

A synopsis of *Anthoxanthum* (Poaceae: Pooideae: Poeae) in southern Africa and description of a new subspecies

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Summary. A new subspecies of *Anthoxanthum* (Pooideae: Poeae) from South Africa was identified, described, illustrated and compared with similar members of the genus.

Key Words. lemma, South Africa, spikelet, taxonomy.

Introduction

Anthoxanthum L. is a genus of temperate C₃ grasses with ± 20 species throughout the world (Gibbs Russell *et al.* 1990; Fish 2000). The genus is most diverse in the temperate regions of the northern hemisphere, especially Asia, from where it extends southwards through the African mountains (Afrotropical Region) with a secondary centre of diversity in southern Africa (±4 species in southern Africa and 1 naturalised). The main objective of this paper is to describe a new subspecies of *Anthoxanthum* from southern Africa, to present a synopsis of the genus and determine additional characters to define species in the region. Specimens from the National Herbarium (PRE) were examined.

Stapf (1899) described three species for southern Africa namely *Anthoxanthum dregeanum* (Nees) Stapf, *A. ecklonii* (Nees ex Trin.) Stapf and *A. tongo* (Trin.) Stapf. All are endemic to southern Africa, except *A. ecklonii* which is widely distributed in southern Africa. During a taxonomic treatment of the genus a new subspecies was identified, which in the present contribution is described, illustrated and compared with similar members of the genus.

Taxonomic Treatment

Anthoxanthum L., *Species Plantarum*: 28 (Linnaeus 1753). Type species: *Anthoxanthum odoratum* L.

An annual or perennial, tufted to decumbent; stoloniferous or rhizomatous; sometimes aromatic. *Leaf blade* linear, expanded and often folded; ligule an unfringed membrane. *Inflorescence* a narrow, spike-like panicle; spikelets solitary, sessile or pedicelled. *Spikelet* moderately laterally compressed, disarticulating above the glumes; glumes unequal, similar, membranous with hyaline margins, glabrous to hairy, awnless; lower glume 1 – 5-nerved; upper glume 3-nerved. *Florets* 3, lower 2 florets male or sterile with lower lemma(s) longer than the uppermost lemma, membranous, hairy, 5 – 7-nerved, apex 2-lobed, lowest lemma with a short straight awn from above middle of the back, second lemma awned from near the base, awn geniculate; uppermost floret bisexual, lemma glabrous, awnless; palea without keels, usually 1-nerved. *Lodicules* 0. *Stamens* 2 or 3 (rarely). *Ovary* glabrous; styles long, plumose. *Caryopsis* hilum short; embryo small.

PHOTOSYNTHETIC PATHWAY. C₃; XyMS+.

CYTOLOGY. $x = 5$ (polyploidy).

SPECIES. ± 20. North temperate regions of the world and the mountains of tropical Africa. Apart from the African species, the genus is found in Europe, Asia and North America; ± 4 in southern Africa (1 naturalised), Lesotho, South Africa: Mpumalanga, Free State, KwaZulu-Natal, Eastern and Western Cape.

Key to species

1. Lower glume 1-nerved. 2
Lower glume 3 – 5-nerved. 5
2. Glumes subacuminate; lower lemma not densely hairy, pilose or hairs somewhat shaggy. 1. **A. brevifolium**
Glumes acute to acuminate; lower lemma densely or sparsely hairy 3

3. Lower lemma 3.0 – 3.5 mm long, always dark brown, densely hairy; anther 4.0 – 4.5 mm long 4. **A. odoratum**¹
Lower lemma 3.5 – 5.0 mm long, pale to light brown, usually sparsely hairy; anther 2.0 – 2.3 mm long. . . . 4
4. Lower glume 5.0 – 6.0 mm long; lower lemma 5.0 mm long; spikelet length 6.0 – 8.5 mm long
. 3a. **A. ecklonii** subsp. **ecklonii**
Lower glume 3.5 – 4.0 mm long; lower lemma 3.5 – 4.5 mm long; spikelet length 5.2 – 6.5 mm
long. 3b. **A. ecklonii** subsp. **natalense**
- 5 (1). Inflorescence small, oblong, contracted or reduced to a scanty raceme; plant delicate and weak, straggling to
loosely tufted; leaves soft. 5. **A. tongo**
Inflorescence spike-like, fairly dense, occasionally interrupted near the base; plant usually distinctly and
densely tufted and erect; leaves usually rigid and pungent 2. **A. dregeanum**

1. Anthoxanthum brevifolium Stapf (1910: 59). Type: South Africa, Eastern Cape: Barkly East Division; on Ben McDhui (Wittebergen), 2955 m, Galpin 6884 (holotype PRE!; isotypes: BOL, photo!; K, photo!).

Tufted rhizomatous perennial 150 – 220 mm high; leaves crowded at the base. *Leaf blade* up to 37.5 × 5.6 mm, short, broad, apex blunt. *Inflorescence* contracted, spike-like, 30 – 40 mm long. *Spikelet* 7 mm long; glumes subacuminate, glabrous or scabrid on the back, keels smooth or scaberulous; lower glume 5 mm long, 1-nerved, subhyaline; upper glume 7 mm long, 3-nerved, longer than and enfolding the spikelet; lower lemma 5.5 mm long, 5-nerved, light brown, hairs not dense but somewhat shaggy or pilose; upper floret lemma 2.0 mm long, glabrous, awnless; anther 2.4 mm long.

RECOGNITION. This species is known only from the type collection. Except for the very short, broad leaf blades and subacuminate glume, this specimen is difficult to distinguish from *Anthoxanthum ecklonii* which has acute to acuminate glumes.

DISTRIBUTION. Endemic. South Africa: Eastern Cape.

FREQUENCY IN SOUTHERN AFRICA. Rare.

SPECIMENS EXAMINED. SOUTH AFRICA: Eastern Cape: Barkly East Division; on Ben McDhui (Wittebergen), 2955 m, Galpin 6884 (holotype PRE!; isotypes: BOL, photo!; K, photo!).

CONSERVATION STATUS. Data deficient — Taxonomically Problematic (DDT) (Victor *et al.* 2007).

PHENOLOGY. Flowering March.

2. Anthoxanthum dregeanum (Nees) Stapf (1899: 466). Type: South Africa, Western Cape, "Cape Good Hope".

Hierochloa dregeana Nees ex Trin. (Trinius 1839: 83). Type as above.

Tufted, rhizomatous perennial 200 – 600 mm high. *Leaf blade* to 250 × 9 mm, linear, usually rigid, often folded, gradually tapering to a pungent point. *Inflores-*

cence spike-like, up to 80 mm long, occasionally interrupted near the base. *Spikelet* 6 to 7 mm long; glumes shortly acuminate, glabrous or minutely hairy on the backs, keels smooth or scaberulous; lower glume 4 – 5 mm long, 3-nerved; upper glume 6 to 7 mm long, 3-nerved, longer than and enfolding the spikelet; lower lemma 4 – 6 mm long, dark brown, hairy; upper floret lemma 2.0 – 3.0 mm long, glabrous, awnless; anther 2.6 – 3.9 mm long.

DISTRIBUTION. Endemic. South Africa: Western Cape.

FREQUENCY IN SOUTHERN AFRICA. Infrequent to locally common.

SPECIMENS EXAMINED. SOUTH AFRICA. Acocks 19885; Bolus 14668A, 14668B; Esterhuysen 26575; Liebenberg 4010; Rehm 806; Vlok 1283.

CONSERVATION STATUS. Least Concern (LC) (Fish & Victor 2005).

PHENOLOGY. Flowering Oct. to Jan.

ECOLOGY. On moist mountain slopes.

3a. Anthoxanthum ecklonii (Nees ex Trin.) Stapf subsp. **ecklonii** (Stapf 1899: 466). Type: South Africa, Western Cape, "Cape Good Hope".

Ataxia ecklonis Nees ex Trin. (Trinius 1839: 77). Type as above. *Hierochloa ecklonii* Nees (1841: 7). Type as above.

Loosely or densely tufted perennial 350 – 800 mm high; rhizomatous; base of culm usually bulbous. *Leaf blade* 70 – 250 × 4 – 9 mm, expanded or folded, tapering to a very fine acute point. *Inflorescence* spike-like, 40 – 130 mm long. *Spikelet* 6 – 8 mm long; glumes acute to acuminate, glabrous or scabrid on the backs, keels scaberulous; lower glume 5 – 6 mm long, 1-nerved, hyaline; upper glume 6 – 8 mm long, 3-nerved (rarely 1-nerved), sub-hyaline, longer than and enfolding the spikelet; lower lemma 5 mm long, pale to light brown, usually sparsely hairy; upper floret lemma 2.0 – 2.4 mm long, glabrous, awnless; anther 2.0 – 2.3 mm long.

RECOGNITION. Resembles *Anthoxanthum odoratum*, which has the lower lemma shorter (3.0 – 3.5 mm long), dark brown and densely hairy.

¹ Alien or exotic

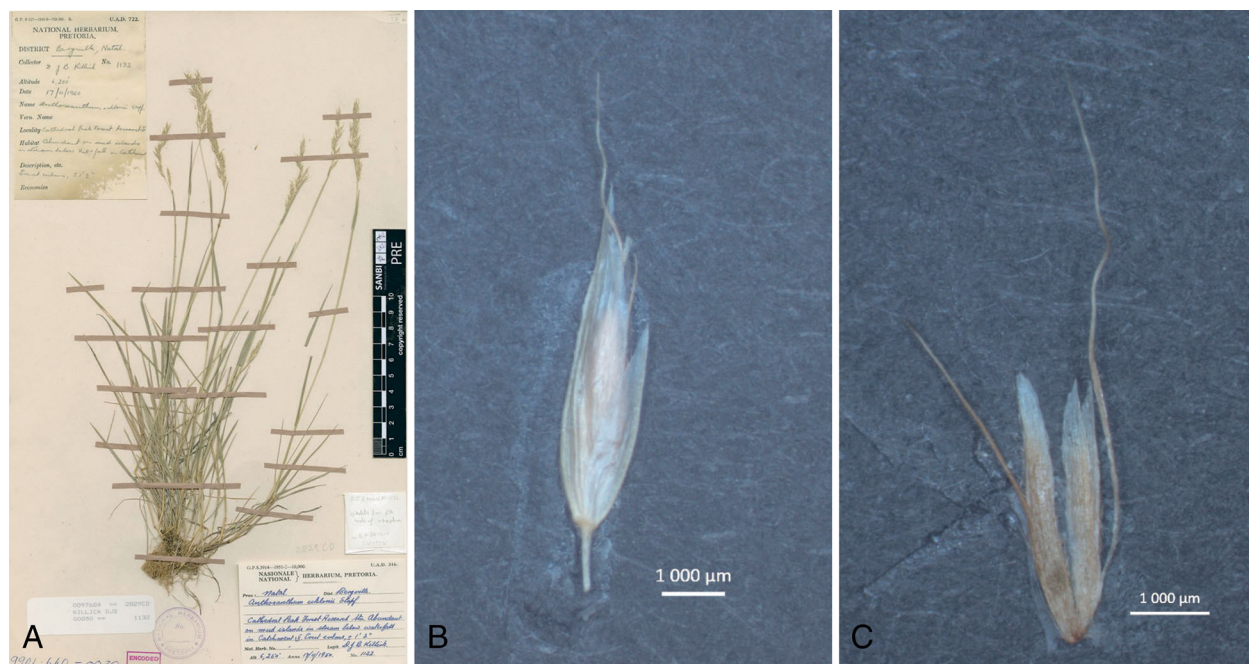


Fig. 1. *Anthoxanthum ecklonii* subsp. *natalense*. A habit; B spikelet; C lower lemma. D. J. B. Killick 1132 (PRE). PHOTOS: A. C. Mashau, specimen scanned by William Sepheka.

DISTRIBUTION. Possibly Malawi. Lesotho, South Africa: Mpumalanga, Free State, KwaZulu-Natal, Eastern Cape and Western Cape.

FREQUENCY IN SOUTHERN AFRICA. Infrequent but fairly widespread.

SPECIMENS EXAMINED. SOUTH AFRICA. *Acocks* 20194; *Killick* 1296; *Moss* 1738; *Roberts* 3297; *Smook* 1192, 4804.

CONSERVATION STATUS. Least Concern (LC) (Fish & Victor 2005).

PHENOLOGY. Flowering Dec. to April.

ECOLOGY. Usually in moist places such as stream sides and on grassy mountain slopes, extending to forest margins.

3b. *Anthoxanthum ecklonii* (*Nees ex Trin.*) *Staff* subsp. *natalense* Mashau, subsp. nov. Type: South Africa, Kwazulu-Natal, 2829 (Bergville): Cathedral Peak Forest Research Station (–CD), 17 Nov. 1950, *D. J. B. Killick* 1132 (holotype PRE!).

<http://www.ipni.org/urn:lsid:ipni.org:names:77153655-1>

Loosely tufted perennial 300 – 430 mm high; rhizomatous. *Leaf blade* 60 – 150 × 1.5 – 4.5 mm, expanded

or folded. *Inflorescence* contracted, spike-like, 35 – 90 mm long. *Spikelet* 5.2 – 6.5 mm long; glumes unequal, acute to acuminate, glabrous, keels scaberulous; lower glume 3.5 – 4.0 mm long, 1-nerved; upper glume 5.2 – 6.5 mm long, 3-nerved; lower lemma sparsely hairy; lowest lemma 3.5 – 4.5 mm long, pale to light brown, awned from $\pm \frac{1}{2}$ – $\frac{2}{3}$ as long as lemma body; second lemma 3.5 – 4.5 mm long, awned from $\pm \frac{1}{3}$ as long as lemma body; upper floret lemma 1.5 – 2.0 mm long, glabrous, awnless; anther 1.5 mm long (Fig. 1).

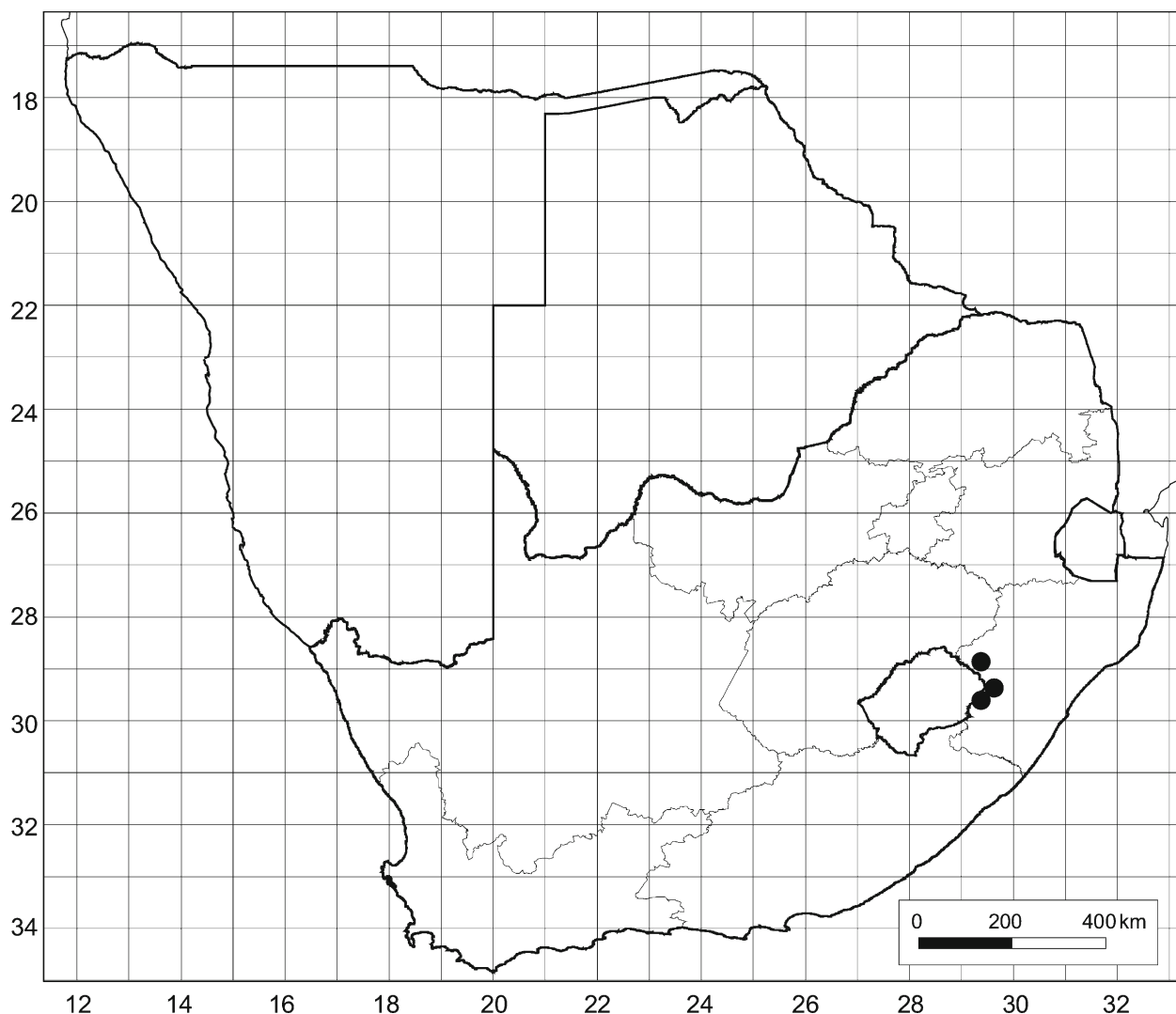
RECOGNITION. *Anthoxanthum ecklonii* subsp. *natalense* is similar to *A. ecklonii* subsp. *ecklonii*. Both subspecies have glumes with keels scaberulous and lower lemma sparsely hairy, but they differ in a number of characters as summarised in Table 1.

DISTRIBUTION. Known only from the broad arc of Drakensberg covering the surroundings of Bergville in the northern side, then south to Impendle and Underberg (KZN) (Map 1).

SPECIMENS EXAMINED. SOUTH AFRICA. KWAZULU-NATAL. 2829 (Bergville): Cathedral Peak Forest Research Station, (–CD), 20 Nov. 1951, *Killick* 1606 (PRE). 2929 (Escourt): Highest Forest Station (–BC), 15

Table 1. Differences between *Anthoxanthum ecklonii* subsp. *natalense* and *A. ecklonii* subsp. *ecklonii*.

Character	<i>A. ecklonii</i> subsp. <i>natalense</i>	<i>A. ecklonii</i> subsp. <i>ecklonii</i>
Spikelet length (mm)	5.2 – 6.5	6.0 – 8.0
Lower glume length (mm)	3.5 – 4.0	5.0 – 6.0
Lower lemma length (mm)	3.5 – 4.5	5.0



Map 1. Known distribution of *Anthoxanthum ecklonii* subsp. *natalense* ●.

Jan. 1966, *Killick & Vahrmejer* 3625 (PRE); (Mpendhle): Mulangane ridge, above Carter's Nek, (–BC), 5 Feb. 1984, *Hilliard & Burt* 17587 (PRE). 2929 (Underberg): Sani Pass, next to the Umkomazana R. (–CB), 18 Jan. 1977, *du Toit* 2295 (PRE); 5 – 7 miles NNW of Castle View farm, headwaters Mlahlangubo R. (–CB), 23 Jan. 1982, *Hilliard & Burt* 15360 (PRE); Cobham Forest Reserve, Lakes cave area (–CB), 12 Dec. 1982, *Hilliard & Burt* 15914 (PRE).

CONSERVATION STATUS: Not Evaluated.

PHENOLOGY. Flowering time: Nov. to Feb.

ECOLOGY. *Anthoxanthum ecklonii* subsp. *natalense* is associated with the Drakensberg Foothill Moist Grassland (Mucina & Rutherford 2006). Plants grow abundantly on mud islands in streams below waterfalls. The area is characterised by mudstones and sandstones of the Tarkastad] Subgroup and the Molteno Formation (Karoo Supergroup) as well as intrusive dolerites of the Jurassic age.

ETYMOLOGY. *Anthoxanthum* derived from the Greek word 'anthos' meaning flower; 'xanthos' means yellow,

referring to the yellow-green mature spikelets. The species epithet 'ecklonii' is in honour of Christian Frederick Ecklon (1795 – 1868) German-born South African apothecary and plant collector. The word 'natalense' denotes the origin of the subspecies, collected from Kwazulu-Natal, South Africa.

4. *Anthoxanthum odoratum*² L. (Linnaeus 1753: 28). Type: Europe. Sweet vernal grass.

Loosely or densely tufted perennial 300 – 600 (– 1000) mm high. *Leaf blade* 150 – 300 × 2 – 8 mm, expanded, apex acute to acuminate. *Inflorescence* spike-like, 10 – 90 mm long. *Spikelet* 7 – 10 mm long; glumes acute, hyaline, glabrous or minutely hairy on the back, keel scaberulous; lower glume up to 5 mm long, 1-nerved; upper glume 7 – 10 mm long, longer than and

² Alien or exotic

enfolding the spikelet; lower lemma 3.0 – 3.5 mm long, always dark brown, densely hairy; upper floret lemma 1.5 – 2.0 mm long, glabrous, awnless; anther 4.0 – 4.5 mm long.

RECOGNITION. *Anthoxanthum odoratum* resembles *A. ecklonii*, which has the lower lemma longer (5 mm long), lighter coloured and sparsely hairy.

DISTRIBUTION. Naturalised from Europe. Introduced in North and South America, Australia, Tasmania and New Zealand. South Africa: KwaZulu-Natal and Eastern Cape.

SPECIMENS EXAMINED. SOUTH AFRICA. *Acocks* 22118; *Moll* 1386; *Phillipson* 906.

FREQUENCY IN SOUTHERN AFRICA. Locally common.

CONSERVATION STATUS. Not Evaluated.

PHENOLOGY. Flowering Oct. to Feb.

ECOLOGY. Humic soils in moist, swampy areas.

USES. Introduced as a fodder grass to some countries. Fresh plant smells of coumarin.

5. *Anthoxanthum tongo* (Trin.) Stapf (1899: 467). Type: South Africa, Western Cape, "Cape Good Hope".

Ataxia tongo Nees ex Trin. (Trinius 1839: 78). Type as above.

Hierochloa tongo (Nees ex Trin.) Nees (1841: 71). Type as above.

Straggling or loosely tufted perennial 100 – 400 mm high; culm very fine; occasionally mat-forming. *Leafblade* 20 – 100 (– 170) × 2 mm, flat or folded, filiform to setaceous. *Inflorescence* small, up to 35 mm long, oblong, contracted or reduced to a scanty raceme, with very few spikelets. *Spikelet* 5 – 7 mm long; glumes acute, glabrous or pilose on the back; lower glume up to 5 mm long, 3 – 5-nerved; upper glume 5 – 7 mm long, 3-nerved, longer than and enfolding the spikelet; lower lemma ± 4 mm long, creamy white to light brown, densely hairy; upper floret lemma 1.8 – 2.3 mm long, glabrous, awnless; anther 2.5 – 3.2 mm long.

DISTRIBUTION. Endemic. South Africa: Western Cape.

FREQUENCY IN SOUTHERN AFRICA. Locally common.

SPECIMENS EXAMINED. SOUTH AFRICA. *Acocks* 23021; *Ellis* 5146; *Esterhuysen* 28443, 33603; *Kruger* 815; *Rycroft* 712.

CONSERVATION STATUS. Least Concern (LC) (Fish & Victor 2005).

PHENOLOGY. Flowering Sept. to Feb.

ECOLOGY. In moist shady places in the shelter of rocks and in shallow crevices.

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