

Reinstatement of *Spinifex sericeus* R.Br. and hybrid status of *S. alterniflorus* Nees (Poaceae)

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Abstract

Craig, G. F. Reinstatement of *Spinifex sericeus* R.Br. and hybrid status of *S. alterniflorus* Nees (Poaceae). Nuytsia 5(1): 67-74 (1984). *Spinifex sericeus* R.Br., previously included under *S. hirsutus* Labill., is reinstated. *S. alterniflorus* Nees, a hybrid of *S. hirsutus* Labill. and *S. longifolius* R.Br., is described. Distinguishing features and a key to the Australian species of the genus are presented; distribution maps are provided.

Introduction

There are four species of *Spinifex* growing in Australia, one of which is a naturally occurring hybrid between *Spinifex hirsutus* Labill. and *S. longifolius* R.Br., called *S. alterniflorus* Nees. A fifth species, *S. littoreus* (Burm. f.) Merr. is absent from Australia.

Robert Brown (1810) recognised *Spinifex sericeus*, which he described from collections in the area of Port Jackson, New South Wales and on the coast of Queensland, as being distinct from *S. hirsutus* Labill. (1806-7), the lectotype of which was collected by Labillardière from the south coast of Western Australia. *S. sericeus* R.Br. was later made a synonym of *S. hirsutus* Labill. by Bentham (1878). Recent studies (Craig 1982) suggest that *S. sericeus* R.Br. should be reinstated.

Discussion

Morphology. The major vegetative features which distinguish *Spinifex hirsutus* and *S. sericeus* are leaf blade width and internode diameter. The more robust *Spinifex hirsutus* has often very short stem internodes, 9 to 18 mm diameter, and broad leaf blades (9 to 17 mm width). This compares with *S. sericeus* which has relatively narrow stem internodes, 4 to 8 mm diameter, and narrower leaves (5 to 10 mm leaf blade width).

Spinifex alterniflorus is morphologically intermediate to *S. hirsutus* and *S. longifolius*. It can be distinguished from both species by having a narrow leaf blade (3 to 7 mm broad) which is sparsely pubescent below and glabrous above.

Biochemistry. Starch gel electrophoresis of enzymes show clear distinctions between the varieties. Variations in allelic patterns were observed for ADH, IDH, GOT, LAP and PGM enzymes (Craig 1982) which highlight the phenotypic variation between the *Spinifex* species.

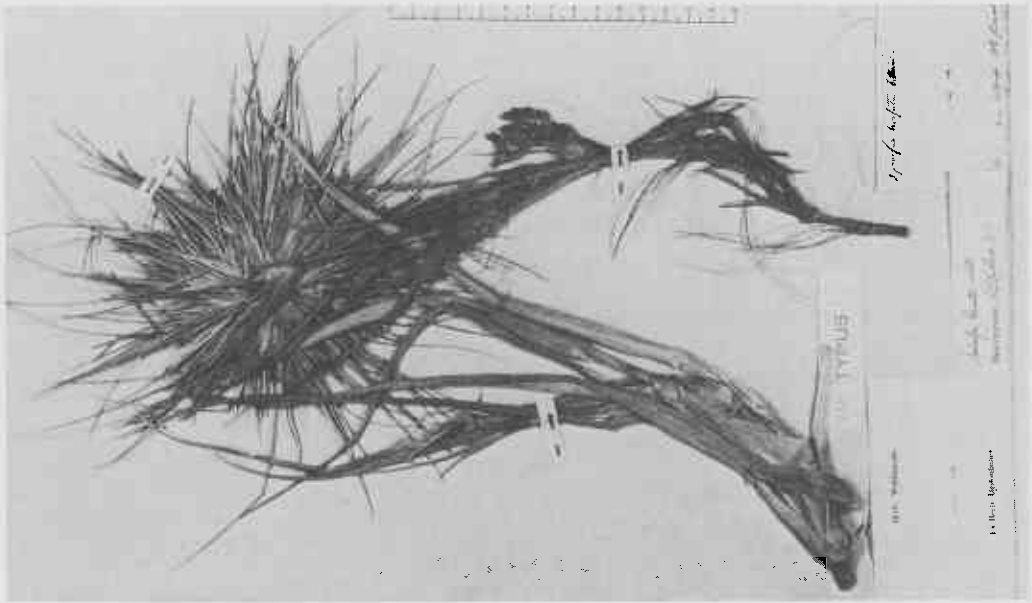


Figure 1. Type specimens of *Spinifex hirsutus* Labill. (1806). The bisexual inflorescence (L.H.S.) is typical of Western Australian populations, and the male inflorescence (R.H.S.) from eastern Australian populations.

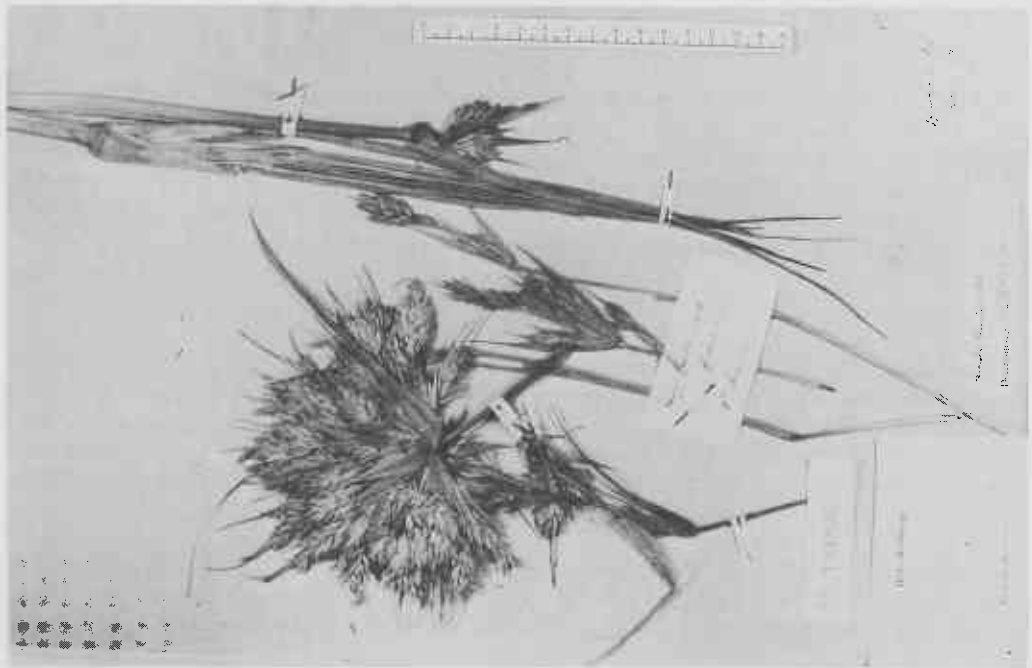


Figure 2. Lectotype sheet of *Spinifex hirsutus* Labill. (1807), probably collected from Esperance Bay in Western Australia.

Pollen fertility. Estimates show 83% pollen viability for *S. hirsutus*, 93% viability for *S. sericeus*, and from 0 to 10% viability for *S. alterniflorus* (Craig 1982).

Distribution. The two species are geographically distinct. *Spinifex hirsutus* is restricted to the south-west of Western Australia, and *S. sericeus* occurs in the eastern states of Australia, including Tasmania. It is also found in New Zealand. *Spinifex alterniflorus* occurs where the distributions of *S. hirsutus* and *S. longifolius* overlap, that is, in the south-west of Western Australia between Bunbury and Perth.

Photographs of the type specimens of *Spinifex hirsutus* Labill. (1806-7) held at the Herbarium Universitatis Florentinae (FI) and *S. sericeus* R.Br. (1810) held at the British Museum (BM) were examined. The type material of *S. hirsutus* is likely to have come from Esperance Bay in Western Australia or "capite van-Dieman" (Tasmania) where Labillardière visited during 1791-94 while on d'Entrecasteaux's voyage. Both the broad-leaved and narrow-leaved variants are included as types (Figure 1). A specimen labelled "cotypus" (Figure 2) closely resembles the male inflorescence illustration published by Labillardière (1807, tab. 231) and one labelled "isotypus" (Figure 1) resembles the bisexual inflorescence illustration (tab. 230) in the same publication. Stem width and leaf width measurements show that these specimens correspond to the broad-leaved *Spinifex* which grows in Western Australia. Thus the name *S. hirsutus* Labill. is restricted to the broad-leaved robust form, and the name *S. sericeus* R.Br. is reinstated for the narrow-leaved plant of eastern Australia.

Taxonomy

The following key distinguishes the three commonly occurring species of *Spinifex* in Australia, as well as a fourth, rarely mentioned species, *S. alterniflorus* Nees. This is a naturally occurring hybrid between *S. hirsutus* and *S. longifolius* which occurs between Bunbury and Perth in Western Australia (Craig 1982). A fifth species, *S. littoreus* (Burm. f.) Merr. grows on the sandy shores of India, Burma, Java and China (Trimen 1974); it is absent from Australia.

- 1a. Leaves glabrous on both lower and upper side, rigid, narrow *S. longifolius* R.Br.
- b. Leaves silky-pubescent or villous on one or both sides, flexuose 2
- 2a. Leaf blades villous below and glabrous above, 3-7 mm broad, green 3. *S. xalterniflorus* Nees
- b. Leaf blades densely hairy on both sides, 5-17 mm broad, grey-green 3
- 3a. Stem internode diameter 9-18 mm; leaf blade 9-17 mm broad, densely silky pubescent; base of female or bisexual spikelet hairy; male spikelet 11.5 to 13.5 mm long 1. *S. hirsutus* Labill.
- b. Stem internode diameter 4-8 mm; leaf blade 5-10 mm broad; base of female or bisexual spikelet glabrous; male spikelet 9.5 to 10.5 mm long 2. *S. sericeus* R.Br.

Spinifex longifolius has been taxonomically described by Gardner (1952). It is a native coastal species of Australia, extending from Geographe Bay in Western Australia northwards through Northern Territory, New Guinea and the lesser Sunda Islands to Java (Sauer 1965). There are a few scattered occurrences in northern Queensland (McDonald 1979).

In Western Australia north of Geraldton it is the principal binding agent of the seawardmost foredunes. In the South-West, *Spinifex longifolius* more commonly grows on foredunes in sheltered areas where there is little sand inundation, rather than sites where sand is rapidly accreting.

Spinifex longifolius flowers between May and September in the north, and between August and November in the south-west of Western Australia.

1. ***Spinifex hirsutus*** Labill., Nov. Holl. Pl. 2: 81, tab. 230, 231 (1806-7). *Lectotype* (here selected): Esperance Bay, *Labillardière* (FI, photo seen, Figure 2) specimen labelled "Cotypus."

Culms creeping, stout, much branched, with usually very short terete internodes, 9 to 18 mm diameter, and imbricate leaf-sheaths which are persistent and mostly crowded on the older parts. *Leaf-sheaths* broad, open, scarcely keeled, truncate, striate, silky-pubescent on the outside and densely ciliate on the margins; *ligule* a densely ciliate rim. *Leaf blades* flat, linear, 9 to 17 mm broad and up to 35 cm long, densely silky-hairy on both sides. *Male inflorescence* pedunculate, consisting of clustered racemes, several together forming a terminal pseudo-head with usually a few fasciculate racemes some distance below, and subtended by lanceolate silky-villous spathioles. *Racemes* with sessile spikelets not distichously arranged. *Spikelets* on very short stout pedicels, solitary, silky-hairy, 11.5 to 13.5 mm long; *glumes* equal, 10.0 to 13.0 mm long and 5 to 9 veined; *lemmas* equal, 10.0 to 14.0 mm long, lower lemma 6 to 8 veined and upper lemma 5 veined. *Female inflorescence* a pseudo-head of racemes (each of which is reduced to one or rarely two spikelets), 1 to 3 on a single flowering stem, surrounded by bracts which vary from lanceolate to linear-subulate; rachis up to 15 cm long ending in a long subulate point or stout bristle. *Spikelets* sessile or subsessile, lanceolate in outline, 12.5 to 18.0 mm long, silky at base; *glumes* as long as the spikelet, *lower glume* 10 to 12 veined, *upper glume* 7 to 11 veined; *lemmas* subequal, 11.0 to 15.0 mm long, lower lemma 5 to 9 veined. Lower lemma without *palea*. *Stamens* rudimentary.

Specimens examined (all PERTH). WESTERN AUSTRALIA: Middle Is., Recherche Archipelago, A. S. Weston 10777; Emu Point, Albany, K. Newbey 3511; Albany, Oct. 1945, C. Gardner; Oldfield River, A. E. Orchard 1482; East Mt Barren, J. R. Cannon 361; Eyre, July 1901, Anketell; Israelite Bay, R. A. Saffrey 1332; Mullaloo Beach, T. E. H. Aplin 954; Middleton Beach, Albany, Dec. 1902, C. Andrews.

Distribution. South-west coast of Western Australia, from near Jurien in the north to Eyre on the south coast (Figure 3).

Habitat. Seawardmost foredunes where sand is actively accreting.

Flowering period. November to January.

2. ***Spinifex sericeus*** R.Br., Prod. 198 (1810). *Type*: Broad Sound, 10 Sept. 1802, R. Brown (holo: BM, photo seen (PERTH)).

[*S. hirsutus* Labill., Nov. Holl. Pl. 2:81, tab. 230, 231 (1806-7) pro parte, not as to lectotype.]

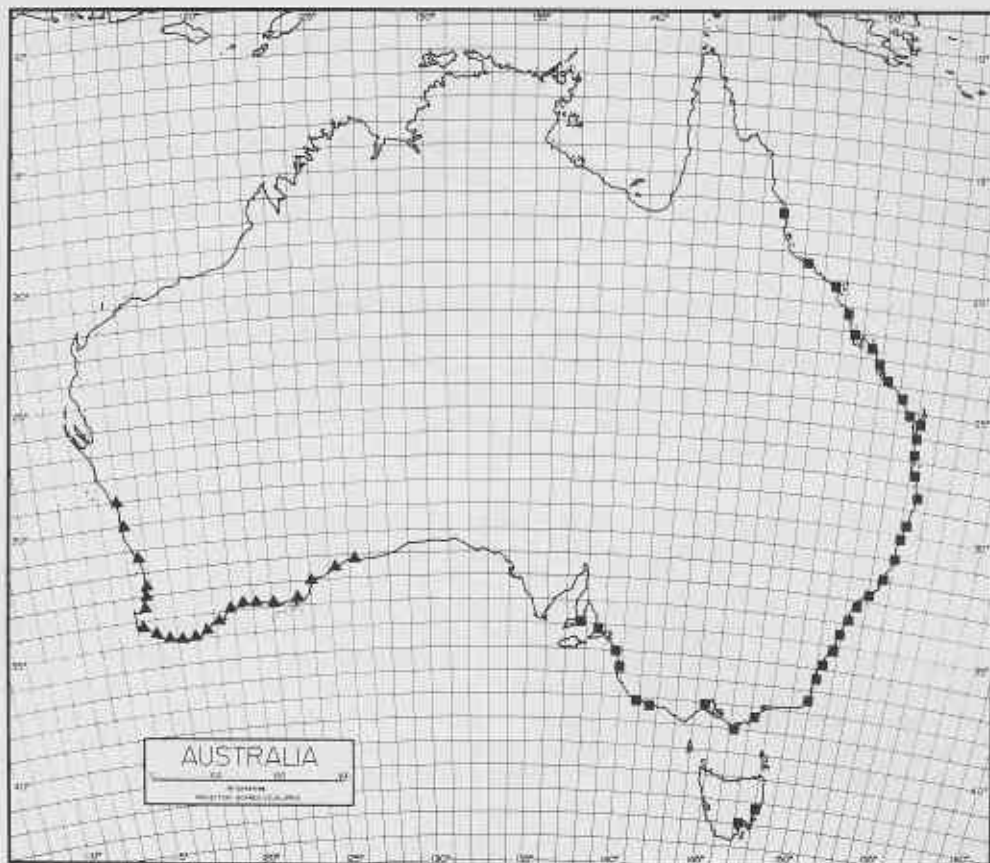


Figure 3. Distribution of *Spinifex hirsutus* Labill. (▲) and *S. sericeus* R.Br. (■) in Australia.

Culms creeping, stem internode diameter 4 to 8 mm. *Leaf blades* flat, linear, 5 to 10 mm broad and up to 38 cm long, silky-hairy on both sides. *Male inflorescence* as in *S. hirsutus*. *Male spikelets* 9.5 to 10.5 mm long. *Glumes* slightly shorter than lemmas, *lower glume* 7.0 to 9.0 mm long and 7 to 9 veined, *upper glume* 8.0 to 10.0 mm long and 6 to 10 veined, *lower lemma* 9.0 to 10.0 mm long and 5 to 7 veined, *upper lemma* 9.5 to 10.5 mm long and 5 veined. *Female inflorescence* similar to *S. hirsutus* but with spikelets glabrous at base. *Spikelet* length 13 to 18 mm long; glumes same length as spikelet; lemmas unequal, *lower lemma* 9 to 15 mm long and 5 to 9 veined, *upper lemma* 7 to 13 mm long. *Palea* present in lower lemma, 1/3 to 1/2 as long as palea in upper lemma; upper palea subtending a female floret. *Stamens* rudimentary.

Specimens examined (all PERTH). SOUTH AUSTRALIA: Brighton, M. Koch 936.

VICTORIA: Wilson's Promontory Meebold 2327; Portland Bay, Nov. 1887, C. Walter; Port Phillip, G. Luehmann.

NEW SOUTH WALES: Byron Bay, J. L. Boorman 9826.

Distribution. *Spinifex sericeus* extends southwards from north Queensland, through New South Wales, Victoria, Tasmania, to near Adelaide in South Australia. It is also found in New Zealand. The distribution map (Figure 3) is derived from Western

Australian Herbarium specimens, McDonald (1979), Hesp (1982) and personal observations. In Western Australia, *S. sericeus* is naturalized at City Beach, Perth, at Bunbury and at Peaceful Bay on the south coast.

Habitat. Coastal foredunes where wind blown sand is being deposited.

Flowering period. November to January in south-east Australia, and June to August in Queensland.

As discussed above, type material of *Spinifex hirsutus* Labill. (1806-7) included the broad-leaved variant of *Spinifex* collected from Esperance Bay, Western Australia, and a narrow-leaved variant presumably collected from Tasmania (Figure 1). The lectotype of *S. hirsutus* Labill. was chosen to be the broad-leaved variant and the narrow-leaved type was later described by Brown (1810) from material collected at Broad Sound, near Mackay in Queensland.

3. ***Spinifex xalterniflorus*** Nees in Lehm., Pl. Preiss. 2: 96 (1846) (pro sp.). *Type:* Swan River, *Preiss*, n. 1883 (iso: MEL, n.v. (see below)).

Tussock forming *perennial* with creeping stems, dioecious. *Stems* stout, internode diameter 6 to 9 mm. *Leaf blade* with a thick, rigid midrib, margins flattened, narrow (3 to 7 mm broad), villous below and glabrous above. *Male inflorescence* with characters intermediate to *S. hirsutus* and *S. longifolius*. *Female inflorescence* with up to six pseudo-heads of clustered racemes on a flowering stem, each raceme reduced to one or two spikelets; *rachis* up to 17 cm long ending in a subulate point. *Spikelets* sessile or subsessile, lanceolate in outline, 14.5 to 23.5 mm long, silky at base. *Seeds* very rarely reach maturity.

Specimens examined (all PERTH). WESTERN AUSTRALIA: City Beach, Perth, *Craig* 430 and 440; Floreat Beach, Perth, *Craig* 441; South Cottesloe, Perth, *Craig* 442 and 443.

This taxon is a naturally occurring hybrid between *S. hirsutus* and *S. longifolius* with morphological characters intermediate to both species. It has the appearance of *S. longifolius* but can be recognised by being sparsely pubescent below and glabrous above on the leaf blade.

Distribution. Populations of this hybrid occur in Western Australia at City Beach and Floreat Beach, near Perth; Kwinana, Woodman Point, Warnbro, Preston Beach and Leschenault Peninsula, Figure 4.

Habitat. Coastal foredunes in areas where there is light sand deposition.

Flowering period. August to January.

The type held in Melbourne was examined by N. G. Marchant, of the Western Australian Herbarium, and compared with a specimen and table of characters supplied by me. The type bears a note by S. T. Blake saying it is "perhaps a hybrid".

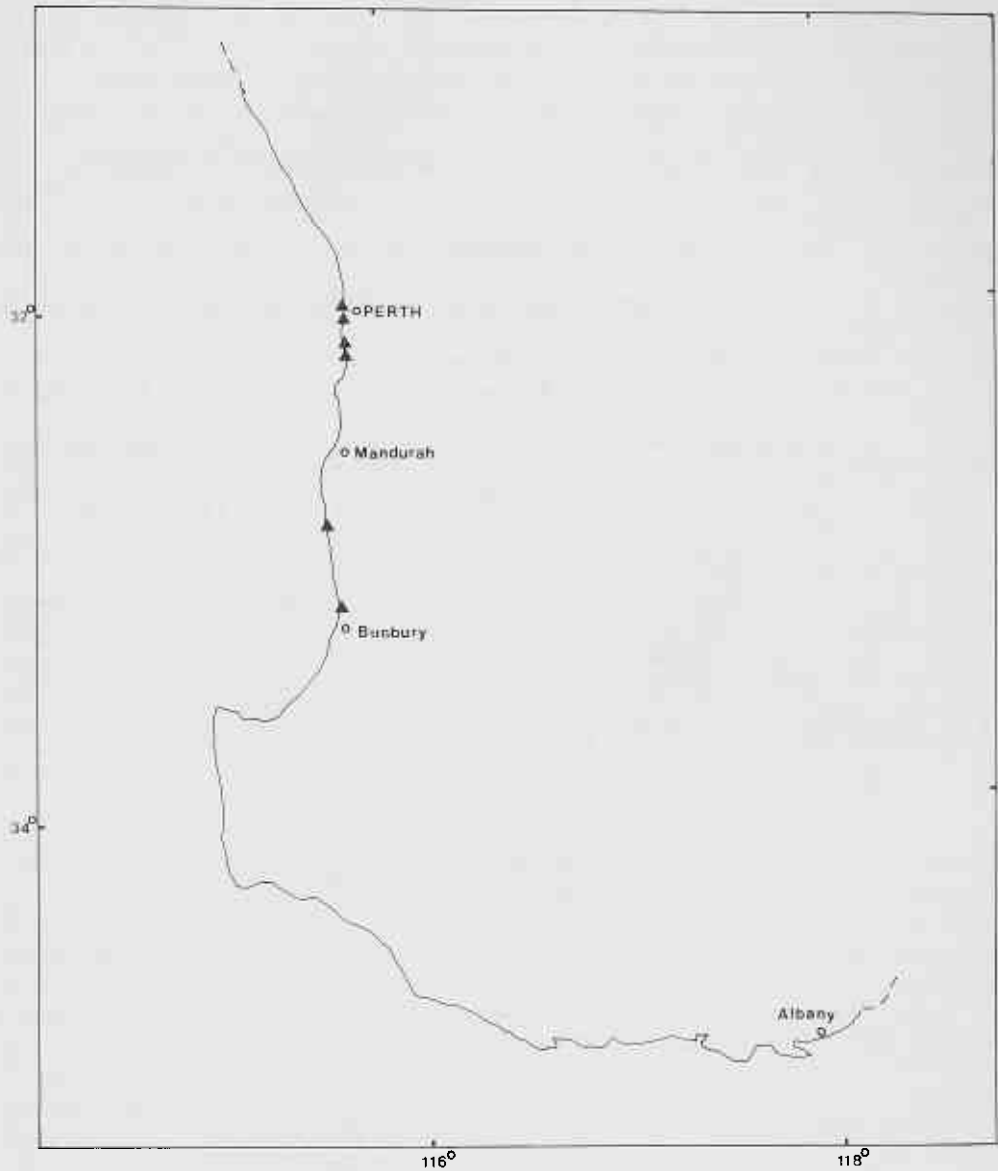


Figure 4. Distribution of *S. xalterniflorus* Nees in the south-west of Western Australia.

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References

- Bentham, G. (1878). "Flora Australiensis" vol. 7. (L. Reeve & Co., London.)
- Brown, R. (1810). "Prodomus Florae Novae Hollandiae et Insulae van Dieman." (Taylor: London.)
- Craig, G. F. (1982). "Hybridity in *Spinifex* L." (M. Sc. Prelim. Thesis, Botany Dept., University of Western Australia.)
- Gardner, C. A. (1952). "Flora of Western Australia." Vol. 1 Part 1, Gramineae. (Govt. Printer: W.A.)
- Hesp, P. A. (1982). "Dynamics and morphology of foredunes in south-east Australia." (Ph.D. Thesis, Sydney University.)
- Labillardière, J. J. (1804-1807). "Novae Hollandiae Plantarum Specimen." (J. Cramer: Weinheim; reprint 1966.)
- McDonald, T. J. (1979). "Studies in *Spinifex hirsutus* with special reference to its use in the rehabilitation of coastal sand dunes." (M.Sc. Thesis, Univ. of Qld.)
- Nees, C. G. D. (1846). In C. Lehmann, "Plantae Preissianae Vol. 2" (Meissner: Hamburg.)
- Sauer, J. (1965). Geographic reconnaissance of Western Australian seashore vegetation. Aust. J. Bot. 13: 39-69.
- Trimen, I. (1974). "A Handbook to the Flora of Ceylon" Part V. (M/S Bishen Singh Mahendra Pal Singh, Dehra Dun.)