spinulosa* and *B. robur* .

= = = Cultivars = = =

For many years the horticulture industry focussed on registered selections of *Banksia spinulosa* , but since the late 1990s more and more cultivars of *Banksia ericifolia* have come on the market , including colour variants and dwarf forms . The latter are particularly attractive as the original plant may reach 6 metres in height , and the new cultivars help enthusiasts choose a plant that is right for their conditions and tastes . *Banksia ericifolia* is also grown for the cut flower industry in Australia , though not to the degree that the western Australian species such as *B. coccinea* and *B. menziesii* are .

There are a number of commercial varieties available from Australian retail nurseries ; however none have yet been registered under plant breeders ' rights legislation , and only one (' Limelight ') is registered with the Australian Cultivar Registration Authority . The lack of official names has led to some varieties bearing several different names .

Banksia ericifolia ' Bronzed Aussie ' is a white @-@ budded terminal @-@ flowering form to 2 m with bronzed foliage ; the inflorescences have honey @-@ coloured pistils . It has been propagated by Victorian nurseryman Rod Parsons of Carawah Nursery in Hoddles Creek . A new release in 2003 , its provenance is unknown ; seed had been given to Rod 's father by an SGAP member many years ago .

Banksia ericifolia ' Golden Girl ' is a golden yellow @-@ flowered form which grows to 1 @. @ 5 ? 1 @. @ 8 m (4 @. @ 9 ? 5 @. @ 9 ft) in height with blue @-@ grey foliage . It has hidden wide fat flowers to 8 cm high and has been propagated by Rod Parsons of Carawah Nursery . Released in 2003 , its provenance is unknown (seed donated to Rod 's father by an SGAP member many years ago .)

Banksia ericifolia ' Kanangra Gold ' , propagated by Kuranga Nursery in Melbourne , is a gold flowered form to 4 m (13 ft) from the Kanangra @-@ Boyd region of the Blue Mountains . It is bushy and flowers are much paler than the regular orange or red forms .

Banksia ericifolia ' Limelight ' , registered with Australian Cultivar Registration Authority (ACRA) in 1987 , is a large plant to 5 m (16 ft) with bright lime green foliage and orange blossoms . It is seldom seen due to the current focus on smaller forms for smaller gardens .

Banksia ericifolia ' Little Eric ' is a dwarf form reaching 1 or 2 m (3 @.@ 3 or 6 @.@ 6 ft) ; the inflorescences have maroon styles and whitish perianth . It is propagated by Richard Anderson of Merricks Nursery on the Mornington Peninsula southeast of Melbourne , the original having arisen as a chance garden seedling .

Banksia ericifolia ' Purple Pygmy ' , also called B. ' Port Wine ' , is a dwarf form propagated by Kuranga Nursery that grows to 1 m (3 @.@ 3 ft) with purplish foliage with claret flowers . It only flowers rarely and is difficult to propagate . Also , due to low demand it is only propagated in low numbers .

Banksia ericifolia ' Red Rover ' is a dwarf cultivar reaching 1 @.@ 8 m (5 @.@ 9 ft) with a more open habit than other forms of similar size . This form has lime green foliage and scarlet @-@ red flowers and was propagated by Rod Parsons of Carawah Nursery from a garden selection and released in 2004 .

Banksia ericifolia ' St Pauls ' is a dwarf form that grows to 2 m (6 @.@ 6 ft) with conspicuous red inflorescences which has been available from time to time from Cranebrook Nursery in Sydney 's western suburbs . It was originally propagated from a plant cultivated at St Pauls ' secondary school (a local high school) .

Banksia ericifolia ' White Candles / Christmas Candles ' , also known as B. *ericifolia* ' Ruby Clusters ' , originated from a plant growing in the Sutherland Shire in Sydney 's south . It has an unusual red style / white body colour combination somewhat reminiscent of B. *coccinea* . The buds are white and contrast with the red styles that emerge through them . It is an open shrub to 3 ? 4 m (9 @.@ 8 ? 13 @.@ 1 ft) .

Banksia ericifolia macrantha ' Creamed Honey ' , so called because its flowers are the colour of creamed honey , is a pale flowered variant originally found at Crowdy Head on the New South Wales north coast . Propagated by Kuranga nursery , it grows to 4 or 5 m (13 or 16 ft) with a more open habit . It is notable in that it is the only cultivar of the northern subspecies of *Banksia ericifolia* currently available .