

Tropical Forages

Bothriochloa bladhii subsp. *glabra*

Scientific name



Bothriochloa bladhii (Retz.) S.T. Blake subsp.
glabra (Roxb.) B.K. Simon

Synonyms

Basionym: *Andropogon glaber* Roxb.; *Bothriochloa glabra* (Roxb.) A. Camus

Family/tribe

Family: *Poaceae* (alt. *Gramineae*) subfamily:
Panicoideae tribe: *Andropogoneae*.

Morphological description

Variable subspecies; ascending to erect, tufted perennial with short rhizomes, sometimes rooting at the nodes of prostrate stems; foliage 40–80 cm, culms largely unbranched, 1–1.5 m high at maturity. Leaf blades glabrous or hairy, 20–30 (–50) cm long and 5–7 (–10) mm wide, linear-lanceolate, tapering gradually from the base to a fine point; ligule membranous.

Inflorescence a panicle, comprising up to 20, mostly simple, green to purplish racemes. Seed unit comprising sessile and pedicellate spikelet, with 11–18 mm awn arising from the sessile spikelet. Leaves and inflorescence strongly aromatic when crushed. 1.6 million seed units/kg.

ssp. *glabra*: lower glumes of the sessile spikelets always pitted, 3–3.5 mm long

subsp. *bladhii*: lower glumes of the sessile spikelets not or very rarely pitted, 3.5–4 mm long

Common names

Africa: blouklosgras, blouklossiesgras, kahlblättriges stinkgras, persklossiegras (Afrikaans); apuoyo (East Africa); cawkitiningel (Nigeria); gèrgétièm, gèrkèndièl, kumba ndiargandal (Senegal)

Asia: □□□□ chou gen zi cao (China); mon-tsuki-gaya (Japan); yaa khaem khok, ya khi ma (Thailand); huyệt thảo nhãn, huyệt thảo không lông, cỏ cờ nhãn, cỏ lá tre (Vietnam)

English: Australian bluestem, Australian beardgrass, old world bluestem, Caucasian bluestem, plains bluestem (USA); Burnett River bluegrass, forest bluegrass (Australia); purple plume grass

Pacific: Latoka grass, thamboni grass (Fiji); desum (Palau); muu (Yap)

India: donda, dhunda, gundha goorana, jhara, kachi gadi, kasi gadi, khar, khar jhara, koda johor, loari, matring, mular, nilon, sandhor, sudugan, sundhaur, tambat

Note: Because of the fine distinction in taxonomy, common names may refer to either subsp. *glabra* or subsp. *bladhii*.

Distribution

Native:



Ascending to erect, tufted perennial with short rhizomes (cv WW- B.Dahl)



Comparison of subsp. *glabra* cultivars with subsp. *bladhii* ecotype (L to R: cv. Swann, cv. WW-B. Dahl, Australian native subsp. *bladhii*)



Panicle comprising up to 20 racemes



Seehead of subsp. *bladhii* (L); subsp. *glabra* cv. Swann (middle), WW-B. Dahl (R)



Inflorescence (close-up)



Seed units; note dorsal pit in lower glumes of the sessile spikelet



Nursery plot (cv. Swann/CPI 11408)

Bothriochloa bladhii (Retz.) S.T. Blake is a diverse species native to many countries through Africa, Asia and Australasia. The distributional limits for subsp. *glabra*, which is distinguished from subsp. *bladhii* (syn. *B. intermedia*) by the presence of pits on the lower glume of the sessile spikelet, are not clear. References in the literature to *Bothriochloa glabra*, may correctly refer to this subspecies, or incorrectly to other members of the complex. Because of the fine distinction in the taxonomy, common names may refer to either subspecies. It appears that subsp. *glabra* is largely confined to India, Indonesia, Madagascar, and south central Africa, from Zambia to north and east South Africa.

Now naturalized elsewhere, including Australia. To date, cultivated material originates (or probably originates) from India.

Uses/applications

Forage

Primarily used as permanent pasture on lower fertility soils. Fine leaf and stem make good hay providing cut before flowering. Limited value for standover feed due to high concentration of inflorescences and loss of quality due to rust disease.

Environment

Useful for revegetating overgrazed pastureland.

Ecology

Soil requirements

Grows on moderately fertile and infertile soils, provided exchangeable aluminium levels are fairly low, with textures from sandy loam to clays and hard-setting clay loams; pH from 5.5 to 8.4.

Moisture

Occurs naturally on alluviums, but also in 'veis' in areas with rainfall to >2,000 mm, often with a distinct dry season. A drought-hardy species, particularly if well grazed to reduce the amount of foliage and hence, water use. Cultivars have been successful mostly in areas with rainfall >750 mm, although can tolerate as low as 600 mm/yr. Can stand temporary waterlogging and flooding, but not tolerant of permanently wet conditions.

Temperature

Occurs from sea level near the equator to >2,500 m at 32° latitude, representing a difference of some 14 °C in average annual temperature over the distributional range. Grass temperatures where cultivars have been successful can be as low as -8 °C.

Light

It has low to moderate shade tolerance, occurring naturally in savannahs, open forests and grasslands.

Reproductive development

Flowers throughout the growing season, although cultivars have a flush of flowering towards the end of March in the southern hemisphere subtropics.

Defoliation

Tolerant of heavy grazing by cattle and sheep, adjusting growth habit to prostrate to accommodate pressure. Grazing should be managed to maintain as leafy a sward as possible, entailing increasing grazing pressure at flowering if necessary.

Fire

Very tolerant of fire.

Agronomy

Guidelines for establishment and management of sown forages.

Establishment

Fresh seed has low germination and takes 6–7 months after harvest to reach maximum germination. Establishes well from seed broadcast onto a cultivated surface, sown at 1–3 kg/ha. This is a fluffy seed, so there may be benefit in pelleting de-awned seed to make it easier to pass through planting equipment.

Fertilizer

Not fertility demanding. Responds to moderate inputs (30–60 kg/ha) of applied nitrogen on infertile soils.

Compatibility (with other species)

Grows well with legumes and other grasses. May become dominant when sown with more palatable grasses such as *Digitaria eriantha*.

Companion species

Grasses: *Bothriochloa pertusa*, *B. insculpta*, *Heteropogon contortus*.

Legumes: *Aeschynomene falcata*, *Chamaecrista rotundifolia*, *Listia bainesii*, *Stylosanthes guianensis* var. *intermedia*, *S. hamata*, *S. scabra*, *Trifolium subterraneum*.

Pests and diseases

In Australia, the same pests and diseases attack introduced varieties, as are found on the native ecotypes of *Bothriochloa bladhii*. Seed crops can be adversely affected by a leafhopper, *Balclutha rubrostriata* (Cicadellidae) that infests the inflorescence. Leaf rust caused by *Puccinia duthiae* is often severe late in the growing season, and is favoured by wet weather. The combination of rust affected leaf and the high stem component at flowering renders the forage unpalatable to livestock late in the growing season in lightly summer-grazed stands.

Ability to spread

Spreads by seed, colonising away from the parent stand under favourable conditions. Can spread into sward grasses such as *Axonopus fissifolius* and *Digitaria didactyla*.

Weed potential

Shows indications of becoming a weed of turf.

Feeding value

Nutritive value

CP levels of 7–14% and IVDMD of up to 58% have been recorded. The higher levels decline rapidly with age of regrowth and with the onset of flowering.

Palatability/acceptability

Cultivars and elite accessions are well accepted by all grazing livestock when young and leafy. Less acceptable as leaf ages, and with flowering and attack by rust disease. Not as palatable as *Digitaria eriantha* or *Bothriochloa pertusa* at the same stage of growth, but 50–80 % of available forage consumed. Indonesian ecotypes appear to be unpalatable at all stages.

Toxicity

No record of toxicity.

Production potential

Dry matter

Yields of rain-grown forage between 5 and 10 t/ha DM, and >20 t/ha DM under fertilized, fully irrigated conditions.

Animal production

90–135 kg/hd LWG and 0.5–0.9 kg/hd/day over 5–6 month growing season. In a seasonally cold, sub-humid environment, can raise carrying capacity from 1.5 sheep/ha to 4 sheep/ha when used in association with legume.

Genetics/breeding

Facultative or obligate apomict. While *Bothriochloa bladhii* is recorded as having chromosome number of $2n = 40, 50, 60, 80$, there is no record of the chromosome number for subsp. *glabra* specifically, although most for *B. glabra* and *Andropogon glaber* cite a value of 40. Introgresses with *Dichanthium* and *Capillipedium* in native populations.

Seed production

It is possible to obtain a light crop early in the growing season, and a heavy crop later in the season. *Balclutha rubrostriata* (leafhopper) can be controlled with dimethoate if numbers become excessive. Small plot yields of up to 500 kg/ha clean seed have been achieved.

Herbicide effects

Tolerant of pre- and post-emergent (2–3-leaf stage) applications of metsulfuron methyl and triasulfuron. Susceptible to imazapic in both pre- and post-emergent treatments.

Strengths

- Grows on low fertility soils.
- Drought tolerant.
- Tolerates heavy grazing.

Limitations

- Less palatable than some other C4 grasses.

- Susceptible to leaf rust.
- Becomes unpalatable with maturity and rust.

Selected references

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Duch-Carvalho T. (2005) WW-B.Dahl Old World Bluestem in sustainable systems for the Texas High Plains. Dissertation in agronomy submitted to the Graduate Faculty of Texas Tech University in partial fulfillment of the requirements for the degree of Doctor of Philosophy. https://www.depts.ttu.edu/foragerresearch/Articles/Duch-Carvalho_Teresa_diss.pdf

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Cultivars

'Swann' (CPI 11408) Released in Australia in 1994. Introduced as *Andropogon ischaemum* (subsequently revised to *B. ischaemum*, and then to current status). From Guyana Highlands (4° N). Similar in most respects to 'WW-B. Dahl', suggesting northern Indian origin. Selected for persistence in low fertility, hard setting, upland soils in the sub-humid subtropics where few other C4 grasses survive.

'WW-B.Dahl' (PI 300857, A-8965, WW-857) Released in Texas USA in 1994. From Manali, India (32° N, 2,600 m asl, rainfall 1,600 mm, 7 months dry season). Erect, lower-growing, leafy, multi-culmed type, foliage usually about 50 cm high, becoming prostrate under heavy grazing. Extensively tested in Texas. Higher yielding but less winter hardiness than other old world bluestems.

Note: Cultivars have much in common with *Bothriochloa ischaemum* (L.) Keng and *Bothriochloa caucasica* (Trin.) C.E. Hubb., the latter now being considered synonymous with *Bothriochloa bladhii* (Retz.) S.T. Blake. Ecologically comparable with *B. decipiens* var. *decipiens* and *B. macra* in Australia.

Promising accessions

CPI 52194 From Mampikony, Madagascar (16° S, 130 m asl, rainfall 1,600 mm). More robust tussock type, well grazed in screening trials in Australia.

CPI 104802A From Madhya Pradesh, India (23° N, 450 m asl, rainfall 1,420 mm). Shortly stoloniferous type, well grazed. in screening trials in Australia.

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