

***Beaufortia aestiva* (Myrtaceae): a new species from the northern kwongan of the South-West Botanical Province, Australia**

K.J. Brooks¹, A.A. Burbidge² and A.S. George¹

¹Biological Sciences, Murdoch University, Western Australia 6150

² Department of Conservation and Land Management, Wildlife Research Centre, PO Box 51, Wanneroo, Western Australia 6065

Abstract

Beaufortia aestiva (Myrtaceae), a new species from the northern kwongan of the South-West Botanical Province, Australia. *Nuytsia* 12 (2):163–169 (1998). *Beaufortia aestiva* K.J. Brooks is described and illustrated. It is closely allied to *B. squarrosa* Schauer and was previously determined as this species. Extending south from Eurardy Station to Eneabba and south-east to Tammin, it prefers shallow sand on a lateritic substrate. It is cultivated in the Perth metropolitan region and flowers abundantly from October to February.

Introduction

The species described here as *Beaufortia aestiva* occurs in the northern kwongan of the South-West Botanical Province of Western Australia. The genus *Beaufortia* R. Br. is endemic in Western Australia (Lamont *et al.* 1984) and is confined to the South-West Botanical Province, except *B. dampieri* A. Cunn. which extends into the Eremean Botanical Province in the Shark Bay area. Brown (1812) described the genus, naming it in honour of Mary Somerset, Duchess of Beaufort and owner of two botanic gardens (Wrigley & Fagg 1993).

A member of the Myrtaceae, the genus *Beaufortia* is in the subfamily Leptospermoideae and is placed in the *Melaleuca* suballiance within the *Leptospermum* alliance. This is an informal classification proposed by Briggs & Johnson (1979) which is likely to undergo revision with increasing knowledge (Johnson & Briggs 1984; Gadek *et al.* 1996).

The genus is closely allied to *Regelia* Schauer. The two differ in that members of *Regelia* have four ovules per locule, and anthers that open outwards in longitudinal slits. *Beaufortia* has one ovule per locule, and there are transverse slits at the apex of the anther (Marchant *et al.* 1987; Wrigley & Fagg 1993). Members of *Beaufortia* share the characteristics of Johnson & Briggs's (1984) *Beaufortia* infra-alliance: five petals and five staminal bundles attached at the rim of a hypanthium, each staminal bundle and petal being opposite one of the five sepals; a pubescent perigynous ovary and filiform style with a small stigma; and filaments with basifixed anthers.

Until now, collections of *B. aestiva* have been included in the species *B. squarrosa* Schauer, both species having ciliate anthers, petals and sepals, glabrous staminal claws and filaments, and squarrose foliage. *Beaufortia squarrosa* was described by Schauer in 1844. Ludwig Preiss collected the type specimen from the Canning River in 1841, recording 'Buno' as the aboriginal name (Schauer 1845). The species extends as far north as Eneabba and south to the Whicher Range. Examination of material previously considered to be *B. squarrosa* has resulted in the recognition of a new species *B. aestiva* which is described in this paper. Andrew Burbidge first recognized *B. aestiva* informally as *B. sp. aff. squarrosa*.

Methods

Wherever possible, measurements were taken from fresh material or material preserved in formalin-acetic-alcohol (FAA), but some measurements were obtained from dried and detergent-softened herbarium specimens. There was no discernible difference between the measurements taken from differently treated specimens. Where length and width are recorded, these refer to the longest and widest section of the organ in question. Plants were observed in the field to determine habit and some ecological aspects.

Material housed at the Western Australian Herbarium (PERTH) was examined as was Andrew Burbidge's collection currently housed at the Wildlife Research Centre, Department of Conservation and Land Management. The holotype specimen of *B. squarrosa* was located (at LD) and a photograph will be lodged in the Western Australian Herbarium (PERTH).

The distributions of both *B. squarrosa* and *B. aestiva* were mapped using latitudinal and longitudinal data provided with the collections. Collections with a general locality were not mapped but fall within the range indicated by the other collections.

The Latin description was prepared using Stearn (1992) as a reference.

Description

Beaufortia aestiva K.J. Brooks

Frutex 0.7–2 m alta. *Ramuli* pubescentes cum maturitate glabrescentes. *Folia* opposita, decussata, subsessilia, ad basin introrsa, supra recurva, late obovata; lamina 4–11 mm longa, 3–7 mm lata, includens marginem quinquenervia. *Hypanthium* 2.5–4 mm longum, glabrum vel sparsim puberulum. *Sepala* late triangularia, trinervia, ciliata, glabra. *Petala* anguste elliptica, 4.3–5.5 mm longa, 1.4–2.6 mm lata, membranacea, glabra, alutacea ad armeniaca, marginibus involutis, ciliatis. *Fasciculus staminalis* 18–33 mm longus, ad dimidium divisus staminibus 5–7, glaber, luteolus ad flammeus; filamentum longissimum 18–34 mm longum, brevissimum 14–16 mm longum; antherarum margo apicalis ciliatus. *Stylus* ruber, 21–29 mm longus, stamina aequans vel excedens. *Fructus* persistens, 7–9 mm longus, 6–8 mm latus, 2–16-fasciculatus, saepe circa 8, rasilis, glaber, fuscus. *Semina* alata, 5–6 mm longa, 1–1.5 mm lata.

Typus: 4 km north of Binu on old section of highway to the west of North West Coastal Highway, Western Australia, latitude 28°01'S, longitude 114°40'E, 25 December 1996, K.J. Brooks 96004 (*holo*: PERTH 04951719; *iso*: CANB, K, NSW).

Dense rounded or spreading *shrub* 0.7–2 m tall and to 2 m across. New *branchlets* pubescent, glabrescent with maturity. *Leaves* opposite, decussate, adjacent pairs overlapping, shortly petiolate; blade introrse at base becoming recurved, obovate to broadly obovate, 4–11 mm long, 3–7 mm wide, having an obtuse to slightly cuspidate apex, distinctly 5(–9)-veined including margin, glabrous; abaxial surface prominently punctate. *Inflorescence* terminal, subglobose, 35–45 mm across; flowers *c.* 12–25, all male, all bisexual, or both together. *Hypanthium* turbinate, 2.5–4 mm long, glabrous to sparsely puberulous with glossy colourless to white hairs. *Sepals* broadly triangular, 1.25–3.3 mm long, 1–3.5 mm wide, coriaceous, 3-veined, ciliate (most pronounced towards base); external surface of the lobes glabrous, smooth, green to pale yellowish-green, the internal surface with an indumentum of sparse, appressed, soft, glossy, simple trichomes. *Petals* narrowly elliptic, 4.3–5.5 mm long, 1.4–2.6 mm wide, membranous, glabrous, cream to pale orange-red, deeper colouring confined to central area of petals; margins involute on fresh specimens, ciliate. *Staminal bundles* 18–34 mm long, divided halfway into slender claw and free filaments, glabrous, yellow with red band on claw to deep red throughout; bundles consisting of 5–7(10) filaments of unequal length, the longest filament (including claw) 18–34 mm long, the shortest 14–16 mm long; number of filaments per bundle variable within the same flower; apical margin of anthers ciliate. *Style* red, 21–29 mm long, level with or exceeding longest stamen by up to 4 mm. *Fruits* persistent, 7–9 mm long, 6–8 mm wide, in clusters of 2–16, frequently *c.* 8, smooth, glabrous, silvery brown. *Seeds* one per locule, winged, 5–6 mm long, 1–1.5 mm wide. (Figure 1)

Selected specimens examined (all at PERTH). WESTERN AUSTRALIA: 7 km SSE of Junga Dam, Kalbarri Natl Park, S.D. Hopper 1260; 37 km W of North West Coastal Highway on Kalbarri road, R.J. Hnatiuk 780358; 25 km E of Binu, C.A. Gardner 12314; East Yuna [Nature] Reserve, B.G. Muir 429 (3.10); 8.8 km S on Moore Road from turnoff on Geraldton–Mullewa road, K.F. Kenneally 11132; 25 km E of Yandanooka, A. Carr 165; 8 km SW of Mt Campbell (between Three Springs and Morawa), L.A. Craven 7006; 3 km W of Lake Indoon, E.A. Griffin 3029 & M. Blackwell; [Reynoldson] Reserve, SE of Kondut, A.S. George 508; Tammin, C.A. Gardner 1111.

Distribution. *Beaufortia aestiva* is distributed throughout the north-western region of the extra-dry mediterranean bioclimatic zone (Beard 1984). Relatively small populations are found in clusters extending north from Tammin to the vicinity of Kalbarri National Park (between latitudes 27°20'S and 31°30'S). A large number of populations have been recorded between Kalbarri, Binu, Yuna and Mullewa. A cluster of populations has been recorded from Mingenew and another around Three Springs. Several populations occur from approximately 35 km north to 25 km south of Eneabba. Four collections have been recorded from Wongan Hills. Several collections were made near Tammin up to 1921 but only one since then, the collector noting a single plant (Livesey, W of Tammin, 8 Nov. 1994, L. Atkins HLA181, PERTH). The species is also known from a single collection north of Eurardy Station (latitude 26°58'57"S, longitude 113° 51'47"E). The discontinuity in the clusters of *B. aestiva* from Mingenew to Tammin may be a result of clearing for agriculture, the localities being within the midwest wheatbelt, but ecological aspects have not been studied. (Figure 2)

Habitat. *Beaufortia aestiva* usually grows on the upper slopes or ridges of undulating sandy plains. These are commonly deep yellow or brown sands formed over a laterite substrate. The species has also been recorded growing in shallow grey sand over a limestone cap. Closed heath to low shrubland predominates on these soils and *B. aestiva* grows amongst species of *Actinostrobus*, *Verticordia*, *Hakea*, *Calothamnus*, *Eremaea*, *Acacia*, *Banksia* and emergent *Grevillea* spp. or *Xylomelum angustifolium*.

Phenology. The peak flowering period is between October and February; but *B. aestiva* flowers from July to late March, and has been collected once at Ajana flowering in May.

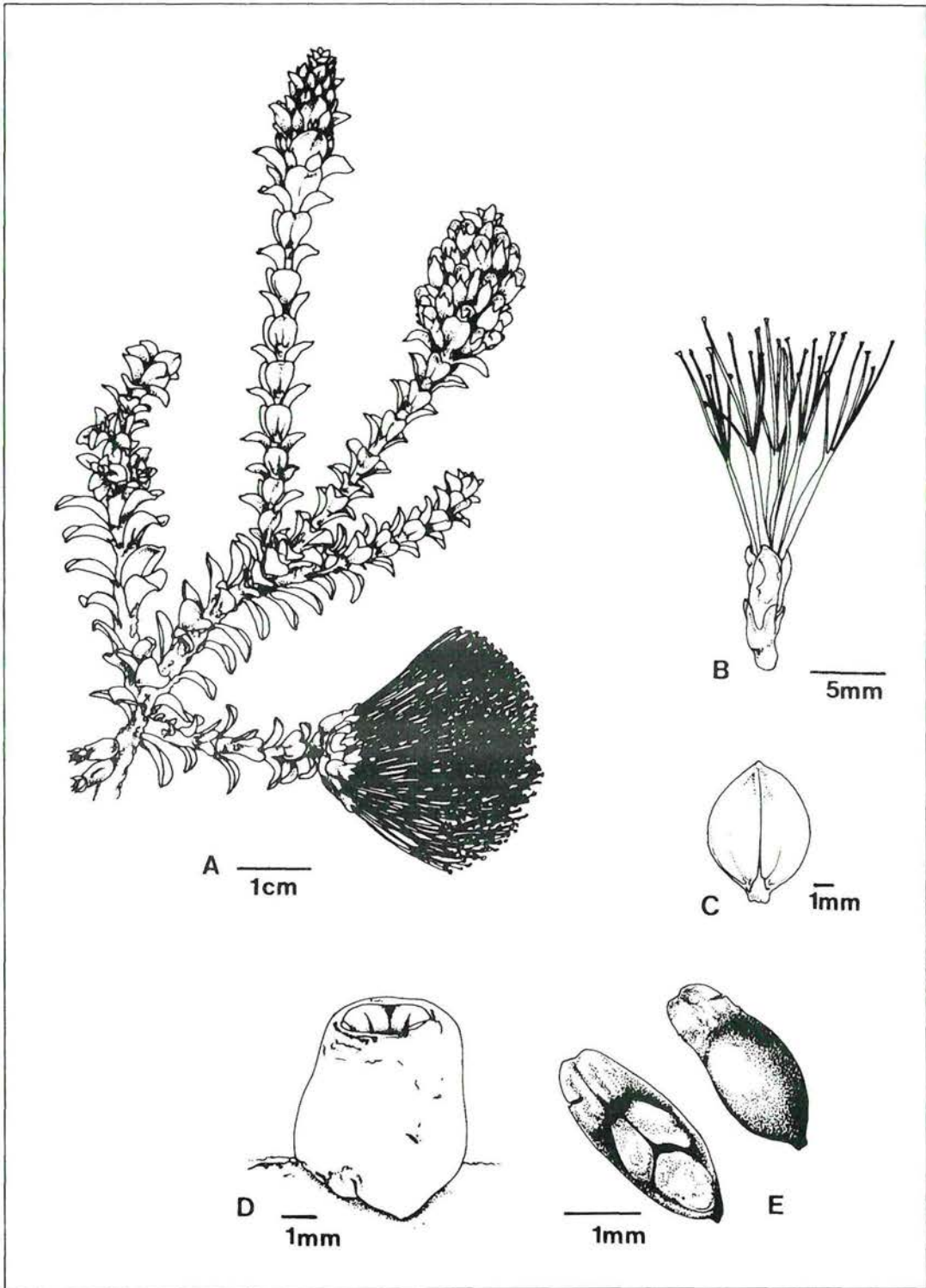


Figure 1. *Beaufortia aestiva*. A – portion of flowering branchlet, B – single flower, C – single leaf showing main venation, D – seed capsule, E – seed. Drawn by Christine McComb from material cultivated at Kings Park and Botanic Garden.

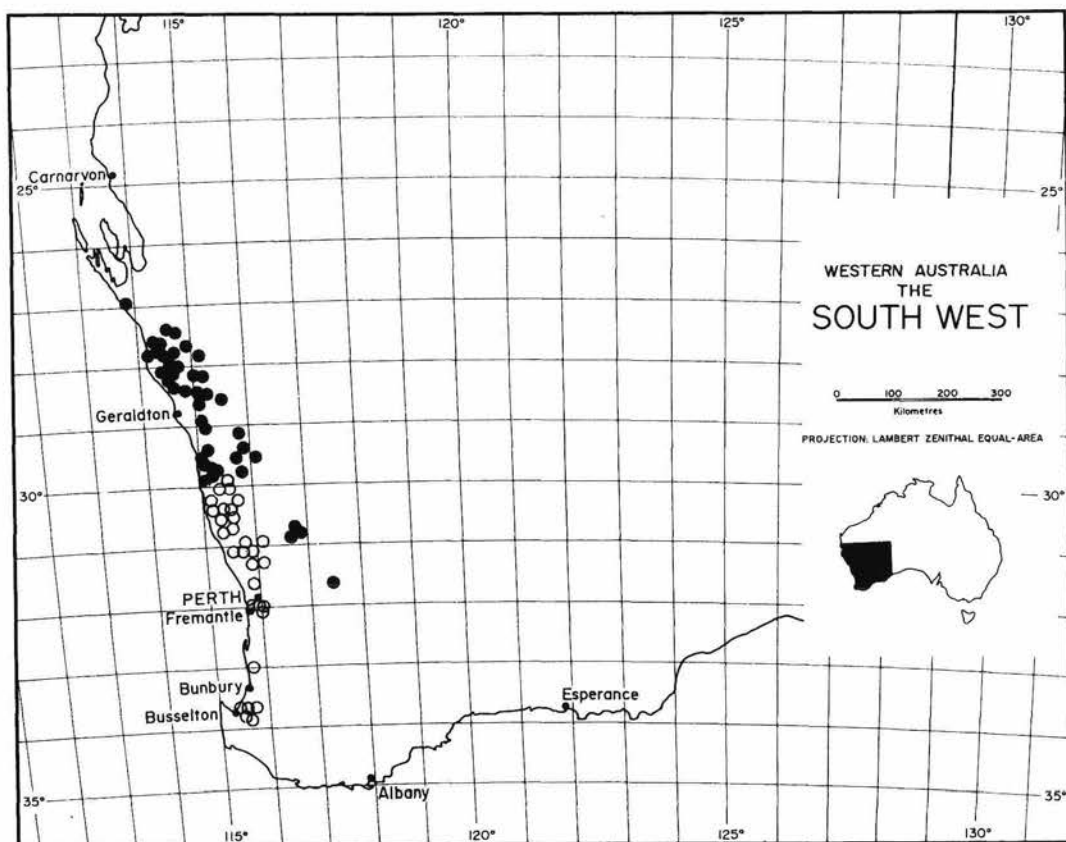


Figure 2. Distribution of *Beaufortia aestiva* ● and *B. squarrosa* ○.

Conservation status. *Beaufortia aestiva* is not considered rare or threatened.

Etymology. The name is derived from the Latin adjective *aestivus* (of summer), in reference to its abundant flowering over the summer period.

Biology. Much of the biology of *B. aestiva* is unknown. The species is bradysporous, retaining its fruits for at least three years, possibly longer. Field observations have shown no dehiscence of the capsule while it is retained on the plant. Not surprisingly, the number of fruits in a cluster tends to be indicative of the ratio of bisexual to male flowers; thus, specimens from the Eneabba area generally have fewer male flowers per inflorescence and larger clusters of fruits. However, the ratio of male to bisexual flowers is variable throughout the species distribution. Both wasps and bees (unidentified) have been observed feeding from the flowers in the field. The plants are non-lignotuberous, being killed by fire and regenerating from seed.

Cultivation. Already cultivated in the Perth metropolitan region, the species makes a good ornamental shrub due to its dense, rounded, habit and large showy flowers throughout much of the year.

Variation. Within *B. aestiva* stamen colour varies from a biscuit-yellow to deep red throughout its range. The yellow form is most common in northern populations. Variation is also seen in the number of filaments per staminal bundle. In some specimens collected from north of Yuna to north-north-east of Eurardy Station (*F.W. Went* 54; *B.G. Muir* 429), the number of stamens increases from 5–7 per bundle to 7–9 per bundle, although occasionally 6 or 10 occur. This variation is most easily seen in specimens in A.A. Burbidge's collection (*D.J. Mell* 2, 7, 8, 9, 10 and 11).

Specimens from the Encabba area have a tendency towards broadly obovate and slightly larger, more recurved leaves than those found in other populations. In addition, the leaves are commonly distinctly 7-veined (*C. Chapman* 1975; *H. Demarz* D3386), including the margin, as opposed to the more usual 5 veins. In some specimens 9 veins are present on some leaves, in others there appears to be a seasonal change between 5- and 7-veined leaves (*E.A. Griffin* 3029; *R.J. Hnatiuk* 770008). The Encabba populations also show a tendency towards larger fruit clusters, commonly having 13 to 16 fruits in a cluster. It is possible that further work on the species would yield subspecies or at least variants of *B. aestiva*.

Cytological studies on *B. squarrosa* by Rye (1979) included specimens now considered to be *B. aestiva* as well as true *B. squarrosa*. These were found to have a haploid number of 8 or a diploid number of 16 chromosomes – a specimen from Yuna was recorded as *c.* 8. However, the specimens used in the study did not cover all the variation in stamen number or venation mentioned above. The specimens of *B. aestiva* used by Rye (1979) are databased in PERTH as *B.L. Powell* 74075 & 74097 and *B.L. Rye* 76018.

Affinities. Until now, collections of *B. aestiva* have been determined as *B. squarrosa*. With closer examination the new species is clearly different. *Beaufortia aestiva* is most readily distinguished from *B. squarrosa* in the following ways. Leaves tend to be more broadly obovate, brighter green and are introrse only at the base; the hypanthium is glabrous as opposed to pubescent in *B. squarrosa*, and the ratio of tube to sepal length is *c.* 2:1 rather than 1:1; the calyx lobes are broadly triangular rather than triangular; although the staminal bundles of both species are of similar length, the claw to free filament ratio is 1:1 in *B. aestiva* and 2:1 in *B. squarrosa* and there is an increase in stamen number from 3 or 4 stamens per bundle in *B. squarrosa* to 5–7 stamens (occasionally to 10) per bundle; the fruit is larger at 7–9 mm long and 6–8 mm wide, whereas the fruits of *B. squarrosa* is 4–6 mm long and 4–5.5 mm wide; the number of fruits in a cluster is commonly greater in the new species. In the field, *B. aestiva* tends to have a denser habit than *B. squarrosa*.

Acknowledgements

Dr Neville Marchant, director of the Western Australian Herbarium (PERTH), allowed access to the herbarium collection. We are grateful to Christine McComb for preparing the botanical illustration and to Grady Brand, of Kings Park and Botanic Garden, for providing the cultivated material used for illustrative purposes. Associate Professor Jen McComb, Murdoch University, gave enthusiastic assistance.

References

- Beard, J.S. (1984). Biogeography of the Kwongan. In: Pate, J.S. & Beard, J.S. (eds) "Kwongan Plant Life of the Sandplain." (University of Western Australia Press: Nedlands.)
- Briggs, B.G. & Johnson, L.A.S. (1979). Evolution in the Myrtaceae – evidence from inflorescence structure. *Proceedings of the Linnean Society of New South Wales* 102: 157–256.
- Brown, R. (1812). Genera et species quaedam plantarum Myrtacearum quae in Horto Kewensi coluntur. Aiton's "Hortus Kewensis" 2nd edn. IV: 410–419. (Longman *et al.*: London.)
- Gadek, P.A., Wilson, P.G. & Quinn, C.J. (1996). Phylogenetic reconstruction in Myrtaceae using mat K with particular reference to the position of *Psiloxylon* and *Heteropyxis*. *Australian Systematic Botany* 9: 283–290.
- Johnson, L.A.S. & Briggs, B.G. (1984). Myrtales and Myrtaceae – a phylogenetic analysis. *Annals of the Missouri Botanical Garden* 71: 700–756.
- Lamont, B.B., Hopkins, A.J.M. & Hnatiuk, R.J. (1984). The flora composition, diversity and origins. In: Pate, J.S. & Beard, J.S. (eds) "Kwongan Plant Life of the Sandplain." (University of Western Australia Press: Nedlands.)
- Marchant, N.G., Wheeler, J.R., Rye B.L., Bennett, E.M., Lander, N.S. & Macfarlane, T.D. (1987). "Flora of the Perth Region." Part I. (Western Australian Herbarium: Perth.)
- Rye, B.L. (1979). Chromosome number variation in the Myrtaceae and its taxonomic implications. *Australian Journal of Botany* 27: 547–573.
- Schauc, J.C. (1845). Dissertatio phytographica de *Regelia*, *Beaufortia* et *Calothamno*, generibus plantarum Myrtacearum. *Nova acta Academiae Caesareae Leopoldino-Carolinae Germanicae Naturae Curiosorum* 21: 1–32.
- Stearn, W.T. (1992). "Botanical Latin." 4th edn. (David and Charles: Newton Abbot, Devon.)
- Wrigley, J.W. & Fagg, M. (1993). "Bottlebrushes Paperbarks and Tea Trees, and all Other Plants in the Leptospermum Alliance." (Angus and Robertson: Sydney.)