



A new species of *Senna* (Fabaceae: Caesalpinioideae: Cassieae) from the Top End, Northern Territory

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Abstract: The new species *Senna arcuata* Jobson, previously known as *Senna* sp. Pine Creek (*P.Martensz* 480) NT Herbarium, is described from the Top End region of the Northern Territory. A detailed description along with distribution, conservation and species affinities are presented.

Keywords: Fabaceae, *Senna*, new species, Northern Territory, Top End

Introduction

Senna Mill. is a circumtropical genus of c. 300 species with its highest diversity in the Americas (Lewis *et al.* 2005). Within Australia, the number of species varies depending on the system used, ranging between 46 and 62 (Randell 1988, 1989, 1990; Randell & Barlow 1998). Based on Randell's earlier work, three sections are currently recognised with *Senna* sect. *Psilorhagma* (Vogel) H.S.Irwin & Barneby being the most speciose in Australia, and containing the majority of the endemic species. *Senna* sect. *Psilorhagma* is further subdivided into three series, with *S.* ser. *Subverrucosae* (Benth.) Randell containing the morphologically diverse *Senna artemisioides* (DC.) Randell and segregate species.

Senna sect. *Psilorhagma* ser. *Oligocladae* Randell is confined to the tropical Monsoon woodlands and shrublands of northern Australia from the Gulf of Carpentaria in Queensland to the western Kimberly coast. The number of species within this endemic series totals seven. Two of the species within ser. *Oligocladae* are narrow endemics associated with Kakadu sandstones or limestones. In general, this series contains the largest number of Australian narrow or restricted range endemics; only *S. oligoclada* (F.Muell.) Randall extends across the entire distributional range of the series. This series is defined by the following characters: low shrubs, often with a persistent rootstock; compound leaves with 1–3 leaflet pairs, leaflets lanceolate, elliptic to ovate; inflorescences chiefly umbellate (but can be cymose to racemose), pedunculate, often peduncles equal to or longer than subtending leaf; pods curved or straight, with crenate to non-crenulate margins.

Senna sp. Pine Creek (*P.Martensz* 480) NT Herbarium was first recognised in 1992 (as *Senna* D6321 Pine Creek) during preparation of *Flora of Darwin Region*,

Vol. 2 (Dunlop *et al.* 1995), when material from the Pine Creek area, 200 km south of Darwin, did not match the descriptions of Randell (1989). At that time the species was not known from the Darwin region and so was not included within the volume; it has subsequently been collected from within the region. This paper describes the species formally, along with presenting its known distribution and comparing it with similar species. The current keys presented in Randell (1989) and Randell & Barlow (1998) are inadequate to determine this species, however, it is currently not possible to create an adequate key until the morphologically variable *S. oligoclada* is studied further.

Methods

Material housed in DNA was examined, with all measurements made from dried herbarium specimens using Vernier calipers. The floral measurements were made from flowers soaked in warm water and detergent. The botanical region cited for the Northern Territory is that used by the Northern Territory Herbarium (DNA & NT), devised by Chippendale (1971).

Taxonomy

Senna arcuata* Jobson, *sp. nov.

Holotypus: Donydji, Arnhemland, Northern Territory, Australia, 20 June 1989, *C.R. Dunlop 8509 & N.G. White* (DNA40353). **Isotypi:** AD, MEL, NSW.

Senna D6321 Pine Creek: Dunlop, G.J. Leach, Latz, M.J. Barritt, Cowie & Albr., *Checkl. Vasc. Pl. N. Terr.* 30 (1995).

Senna sp. Pine Creek (*P.Martensz 480*) NT Herbarium: P.S.Short, Albr., Cowie, D.L.Lewis & B.M.Stuckey, *Checkl. Vasc. Pl. N. Terr.* 32 (2011); Cowie, Cuff, D.L.Lewis & Jobson, *Checkl. Vasc. Pl. N. Terr.* 32 (2017).

Shrub multistemmed, prostrate to ascending to 0.4 m high, stems dying back or burnt and appearing annual, rootstock lignotuberous; all vegetative parts sparsely to densely hairy with hooked white hairs. *Stems* green to pale red brown, often 4-ribbed and appearing tetragonous. *Leaves* alternate, compound, paripinnate terminating in a fine flattened or shallowly winged appendage, first leaves near rootstock, or near inflorescence often smaller than leaves along stems, 2–6 (rarely 8)-foliate. *Petiole* (including pulvinus) 5–15 mm long, rhachis 8–35 mm long, rhachis and petiole canaliculate on upper surface, ribbed. *Leaflets* elliptic to oblong to ovate to obovate, 12–37 mm long, 5–20 mm wide; apex mucronate, acute to obtuse, occasionally emarginate; bases unequal, cuneate to rounded; surfaces discolorous, punctate; adaxial surface glabrous to densely pilose; abaxial surface sparsely pilose and confined to midrib and secondary veins to moderately pilose across surface; margin with arcuate hairs, undulate due to veins terminating at margin and creating irregular indentations. *Rhachis* glands sessile, erect,

at nodes of leaflets, 1.1–2 mm long. *Stipules* 2–7 mm long, linear-spathulate to acicular, patent to spreading, often incurved, flattened with raised mid-rib, pilose mostly on midrib and margins, persistent. *Inflorescence* subterminal, cymose to racemose with 4–6 (–8) flowers. *Peduncles* (17–) 28–50 mm long, 4-ribbed, sparsely to densely pilose. *Pedicels* 0.9–15 mm long, ribbing and hair morphology as for peduncles. *Bracts* 1.9–3.75 mm long, narrow elliptic to ovate, 1–3-nerved with midrib often more prominent, persistent until fruiting, bract number equalling number of flowers in inflorescence, 1 bract often 2–3 mm above whorl of other bracts. *Sepals* 3–8 mm long, 2–3 mm wide, ovate to obovate, 3–5-nerved, very sparse to dense with arcuate hairs, punctate (occasionally obscure); margin sparsely ciliate; apex obtuse, imbricate yellow-green, 2 lobes shorter than other 3. *Petals* 7.5–15.5 mm long, 3.75–10.5 mm wide, obovate to spatulate, venation open, reticulate, conspicuous, with 1–3 parallel longitudinal veins in centre of lamina, orange-yellow, glabrous. *Stamens* 10 (rarely to 6), all fertile, 3–6 mm long, subequal, 1 pair always slightly longer than other pairs; filaments basal, with shorter ones capped by a short, stout obtuse appendage. *Ovary* 4–6 mm long, flattened, indumentum pilose to appressed with uncinata, white hairs; stipe 1–1.5 mm long; style glabrous, hooked to incurved; stigma capitate. *Pods* 42.5–65 mm long,



Fig. 1. *Senna arcuata*, habit. — Photo: Kym Brennan.



Fig. 2. Herbarium specimen of *Senna arcuata*, showing habit and lignotuber resprouting after fire.

8–11.5 mm wide, sparsely pilose with appressed arcuate (rarely spreading and straight) hairs; margins thickened, red-brown; style persistent or dehiscent. *Seeds* 5–8, transverse in pod, 4–5 mm long, 5–6 mm wide, oblong, flat, smooth, red-brown. **Figs 1, 2.**

Diagnosis. Weakly ascending to erect lignotuberous shrub to 0.4 m high; vegetative parts and calyx covered in arcuate (curved) white hairs; inflorescence cymose with chiefly 4–6 flowers; pods sparsely covered in appressed arcuate hairs; seeds transverse, 5–8.

Distribution. Occurring in a broad arc from Maranboy to Pine Creek, and from Mary River and Kakadu national Parks to Ramingining in central Arnhemland (Fig. 3).

Habitat. Recorded growing in *Eucalyptus tetradonta* (Darwin stringybark) or *E. tetradonta* – *E. miniata* (Darwin woollybutt) open woodland on white sands or grey sandy loams; the sand at times derived from sandstone or granite.

Phenology. Flowering sporadically throughout the year with the most collections made in February and March. One specimen (Cowie 8444) notes flowering after a dry season fire. Fruiting predominantly in February and March, but has also been recorded in April, May and October.

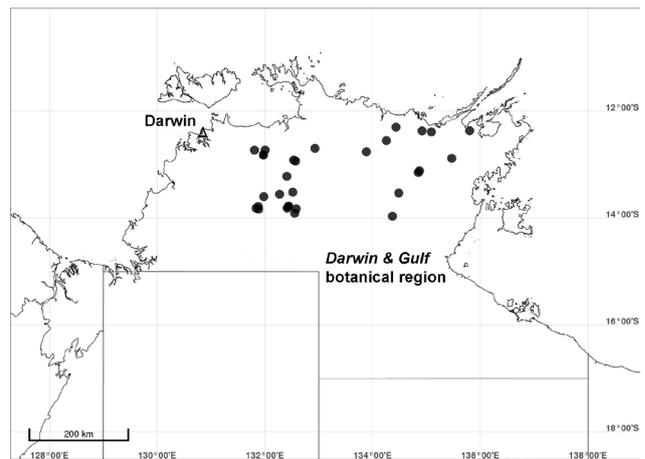


Fig. 3. Distribution of *Senna arcuata* in the Northern Territory.

Affinities. *Senna arcuata* shows strong affinities with both *S. heptanthera* (F.Muell.) Randell and *S. procumbens* Randell, with major differences presented in Table 1; frequently the characters observed in *S. arcuata* are intermediate between the other two. All three species are prostrate to weakly ascending. Vegetatively, *S. heptanthera* differs from *S. arcuata* by having an indumentum of straight hairs rather than curved, having fewer leaflet pairs (1–2 vs. 2–6 [–8]), broader leaflets (20–40 mm vs. 5–20 mm wide) and hairy stipules that are tardily caducous, and inflorescences with more flowers (8–10 vs. 4–6 [–8]). Comparing *S. procumbens* with *S. arcuata*, the former is glabrous except for the occasional sparse hairs on young petioles and peduncles, in contrast to an obvious indumentum of curved hairs and longer leaflets (40–50 mm vs. 12–37 mm); in general, there are more flowers per inflorescence (5–8 vs. 4–6 [–8]) and the pods tend to contain more seeds (7–10 vs. 5–8).

Previously this species was often identified and filed as *S. oligoclada*. Although a highly variable species, it can be readily distinguished from *S. arcuata* by its taller habit (up to 3 m tall) and the fact that it is often single-stemmed (vs. multistemmed), lacks a lignotuber (vs. lignotuber present), and has caducous bracts (vs. persistent).

Conservation Status. *Senna arcuata* occurs in Nitmiluk, Mary River and Kakadu national parks. The lignotuberous nature of this species, observed on some specimens, means it is resilient to frequent fires. It is listed as ‘Least Concern’ under the *Territory Parks and Wildlife Conservation Act 2000*.

Etymology. The epithet is Latin and means ‘curved’ or ‘arched’ as in a bow, and refers to the curved hairs found on all vegetative parts of the plant.

Selected specimens examined

NORTHERN TERRITORY: **Darwin and Gulf.** Along Kakadu Hwy in hills just N of Barramundi Gorge turnoff, 21 Feb. 1982, *K. Brennan 1883* (fr.; DNA); 6 km E of turnoff

Table 1. Comparative characters between *Senna heptantha*, *S. procumbens* and *S. arcuata*.

Character	<i>Senna heptantha</i>	<i>Senna procumbens</i>	<i>Senna arcuata</i>
Habit	Prostrate	Prostrate, often long trailing stems	Weakly ascending to erect, sometimes decumbent
Stem in transverse section	Terete to subterete	Quadrangular	Quadrangular becoming terete
Hairs on stems and petioles	Straight, patent	Glabrous	Hooked, patent
Leaflet pairs	1–2	2–3	2–6 (–8)
Leaflet shape	Obliquely ovate, apex obtuse	Linear to narrow lanceolate, apex acute	Elliptic to obovate, apex obtuse or acute
Hairs on leaf margins	Curved or hooked	Glabrous or very sparse hooked	Hooked, patent
Glands	Only between lowest leaflet pair	Between all leaflet pairs	Between all leaflet pairs
Leaflet width (mm)	20–40	10–15	5–20
Stipules	Tardily caducous, hairy	Persistent, glabrous	Persistent, hairy
Flower number per inflorescence	8–10	7–10	4–8
Seed number in pod	5–7	7–10	5–8

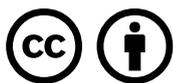
to Ramingining on Bulman to Gove Rd, 23 Sep. 1987, *M.J. Clark 1465* (fl.; DNA); Raymingurr Rd, Arnhemland, 6 Oct. 1987, *M.J. Clark 1603* (fl.; DNA, NSW); Near Emu Springs, central Arnhemland, 20 Sep. 1999, *I.D. Cowie 8444* & *C.R. Dunlop* (fl. & fr.; DNA); 68 miles [109 km] NE of Maranboy police station, 5 Mar. 1965, *M. Lazarides* & *L.G. Adams 75* (fl.; CANB, DNA); 16 miles [26 km] W of El Sharana, Pine Creek Rd, 22 Jan. 1973, *P. Martensz* & *R. Schodde 480* (fl.; AD, BRI, CANB, DNA, MEL, NSW, NT); Nitmiluk N.P., 22 May 2001, *C.R. Michell 3090* & *S. Boyce* (fr.; BRI, DNA); Nitmiluk N.P., North Murrumbidgee Plateau, 9 Apr. 2002, *C.R. Michell 3696* (fr.; DNA); *loc. cit.*, 28 Mar. 2002, *C.R. Michell 3697* (fl.; DNA); 6.5 km NE of Pine Creek along Kakadu Hwy, 21 Jan. 1999, *J.A. Risler 97* & *D.L.W. Low Choy* (fl. & fr.; DNA).

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