

Eulalia simonii R.M.Butler & Trudgen (Poaceae: *Andropogoneae*), a new species from the Pilbara and Gascoyne bioregions of Western Australia

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Summary

Butler, R.M. & Trudgen, M.E. (2021). *Eulalia simonii* R.M.Butler & Trudgen (Poaceae: *Andropogoneae*), a new species from the Pilbara and Gascoyne bioregions of Western Australia. *Austrobaileya* 11: 45–55. *Eulalia simonii* R.M.Butler & Trudgen is described. It differs from all other Australian *Eulalia* Kunth species in having elongated rhizomes, and from Australian material of the widespread *E. aurea* (Bory) Kunth in its larger and paler spikelets, broader lamina, and usually very small awns which are rarely visible past the glumes. A distribution map, photographs, drawings of floral parts, and a key to *Eulalia* taxa currently recognised for Australia are provided.

Key Words: Poaceae; *Eulalia*; *Eulalia simonii*; Australia flora; Western Australia flora; new species; taxonomy; identification key

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Introduction

Eulalia Kunth (Poaceae tribe *Andropogoneae* Dumort.) has some 35 described species worldwide (Clayton *et al.* 2006), of which four described species (*E. annua* B.K.Simon, *E. aurea* (Bory) Kunth, *E. mackinlayi* (F.Muell.) Kuntze, and *E. trispicata* (Schult.) Henrard), and one phrase-named species (*E. sp.* Sabai Island (J.R.Clarkson 7801) (Simon *et. al.* 2007) have been accepted by the Australian Plant Census (CHAH 2018) as occurring in Australia. Two other phrase-named species, *Eulalia sp.* (Three Rivers Station, B.Forsyth AQ789133) (the species described here), and *E. sp.* (Jindy, JMR-MM 140) are recognised on the website ‘AusGrass2’ (Simon & Alfonso 2011) as also occurring in Australia. The type for the genus, *Eulalia aurea*, was described from Réunion Island and is currently considered to also occur in Australia, Africa, and Asia. *Eulalia annua* and *E. mackinlayi* are only known from northern Australia. *Eulalia trispicata* is known from eastern Australia (Queensland), Asia, and India.

The new species described here as *Eulalia simonii* was first recognised as an undescribed species in 2008 by Dr Ken Tinley. He sent material from Three Rivers Station (190 km north of Meekatharra, Western Australia, in the Gascoyne bioregion) to Bryan Simon (1943–2015). Simon confirmed it as a new species in the genus *Eulalia*, and included *E. simonii* as *E. sp.* (Three Rivers Station, B.Forsyth AQ789133) on the website ‘AusGrass2’ (Simon & Alfonso 2011).

Some years later, specimens of *Eulalia* were collected during vegetation surveys undertaken by Biota Environmental Sciences (Biota) in the Pilbara bioregion (DoEE 2012); these were sent to Simon who identified them as *E. sp.* (Three Rivers Station, B.Forsyth AQ789133). Additional collections from later surveys provided further material for the delimitation and formal description of the species. These additional collections, together with re-examination of material held from

previous field surveys, suggest that the taxon is not uncommon in the Pilbara bioregion, occurring in parts of the Hamersley Range and on the Chichester Plateau.

Materials and methods

The description here of *Eulalia simonii* is based on examination of dried and pressed material collected by Biota and other consultancies, as well as observations made in the field of habit and habitat preferences. All measurements were taken from dried material. Microphotographs were taken using an Olympus UC50 camera mounted on an Olympus SZX10 microscope fitted with a 1.5 \times objective lens. The images were compiled in Helicon Focus (Version 6). The key to species is based on the ‘AusGrass2’ (Simon & Alfonso 2011) key and information from descriptions of the *Eulalia* species available on ‘GrassBase’ (Clayton *et. al.* 2006). The distribution map was produced using MapInfo Professional Version 12.0.1.

Taxonomy

***Eulalia simonii* Butler & Trudgen, sp. nov.** with affinity to *E. aurea* but differing in the elongated rhizomes (versus short), the longer spikelets (5–7 mm versus 3.5–15 mm) and the linear-lanceolate leaf lamina (versus linear). **Typus:** Western Australia. PILBARA BIOREGION: 44.7 km W of Mulga Downs Homestead, 69.2 km NNE of Tom Price and 89.9 km ESE of Kanjenjie Homestead, 7 April 2013, *E. Ridley* BES 00767 (holo: PERTH 9257098; iso: BRI, CANB, K, NSW *distribuendi*).

Eulalia sp. (Three Rivers Station, B.Forsyth AQ789133); (Simon & Alfonso 2011).

Rhizomatous clonal perennial, rhizomes buried *c.* 10 cm below surface. Culms numerous, closely packed, ascending to erect, unbranched, neither robust nor slender, firm, 25–100 cm long; cataphylls 0.5–3.5 cm long, lanceolate, shortly sericeous for lower 1/5–1/4; hairs white. Ligule membranous, shallowly curved, *c.* 0.6 mm long, upper half divided ciliolate. Leaves differentiated into sheath and blade. Leaf blade base constricted into a short false petiole; false petiole bone

coloured, thinly hairy. Lamina (mid-culm) linear-lanceolate, 4–28 cm long, 3–9 mm wide, fairly firm, tip long-acuminate; densely veined above and below, the veins rounded, midrib distinctly widened, flattened and whitish on the adaxial surface near the orifice, tapering along the blade, narrower and rounded on the abaxial surface; adaxial and abaxial surface sparsely hairy, the hairs long, fine, simple, with bulbous bases. Leaf sheath sparsely to moderately hairy, the hairs long, fine, simple, with bulbous bases; margins more densely hairy, hairs the same as on the sheath. Inflorescence digitate; a terminal cluster of 2–4 erect racemes. Racemes 4–9.5 cm long; densely hairy except the upper part of the glumes and where the spikelets are appressed to the rachis. Rachis flexuose, fragile, disarticulating at the nodes with age, 3-sided, sides flat, that opposite a sessile floret glabrous, shiny, the other two flat or slightly rounded, pubescent, dull, sometimes with a slight central ridge, margins densely hairy; hairs 1–6.5 mm long, very pale brown. Rachis scar shallowly to steeply angled, broad ovate in outline, punctate. Spikelets in pairs, one sessile and one pedicelled, both fertile, similar. Pedicels linear, densely hairy; hairs 2–6 mm long (hairs longer toward pedicel apex). Spikelets narrow-elliptic in outline, dorsally compressed, 5–7 mm long, falling entire, deciduous from the base. Spikelet callus scar steeply angled, ovate in outline. Lower glume chartaceous, dorsally compressed, 2-keeled, narrow-elliptic in outline with a truncate tip, 5–6.5 mm long, *c.* 1.2 mm wide, medium brown in the lower half, paler in the upper half; densely long hairy in the lower half, upper half glabrous or sparsely short hairy except for a fringe of short hairs on the tip that extends a short distance down the margins; 7–13 distinct veins. Upper glume chartaceous, laterally compressed with narrow in-rolled margins, 1-keeled, narrow-elliptic in outline with a truncate tip, 5–6.4 mm long, *c.* 1 mm wide, medium brown in the lower half, paler in the upper half; densely long hairy along the midrib and in the lower third, sparsely hairy in the middle and glabrous or sparsely short hairy in the upper half except for a fringe of short hairs

on the tip that extends a short distance down the margins; 3–5 distinct veins. Fertile lemma reduced to a hyaline structure, narrow-oblong; 1–3 mm long; without keels; 1-veined (3-veined rarely); margins ciliate, apex lobed; muticous, or 1-awned; awn from a sinus, very fine, not geniculate, 1–9 mm long (usually not exerted from floret), with simple hairs. Palea present, shape variable but usually lanceolate, c. 1.3 mm long, hyaline. Lodicules 2, cuneate, c. 0.3 mm long, hyaline, apex lunate. Anthers 3, 3–3.9 mm long. Caryopsis not seen. **Figs. 1–6.**

Additional selected specimens examined: Western Australia. c. 87.2 km WSW of Mungaroo Range Nature Reserve, 81.1 km NNW of Tom Price & 196 km WNW of Marillana Homestead, May 2012, *Butler BES 00305* (NSW, PERTH); 50.9 km W of Mulga Downs Homestead, 74 km NNE of Tom Price & 81.1 km ESE of Kanjenjie Homestead, Apr 2013, *Adam BES 00766* (PERTH); 27 km N of Mt Sheila, 32 km SW of Mt Florence & 48 km SE of Kanjenjie Outstation, May 2012, *Butler BES 00768* (PERTH) (**Fig. 3**); NE of Mt Brockman, *s.dat.*, *de Kock PLDK03-04* (BRI); NW of Hamersley, May 2011, *de Kock SERN056:1* (BRI); Three Rivers Station, headwaters of Gascoyne River, Jan 2010, *Forsyth s.n.* (BRI: AQ789133 & AQ789134); 44.7 km W of Mulga Downs Homestead, 69.2 km NNE of Tom Price & 89.9 km ESE of Kanjenjie Homestead, Mar 2012, *Maier et al. BES 00302* (MEL, PERTH); 24.3 km WSW of Mulga Downs Homestead, 75.1 km NE of Tom Price & 111.4 km ESE of Kanjenjie Homestead, Mar 2012, *Venkatasamy & Colwill BES 00303* (PERTH) (**Fig. 1**); c. 21 km SW of Mulga Downs Station, 45 km NW of Auski Roadhouse & 71 km E of Mt Sheila, Mar 2012, *Butler BES 00765* (PERTH); 49.9 km WNW of Marillana Homestead, 64.7 km SE of Mulga Downs Homestead & 122.6 km E of Tom Price, Mar 2012, *Flaherty & Glover BES 00304* (K, PERTH); c. 39 km SE of Auski Roadhouse, 52 km W of Marillana Homestead & 47 km ESE of Mt Bruce, May 2011, *de Kock BES 00763* (PERTH); 44.7 km ESE of Mount Bruce Homestead, 102.4 km WSW of Warrie Homestead & 112.6 km NW of Newman, May 2012, *Butler & Flaherty BES 00772* (PERTH); c. 67 km SE of Auski Roadhouse, 87 km NW of Newman & 141 km E of Tom Price, Jun 2007, *Morgan BES 00764* (PERTH); 41.3 km SSW of Marillana Homestead, 69.4 km NW of Newman & 74.3 km E of Juna Downs Homestead, Mar 2011, *de Kock & Colwill BES 00760* (PERTH).

Distribution and habitat: *Eulalia simonii* is known from over 60 records in the Chichester and Hamersley subregions of the Pilbara bioregion of Western Australia and one record from the Augustus subregion of the Gascoyne bioregion (**Map 1**). As it has been confused in the past with the widespread *E. aurea*,

the new species may be somewhat more widespread than current records indicate. The predominance of collections in the Pilbara bioregion compared to the Gascoyne bioregion probably reflects the much larger amount of survey work for environmental impact assessment in the former region in the last 20 years.

Known collections of *Eulalia simonii* are from valley floors (**Fig. 7**) and drainage areas, ranging from minor drainages to large ephemeral rivers. Most specimens were recorded as coming from reddish-brown clay loam, but sometimes red-brown clay or loam.

Collections have been recorded from three broad vegetation types: *Eucalyptus xerothermica* L.A.S.Johnson & K.D.Hill and/or *Corymbia hamersleyana* (D.J.Carr & S.G.M.Carr) K.D.Hill & L.A.S.Johnson) low open woodland; *E. victrix* L.A.S.Johnson & K.D.Hill, *Acacia citrinoviridis* Tindale & Maslin open woodland; and mixed *Acacia* spp. tall shrubland. Common understory species recorded in the shrub stratum of these vegetation types were *A. pyrifolia* DC. var. *pyrifolia*, *A. tumida* var. *pilbarensis* M.W.McDonald, *Androcalva luteiflora* (E.Pritz.) C.F.Wilkins & Whitlock, *Dodonaea lanceolata* F.Muell. and *Gossypium robinsonii* F.Muell. In the low shrub/herb stratum, common species were *Alternanthera nana* R.Br., *Boerhavia coccinea* Mill., *Arivela viscosa* (L.) Raf., *Afrohybanthus aurantiacus* (Benth.) Flicker and *Pluchea rubelliflora* (F.Muell.) B.L.Rob. while in the grass stratum, *Chrysopogon fallax* S.T.Blake, *Eragrostis tenellula* (Kunth) Steud., *Eulalia aurea*, *Paraneurachne muelleri* (Hack.) S.T.Blake, *Themeda triandra* Forssk. and *Triodia epactia* S.W.L.Jacobs were commonly present.

Phenology: Fertile specimens of *Eulalia simonii* have been collected from March to May. Timing of rainfall is variable where *E. simonii* is known to occur and therefore flowering times are likely to be similarly variable and extend outside this part of the year.



Fig. 1. Specimen of *Eulalia simonii* (Venkatasamy & Colwill BES 00303, PERTH).



Fig. 2. *Eulalia simonii*. Ligule and adaxial leaf surface (*Ridley BES 00767*, PERTH).



Fig. 3. *Eulalia simonii*. Abaxial leaf surface and leaf sheath (*Ridley BES 00767*, PERTH).



Fig. 4. *Eulalia simonii*. Part of inflorescence (*Ridley BES 00767*, PERTH).



Fig. 5. *Eulalia simonii*. Pedicellate spikelet (Ridley BES 00767, PERTH).

Affinities: *Eulalia simonii* has a quite different form to Australian material referred to as *E. aurea*. It forms clonal patches to more than 3 m across of small tussocks joined by long underground rhizomes (Fig. 8). The individual tussocks are fewer culmed and shorter than those of *E. aurea*, which in the Pilbara usually occurs as single tussocks, not in patches. The broader leaves of *E. simonii* that become prominently curled on maturity easily distinguish it from other Pilbara *Eulalia* material, as do the paler, more robust and more densely hairy inflorescences with shorter or no visible awns.

Notes: The veins on both the upper and lower glumes of *Eulalia simonii* vary significantly in number and degree of development. The width of the lamina varies significantly but is consistently wider than in Pilbara material referred to as *E. aurea*.

The original collection given the geographic name *Eulalia* sp. (Three Rivers Station, B.Forsyth AQ789133) by Bryan

Simon is on the PERTH database, but could not be found in the collections in 2014; however, there is a duplicate at BRI. Its location is shown near the Three Rivers Station Homestead (Map 1).

Eulalia simonii keys to the genus *Eulalia* in the key to grass genera in Clayton & Renvoize (1986) (spikelets paired; spikelets bisexual; rachis internodes slender, lemmas awned; pedicellate and sessile spikelets similar and both fertile; inflorescence of single or subdigitate racemes (not panicle); inflorescence terminal (not axillary); spikelets paired (not in groups of three); lower glumes convex, spikelets conspicuously hairy; raceme rachis fragile, only one spikelet pedicellate; lower glume as long as the upper, villous; callus short, spikelets dorsally compressed). In Watson & Dallwitz (1992), *Eulalia simonii* fits the description for *Eulalia* except that in *E. simonii*, the leaves are linear-lanceolate, not 'linear'. In the latter publication, the lemma awn is described as 'much longer than the body of the lemma'; in the new species

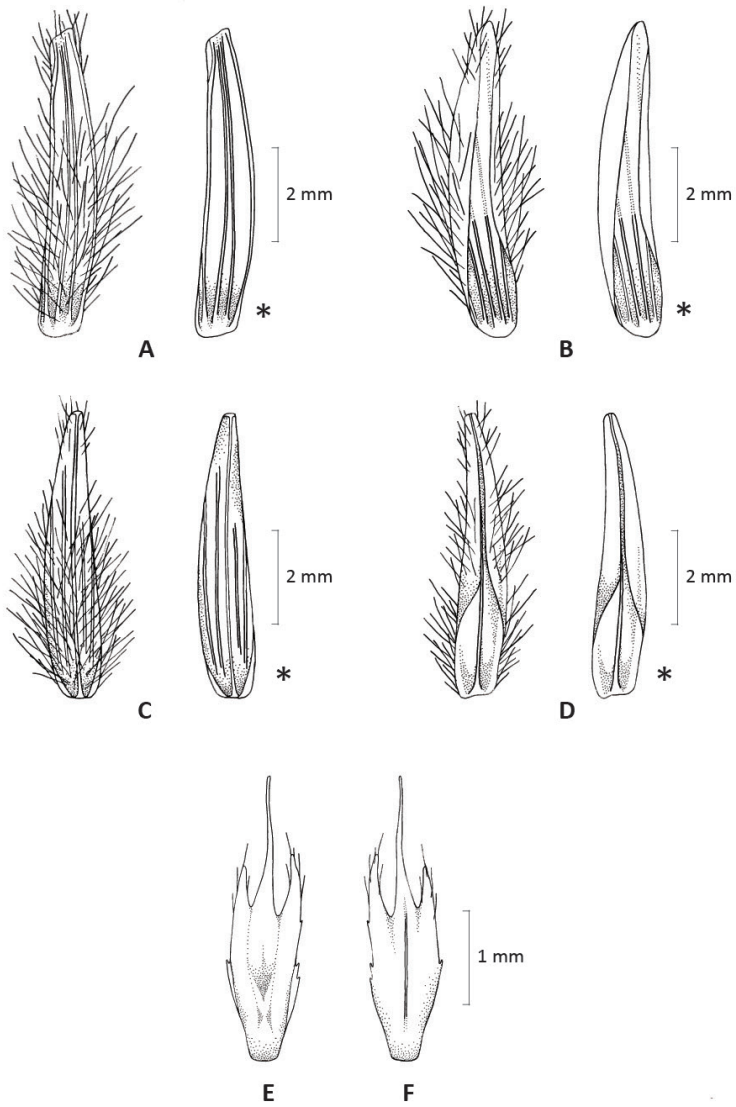


Fig. 6. *Eulalia simonii*. A. Lower glume, back. B. Lower glume, front. C. Upper glume, back. D. Upper glume, front. E. Lemma front. F. Lemma back. *Denotes hairs removed. A–F from *Butler BES 00768* (PERTH). Del. S. Werner.

the lemma is 1–3 mm long and the awn is 1–9 mm long, so this fits the specimens of the taxon with less modified lemmas. The lower glume in *Eulalia simonii* is 7–13 nerved, not ‘1–9 nerved’; however, it is not unusual for the variation in a genus to expand when new species are described. *Eulalia simonii* fits within the morphological variation described for the genus *Eulalia* reasonably well based on the parameters given in these two publications (Clayton & Renvoize, 1986; Watson & Dallwitz, 1992). However, it differs from described Australian *Eulalia* species by

its combination of elongated rhizomes, broad leaves, large spikelets, and usually very small awns which do not extend past the glumes on most specimens (**Table 1**).

Conservation status: *Eulalia simonii* is moderately widespread and common. A status of **Least Concern** is recommended (IUCN 2012).

Etymology: The new species is named for the late Bryan Simon (1943–2015) who made significant contributions to the taxonomy of Australian grasses during his long and successful career.



Fig. 7. *Eulalia simonii*, showing tussocks that are linked by rhizomes (*cf.* **Fig. 8**), the reddish colour that its leaves turn to as the environment dries and the habitat on the narrow floodplain of a creek, c. 70 km NW of Wittenoom. Photo: S. Ford

Table 1. Comparison of *Eulalia simonii* to the other *Eulalia* species currently accepted as occurring in Australia

Species	Plant height	Rhizomes	Spikelet length	Leaf blade	Lemma length	Lemma awn
<i>E. annua</i>	10–45 cm	Absent	2.5–3 mm	Linear, 1–3 mm in width	c. 0.5 mm	1-awned, from a sinus, 18–20 mm in length
<i>E. aurea</i>	40–150 cm	Present, short	3.5–5 mm	Linear, 3–6 mm in width	c. 1 mm	Muticous or 1-awned, from a sinus, 0–20 mm in length
<i>E. mackinlayi</i>	140–250 cm	Absent	6–8 mm	Linear, 1–6 mm in width	c. 1 mm	1-awned, apical, 20–27 mm in length
<i>E. sp.</i> (Sabai Island J.R.Clarkson 7801)	60–80 cm	Unknown	3–3.5 mm	Shape unknown, 1–2.5 mm in width	c. 1.5 mm	1-awned, from a sinus, 5–7 mm in length
<i>E. simonii</i>	40–100 cm	Present, elongated	5–7 mm	Linear-lanceolate, 3–9 mm in width	1–3 mm	Muticous or 1-awned, from a sinus, 1–9 mm in length
<i>E. trispicata</i>	30–130 cm	Absent	3.5–4 mm	Linear, 1–5 mm in width	c. 1.5 mm	1-awned, from a sinus, 7–15 mm in length

Identification key to Australian *Eulalia* species

- 1 Annual. ***E. annua***
1. Perennial **2**
- 2 Plants tall (1.5 m tall or taller), robust, with fulvous, fibrous base ***E. mackinlayi***
2. Plant less than 1.5 m tall **3**
- 3 Racemes more than 5 per inflorescence. ***E. trispicata***
3. Racemes usually less than 5 per inflorescence **4**
- 4 Spikelets greater than 5 mm long, rhizomes elongated. ***E. simonii***
4. Spikelets 5 mm long or less, rhizomes not elongated or absent **5**
- 5 Spikelets 3.5 mm long or longer, leaves 2–6 mm wide. ***E. aurea***
5. Spikelets 3.5 mm long or less, leaves 1–2.5 mm wide ***E. sp.* (Sabai Island J.R.Clarkson 7801)**



Fig. 8. *Eulalia simonii*. Elongated rhizomes and clusters of culms of plants, c. 70 km NW of Wittenoom. See **Fig. 7** for habitat photo from the same location. Photo: R. Butler.

Acknowledgements

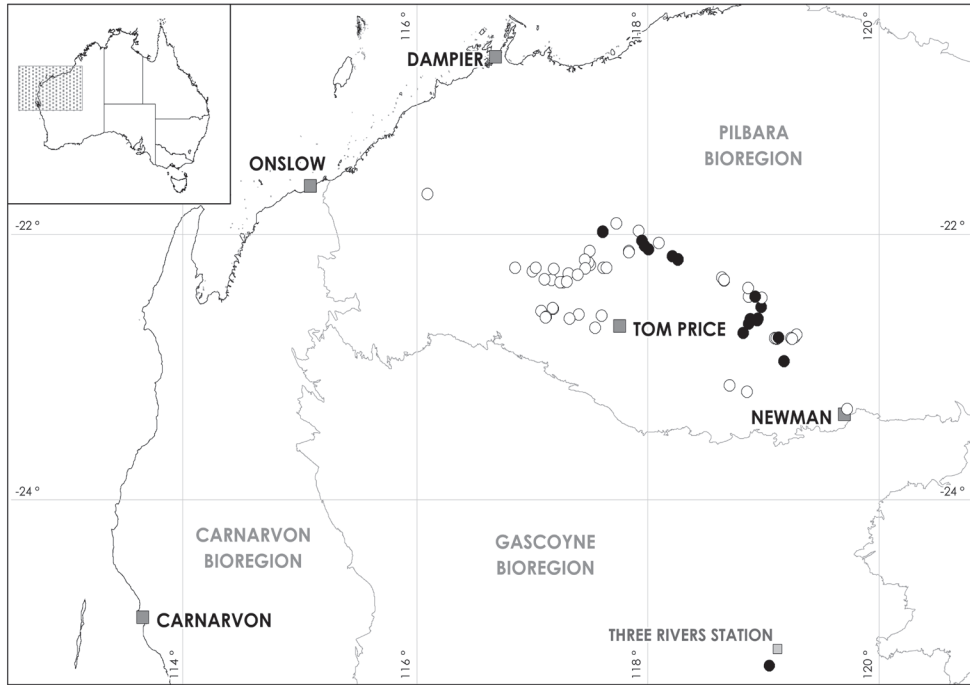
We are grateful to Biota for providing the use of a vehicle and research time for R.M. Butler; and time for K. Webster to draw **Map 1**. We would like to acknowledge Biota botanists as well as B. Morgan and S. Colwill for collecting *Eulalia simonii* specimens cited in this paper and Biota zoologist S. Ford for the photo in **Fig. 7**. We are grateful to Scott Werner for his excellent illustrations in **Fig. 6**. Michi Maier kindly provided comments on the manuscript.

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Map 1. Distribution of *Eulalia simonii* in the Pilbara and Gascoyne bioregions. ● = vouchered specimens, ○ = records based on sterile (not vouchered) material.