

# The genus *Cenchrus* (Poaceae) in Australia

By A. S. Weston

## Abstract

A key to the species of *Cenchrus* in Australia is presented. Comments are made on the synonymy and distribution of the species keyed, particularly with reference to Western Australia. *Cenchrus biflorus* is recorded for the first time in Western Australia.

## Introduction

*Cenchrus* is one of many genera of grasses in Australia that are troublesome both pragmatically and theoretically. The importance of the members of *Cenchrus* as weeds is indicated by statements made by Burbidge (1970), Gardner (1952), Maiden (1898) and Willis (1962) and by the frequency with which plants of this genus are submitted to the herbaria for identification. Of the nine species found in Australia two have been introduced for erosion control (Willis, 1962) and forage (Gardner, 1952), at least two, both American in origin, are important weeds and only two are native. Yet Bentham (1878) lists three species of *Cenchrus*, all presumably indigenous, if not endemic, to Australia. One of the three was actually an early adventive from America; it and another species were incorrectly named by Bentham.

Now, almost one hundred years later, the confusion concerning the naming and delimiting of *Cenchrus* is still evident; half of the names used by Gardner (1952) are misapplied or otherwise incorrect, Eichler (1965) expresses uncertainty as to which of two names is the correct one to apply to a species found in South Australia and the adventive plants in Victoria that Willis (1962) calls *Cenchrus pauciflorus* Benth. would probably fit within the limits set by DeLisle (1963) for *Cenchrus longispinus* (Hack.) Fern. Twentyman's discussions (1972) and descriptions of *Cenchrus incertus* M. A. Curtis and *C. longispinus* are a beginning to the resolution of this confusion. As a further step this paper presents a key to the species of *Cenchrus* known by the author to occur in Australia and includes a species whose name has been misapplied here, *Cenchrus tribulooides* L. Although the key is intended primarily for use in Western Australia it should be useful anywhere on the continent. It is based upon DeLisle's treatment (1963) of the genus and an examination of all specimens of *Cenchrus* in the Western Australian Herbarium. These include representatives of all species known to occur in Australia, with the exception of *Cenchrus caliculatus* Cav. *Cenchrus* specimens in the State Herbarium of South Australia were also examined. The key is followed by an alphabetical listing of the keyed species with comments on their synonymy and distribution.

## Key to the *Cenchrus* species found in Australia

- A. Spines connate for more than 1/3 of the distance above the base, forming a more or less globose burr or involucre, which encloses 1 or more spikelets; spines or bristles retrorsely barbed or scabrid.
- B. Burr consisting of 1 whorl of united, flattened spines subtended by at least 1 whorl of smaller and finer bristles.
  - C. Burrs closely crowded in the inflorescence; spines often interlocking; outer bristles equal to or slightly exceeding the inner spines; peduncle ca. 2 mm wide; burrs never, though spines sometimes slightly, purple **C. brownii**
  - CC. Burrs loosely spaced in the inflorescence; outer bristles mostly ca. 1/2 the length of inner spines; peduncle more than 2 mm wide; burrs often purple **C. echinatus**

- BB. Burr consisting of several whorls of flattened spines emerging at irregular intervals throughout the body of the burr and with no row of smaller and finer bristles at the base.
  - C. Spines slender (though often subulate), usually more than 50; burrs short to medium pubescent; 2-4 spikelets per burr; florets 5.8-7.6 mm long  
*C. longispinus*
  - CC. Spines broader at the base, less than 45.
    - D. Burrs glabrous to short pubescent; 2-4 spikelets per burr; florets 3.4-5.8 mm long  
*C. incertus*
    - DD. Burrs densely pubescent; 1 spikelet per burr; florets 6.8-8.7 mm long  
*C. tribuloides*
- AA. Spines connate to 1/3 of the distance above the base, forming a small disc or shallow cup.
  - B. Spines retrorsely barbed.
    - C. Spines grooved externally, long ciliate on inner margins  
*C. biflorus*
    - CC. Spines terete, densely pubescent below, often 1 spine prolonged beyond the others  
*C. caliculatus*
  - BB. Spines antrorsely barbed.
    - C. Spines prolonged beyond the burr none, glabrous or subglabrous, 2-4 mm long  
*C. setigerus*
    - CC. Spine(s) prolonged beyond the burr into distinct, slender, scabrid bristle(s).
      - D. Bristles at base of burr 6-10; long bristle 1; knob at base of burr; peduncle glabrous  
*C. elymoides*
      - DD. Bristles at base of burr at least 20; peduncle ciliate to short pubescent  
*C. ciliaris*

### ***Cenchrus biflorus* Roxb. (Figure 1C)**

*Cenchrus biflorus* Roxb., Fl. Ind. 1:238 (1820).

*Cenchrus echinatus* Benth. in Hook., Niger Fl. 564 (1849).

*Cenchrus biflorus* is a weed of warm temperate to tropical areas. DeLisle (1963) gives its distribution as Africa, Madagascar, Arabia and India, but Hitchcock (1951) reports the introduction of *C. biflorus* into the United States in ballast and wool waste. The method of its introduction into Australia is unknown as is its distribution outside of Western Australia. The oldest specimen of this species in the W.A. Herbarium was collected in 1933 at Broome, the possible initial point of introduction. Since 1950 it has been collected several times, always in the Fitzroy District of the Northern Botanical Province, where it has been misidentified as *C. pauciflorus* and *C. echinatus*. Its habitat preferences are probably similar to those of *C. echinatus*, with which it has been collected.

### ***Cenchrus brownii* Roem. et Schult. (Figure 1D)**

*Cenchrus brownii* Roem. et Schult., Syst. Veg. 2:258 (1817)—Based upon *C. inflexus* R. Br.

*Cenchrus inflexus* R. Br., Prodr. Fl. Nov. Holl. 1:195 (1810), non Poir. (1804).

The material upon which Robert Brown based his description of this species was collected by him in Arnhem Bay, northern Australia, in 1803 (Brown, unpublished; Flinders, 1814), and as recently as 1878 (Bentham, 1878) the species was believed to be indigenous to Australia. In fact, it is native to tropical America and was probably the first alien *Cenchrus* and possibly the first American weed to become established in Australia. It is conceivable that it was unintentionally introduced as early as 1606, by Torres, who sailed from Peru west through the strait named after him but no later than 1793, when Brampton and Alt made the last passage through the Torres Strait prior to the voyage of Flinders' ship, "The Investigator", in 1803 (see Flinders, 1814). The only Western Australian specimen in the W.A. Herbarium was collected in Cottesloe, apparently cultivated. It is in the Darwin and Gulf District of the Northern Territory (Chippendale, 1971) and can be expected in coastal areas of adjoining districts in Queensland and Western Australia.

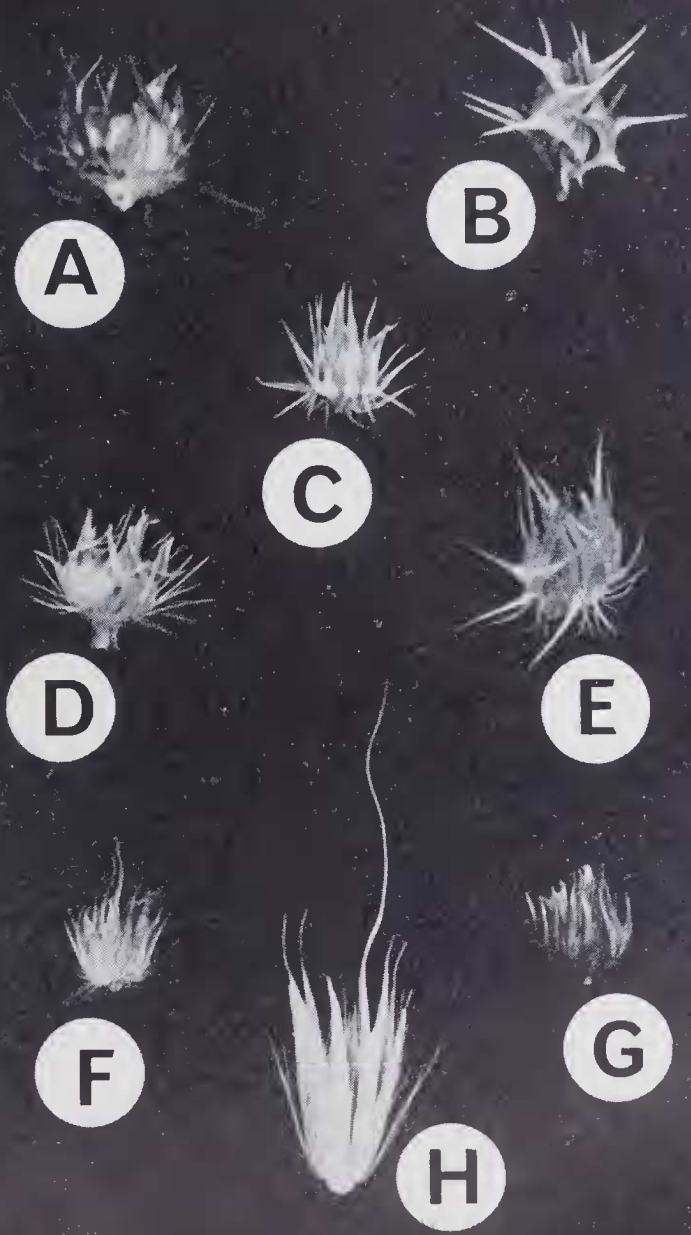


Figure 1—Burs of: A—*C. echinatus*. B—*C. incertus*. C—*C. biflorus*. D—*C. brownii*. E—*C. longispinus*. F—*C. ciliaris*. G—*C. setigerus*. H—*C. elymoides*.

### ***Cenchrus caliculatus* Cav.**

*Cenchrus caliculatus* Cav., Icones 5:40 t.463 (1799).

*Cenchrus australis* R. Br., Prod. Fl. Nov. Holl. 1:196 (1810).

*Cenchrus anomoplexis* Labill., Sert. Austr.-Caled. 14 t.19 (1824).

*Cenchrus caliculatus* is variously known as "Spiny Burr Grass" (Beadle, et al., 1972), "Large Burr Grass", "Scrub Burr Grass" and "Hillside Burr Grass" (Maiden, 1898). Its long, clinging burrs make it an unpleasant weed of roadsides and pastures, especially on the moist, poorer soils of hillsides. It has a natural distribution that includes islands of the South Pacific, New South Wales and Queensland. Contrary to DeLisle (1963), the species is not recorded from the Northern Territory, nor are any of the specimens he examined from there.

### ***Cenchrus ciliaris* L. (Figure 1F)**

*Cenchrus ciliaris* L., Mant. 302 (1771).

*Pennisetum cenchroides* Rich. ex Pers., Syn. Pl. 1:72 (1805).

*Cenchrus pennisetiformis* Hochst. et Steud. ex Steud., Nom. ed. II. 1:317 (1840).

The highly variable *Cenchrus ciliaris*, "Buffel Grass", inhabits dry, sandy areas throughout much of Africa and northern India. Esteemed as a fodder and forage grass, it was introduced in the Port Hedland area with camel fodder from India (Gardner, 1952). The earliest W.A. collections were made in Port Hedland in 1922. Since then its range has been widely extended north east to the Ord River and south east to Kalgoorlie. It is present in all the districts of the Northern Territory (Chippendale, 1971), is adventive on Clifton Hills Station, South Australia (Black, 1943) and probably is common in inland areas of New South Wales and Queensland. It has become established in the Ouyen District of Victoria, where it was introduced by the Soil Conservation Authority to control erosion (Willis, 1962). Gardner (1952) maintained *Cenchrus pennisetiformis* as being doubtfully distinct from *C. ciliaris*, but DeLisle (1963) considered the two names to be synonymous and his treatment is followed here.

### ***Cenchrus echinatus* L. (Figure 1A)**

*Cenchrus echinatus* L., Sp. Pl. 1050 (1753).

Native to warm temperate to tropical America, this species is now a pest in New South Wales, Queensland, the Northern Territory and Western Australia. In W.A. it has been reported from the tropics and as far south as Wagin. The earliest collection in the W.A. Herbarium was made in 1931 at Shark Bay, the only location given for this weed by Gardner (1952), and in 1933 it was collected at Broome. It may have become established in W.A. well before then and be much more common and widespread than is indicated by the number and provenances of the specimens in the herbarium. Unfortunately, weeds, especially ones with spines, are too frequently eschewed by collectors.

### ***Cenchrus elymoides* F. Muell. (Figure 1H)**

*Cenchrus elymoides* F. Muell., Fragm. 8:107 (1873).

*Pennisetum elymoides* (F. Muell.) C. A. Gardn., Fl. W.Austral. 276 (1952).

*C. elymoides* is the only species of *Cenchrus* endemic to Australia. It occurs only in the far north: north of Townsville in Queensland, the Darwin and Gulf and the Victoria River Districts in the Northern Territory (Chippendale, 1971) and the Ord District of the Northern Botanical Province in Western Australia. It is reputedly useful as a fodder (Bailey, 1909). On the basis of what he described as "perfectly free bristles", Gardner (1952) transferred *Cenchrus elymoides* to *Pennisetum*. However, because the inner series of "bristles" (spines) is connate in the lower part and because the outer bristles are not entirely free but arise from a swollen knob at the base of the spikelet

the species is better left in *Cenchrus*. Like *C. caliculatus*, *C. elymoides* is distinguished from the alien species in Australia by the long, solitary bristle extending beyond the spines.

### ***Cenchrus incertus* M. A. Curtis (Figure 1B)**

*Cenchrus incertus* M. A. Curtis, Boston Soc. Nat. Hist. J. 1:135 (1837).

*Cenchrus pauciflorus* Benth., Bot. Voy. H.M.S. Sulphur 56 (1884).

With *C. echinatus*, this species is the most nearly cosmopolitan weed in the genus. Like *C. echinatus* it is native in warm temperate to tropical America and has become well established in Australia, primarily in New South Wales and Queensland. The only Western Australian specimens of *C. incertus* were collected in the Darling District of the South western Botanical Province, but the species can be expected in other parts of the state. The first record of this species in Australia is from north eastern New South Wales in 1921 (see Twentyman, 1963), but it was collected near Bunbury, Western Australia only six years later. Although *Cenchrus pauciflorus* is here included in *C. incertus* neither of the specimens upon which Gardner (1952) based his inclusion of the former species in his Flora of Western Australia can be placed in the latter species. One was a misidentified specimen of *C. biflorus*, and the other belongs to *C. longispinus*.

### ***Cenchrus longispinus* (Hack.) Fern. (Figure 1E)**

*Cenchrus longispinus* (Hack.) Fern., Rhodora 45:388 (1943).

*Cenchrus echinatus* L. forma *longispina* Hackel in Kneucker, Allg. Bot. Zeitschr. 9:169 (1903).

*Cenchrus pauciflorus* Benth. var. *longispinus* (Hack.) Jansen et Wachter, Nederl. Kruidk. Archief 56:246 (1949).

Indigenous to the central and eastern United States, *C. longispinus* is the most temperate species in the genus. It is the only one recorded by DeLisle (1963) for cold temperate continental Canada and, at Boscabel (near Kojonup), is the most southerly occurring *Cenchrus* in Western Australia. To date it is recorded from W.A. only in the Avon and Stirling Districts of the South-western Botanical Province, but in the eastern states its range extends north of Brisbane and includes New South Wales, Victoria and South Australia. The first Australian collection of this species was in 1895, from south central Victoria (Twentyman, 1972). The earliest W.A. collection of *C. longispinus* was from South Caroling in 1924.

### ***Cenchrus setigerus* Vahl. (Figure 1G)**

*Cenchrus setigerus* Vahl., Enum. Pl. 2:395 (1806).

*Cenchrus ciliaris* L. var. *setigerus* (Vahl.) Maire et Weiller in Maire, Fl. Afr. du N. 1:342 (1952).

*Cenchrus setigerus* was in Western Australia by 1929 and now occurs from the Ord River, in the north east, to at least as far south as Carnarvon. Its native range and origin are similar to those of *C. ciliaris* and, like that species, it is a good fodder grass. *C. setigerus* was introduced into north western Australia from India under the name of "Birdwood Grass" (Gardner, 1952). *C. setigerus* and *C. ciliaris* are both apomictic (see DeLisle, 1963), a character advantageous to such colonizing species.

### ***Cenchrus tribuloides* L.**

*Cenchrus tribuloides* L., Sp. Pl. 1050 (1753).

Known as the "Dune Sandburr" in the United States, *C. tribuloides* is restricted to sandy coastal areas of the eastern United States south of New York

and to a few isolated localities to as far south as Brazil. Generally the Australian plants identified as *C. tribuloides* are *C. longispinus* although some might be *C. incertus* (including *C. pauciflorus*) (see Twentyman, 1963). What Black (1943) reports as appearing at Renmark about 1910 is probably *C. longispinus*.

### Acknowledgement

The loan of specimens by Hj. Eichler, as Keeper of the State Herbarium of South Australia, is much appreciated.

### References

Note: the author has not consulted the original descriptions of species cited except those that are included among the references of the following list.

- BAILEY, F. M. (1909)—Comprehensive Catalogue of Queensland Plants—Government Printer: Brisbane.
- BEADLE, N. C. W., EVANS, O. D. & CAROLIN, R. C. (1972)—Flora of the Sydney Region—A. H. & A. W. Reed: Sydney.
- BENTHAM, G. (1878)—Flora Australiensis, Vol. 7—L. Reeve: London.
- BLACK, J. M. (1943)—Flora of South Australia, Part 1—Government Printer: Adelaide.
- BROWN, R. (unpublished)—Botanical Descriptions of Australian Plants—held by The British Museum (Natural History).
- BURBIDGE, N. T. (1968)—Australian Grasses, Vol. 2—Angus & Robertson: Sydney.
- BURBIDGE, N. T. (1970)—Australian Grasses, Vol. 3—Angus & Robertson: Susney.
- CHIPPENDALE, G. M. (1972)—Check list of Northern Territory plants. Proc. Linn. Soc. N.S.W. 96: 207–267.
- DELISLE, D. G. (1963)—Taxonomy and distribution of the genus *Cenchrus*. Iowa St. J. of Sci. 37: 259–351.
- EICHLER, HJ. (1965)—Supplement to J. M. Black's Flora of South Australia—Government Printer: Adelaide.
- FLINDERS, M. (1914)—Voyage to Terra Australis, Vol. 2—G. & W. Nicol: Pall-Mall (London).
- GARDNER, C. A. (1952)—Flora of Western Australia, Vol. 1, Part 1—Government Printer: Perth.
- HITCHCOCK, A. S. (1951)—Manual of the Grasses of the United States—U.S. Government Printing Office: Washington.
- MAIDEN, J. H. (1898)—Manual of the Grasses of New South Wales—Government Printer: Sydney.
- TWENTYMAN, J. D. (1972)—Notes on two species of *Cenchrus* (Gramineae) in Australia. Muelleria 2:164–168.
- WILLIS, J. H. (1962)—Handbook to Plants in Victoria, Vol. 1—Melbourne University Press: Parkville (Melbourne).