

Tropical Forages

Stenotaphrum spp.

Scientific name

Stenotaphrum dimidiatum (L.) Brongn.

Stenotaphrum secundatum (Walter) Kuntze

Synonyms

Stenotaphrum dimidiatum: Basionym: *Panicum dimidiatum* L.; *Stenotaphrum glabrum* Trin.

Stenotaphrum secundatum: Basionym: *Ischaemum secundatum* Walter

Note: Early publications used names such as *Stenotaphrum dimidiatum* var. *americanum* (Schrank) Hack., *Stenotaphrum dimidiatum* var. *secundatum* (Walter) Domin, *Stenotaphrum glabrum* var. *americanum* (Schrank) Döll, and *Stenotaphrum glabrum* var. *glabrum*, all now considered to be what is now accepted as *Stenotaphrum secundatum* (Walter) Kuntze. This has led to some confusion regarding identity, particularly where variety is not included and authorities are not cited with the taxon name.

Family/tribe

Family: *Poaceae* (alt. *Gramineae*) subfamily: *Panicoideae* tribe: *Paniceae* subtribe *Cenchrinae*.

Morphological description

Stenotaphrum dimidiatum: Densely stoloniferous perennial, with deep fibrous roots at stolon nodes; rhizomes sometimes present; culms 6–40 (–60) cm tall. Leaf sheaths strongly flattened, keeled, folded often in fan-shaped array; ligule a ciliate membrane, 0.5 mm long; leaf blades 3–20 cm long, 5–12 mm wide, glabrous, folded along the midrib when young, long-elliptic to linear-lanceolate, apex rounded or obtuse. Inflorescence a false spike, central axis 6–12 (–15) cm long, 2–3 (–6) mm wide, slightly flat on one side, rounded with hollowed out depressions opposite, each depression containing 2–7 spikelets in compact racemes inserted alternately either side of a wavy midrib; broad acute tooth beside each depression on axis margin; subulate barren extension at top of axis; spikelets lanceolate oblong, dorsally compressed, 4–5 mm long, 1–2 mm wide, deciduous with accessory branch structures. Caryopsis broadly elliptical to oblong, dorsally compressed, 3 mm long, 1.2 mm wide.

Stenotaphrum secundatum: Densely stoloniferous perennial, with deep fibrous roots at stolon nodes; culms 6–40 (–50) cm tall. Leaves stiff, blue-grey in colour (some varieties more green). Leaf sheaths strongly flattened, keeled, folded often in fan-shaped array; ligule a ciliate membrane, 0.3–0.5 mm long; leaf blades 5–15 (–30) cm long, 4–10 (–12) mm wide, sparsely villous at throat and on collar, otherwise glabrous; folded along the



Robust stem; leaf sheaths strongly flattened, keeled, folded often in fan-shaped array



With *Vigna hosei* under coconuts, Espiritu Santo, Vanuatu



Stoloniferous growth habit; durable groundcover



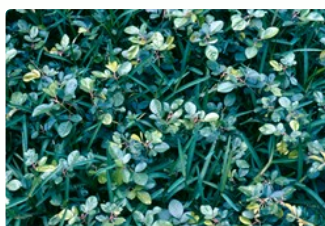
Inflorescence a false spike



Line illustration



With *Desmodium incanum*, Tanna Island, Vanuatu



With *Grona heterocarpa* ssp. *ovalifolium*, North Sulawesi, Indonesia



With *Grona heterophylla*



With *Vigna hosei*, Espiritu Santo, Vanuatu



With *Calliandra calothyrsus* under coconuts, Bali, Indonesia

midrib when young, long-elliptic, linear-lanceolate or linear, apex rounded or obtuse. Inflorescence a false spike, central axis 4–15 cm long, somewhat flattened on one side, rounded with deeply hollowed out cavities opposite, each cavity containing a single spikelet, (sometimes 2–3) inserted alternately either side of a wavy midrib; subulate barren extension at top of axis; spikelets lanceolate oblong, dorsally compressed, 4–5 mm long, 1–2 mm wide, deciduous with accessory branch structures. Caryopsis dark brown, ovoid, dorsally compressed, ca. 1.5 mm long.



Heavily grazed under coconut plantation, Vanuatu

Distinguishing features

S. *dimidiatum*: Axis of terminal inflorescence membranaceous, with tooth-like lobes behind upper racemes; racemes each fitting into a shallow cavity and comprising 3–8 spikelets.

S. *secundatum*: Axis of terminal inflorescence corky, entire on back; racemes more or less embedded in the axis and comprising 1–3 spikelets.

Common names

Stenotaphrum dimidiatum

Asia: yaa paak khwai, ya pak khwai (Thailand)

English: broad-leaf steno (Seychelles), buffalo grass, dogtooth grass, pemba grass

Indian Ocean: kounou ya poundra, nkunu (Comoros); herbe bourrique (Madagascar, Réunion, Rodrigues); ahipisaka (Madagascar); herbe bourik, bourik, bouriq, chiendent patte de poule (Mauritius); sangariatra bé malandi, salalia na poundra (Mayotte); chiendent boeuf, traïnasse (Réunion); chiendent bourrique, gros chiendent (Rodrigues); herbe coco, lerb koko (Seychelles); lauvulla (Tamil)

Latin America: pasto chato (Mexico)

Stenotaphrum secundatum

Africa, Southern: Augustinus gras, Augustinus kweek, buffelsgras, buffelskweek, Cape kweek, coast kweek, grove kweek, growwekweek, kweekgras, lidjieskweek, olifantskweek, rivierkweek, strandbuffelsgras, strand-buffelskweek (Afrikaans); uNgwengwe; marotlo-a-mafubelu (Sotho); umtombo (Zulu)

Asia: 结缕草 ce dun ye cao (China)

English: buffalo grass (Australia); St. Augustine grass (USA); buffalo couch (Vanuatu); Dutch grass, pimento grass (Jamaica); Charleston grass, buffalo quick grass, Cape quick grass, coarse couch grass, quick grass, ramsammy grass, seaside quick grass, salt grass, sheep grass; also called carpet grass, centipede grass, crabgrass, mission grass and wiregrass, which are more commonly used for species of *Axonopus*, *Eremochloa*, *Digitaria*, *Cenchrus* and *Aristida*, respectively.

Europe: chiendent de boeuf; courre à terre, fransawi, gros chiendent (French); amerikanisches Hohlspelzengras (German); erva-de-santo-agostinho (Portuguese); césped catalán (Spanish)

Latin America: cañamazo, carpeta de San Agustín, falso kikuyu, grama americana, grama de costa, grama San Agustín, gramón, gramillón, pasto alfombra, lastón, pasto colchón, pasto San Agustín, yerba de San Agustín (Spanish); grama-de-jardim, grama-inglesa, grama-italiana (Portuguese)

Pacific: 'aki'aki haole, mānienie 'aki'aki, mānienie 'aki'aki haole, mānienie māhikihiki (Hawaii); sipilini (Tonga)

Note: These species are closely related and bear a strong resemblance to one another. Consequently, many of the common names are used interchangeably.

Distribution

Stenotaphrum dimidiatum

Native:

Africa: Kenya; Mozambique; Tanzania; Zimbabwe

Indian Ocean: Madagascar; Mauritius; Réunion; Seychelles

Asia: India (Kerala); Sri Lanka

Naturalized:

Elsewhere in Paleotropics (tropical areas of Africa, Asia and Oceania but excluding Australia and New Zealand)

Stenotaphrum secundatum

Native:

Africa: Cameroon; Côte d'Ivoire; Ghana; Liberia; Nigeria; Senegal; Sierra Leone

Northern America: USA (Florida, Georgia (s.e.), Louisiana (s.), Mississippi (s.), North Carolina (e.), South Carolina, Texas); Mexico (e.)

Caribbean: Antigua and Barbuda; Bahamas; Cuba; Dominica; Guadeloupe; Hispaniola; Jamaica; Martinique; Puerto Rico; St. Kitts and Nevis; St. Lucia

Central America: Belize; Costa Rica; Guatemala; Honduras; Nicaragua; Panama

South America: Argentina (n.e.); Bolivia; Brazil (e.); Chile; Colombia; Ecuador; French Guiana; Guyana; Paraguay; Peru; Suriname; Uruguay; Venezuela (n.)

Other: exact native range obscure

Cultivated/naturalized:

Widespread across the world tropics and subtropics.

Uses/applications

Forage

Although a useful source of forage, these are rarely planted for that purpose, mostly occurring in natural swards. Can be conserved as silage, but needs to be cut before it becomes too fibrous. Not used for cut-and-carry. Excellent species for feeding livestock under trees.

Environment

Dense grazing-, shade- and salt-tolerance makes these species ideal for soil conservation in otherwise difficult environments. Once established, their dense sward resists weed invasion.

Other

Both produce good turf under regular mowing. While *S. secundatum* is the most commonly planted turf of the two, *S. dimidiatum* is being used as a gene source to improve insect and disease susceptibilities in *S. secundatum* cultivars. A decoction of *S. dimidiatum* rhizomes has been used as a diuretic and sudorific in folk medicine.

Ecology

Soil requirements

Although commonly found on siliceous and calcareous sands near the sea, these *Stenotaphrum* spp. are also found on a wide range of well or poorly drained soils, from sandy loams to light clays, even extending to heavier clays. Soils can be infertile to moderately fertile, with pH from (5.0–) 6.0 to 8.5 (calcareous sand), sometimes with salinity to 15 dS/cm. Foliage is also tolerant of wind-borne salt from the sea. *S. dimidiatum* might be less tolerant of salinity than *S. secundatum*, although reports vary, possibly due to misidentification.

Moisture

Both are found in marshy and well-drained land, commonly in areas with rainfall from 1,000 to >2,000 mm in the humid tropics and subtropics, although will colonise moister situations in areas down to 750 mm. While moderately drought tolerant, they prefer good moisture, and can withstand temporary flooding and waterlogging. They tend to grow in full sun in moister sites, preferring partial shade in drier sites.

Temperature

S. secundatum is native over a wide latitudinal range from equatorial regions in West Africa and Central America to warm temperate regions in the USA and Chile, whereas *S. dimidiatum* has a more restricted, largely tropical distribution, with minor exceptions in South Africa, one at 34° S. Both are largely found in lower altitudes near the coast, although *S. secundatum* is found from sea level to 1,300 m asl, growing best between about 20 °C and 30 °C, and a minimum of 10 °C. Diploid types of *S. secundatum* generally display better winter survival than polyploids and are more tolerant of cold and frost than many tropical grasses; triploid types have poor cool season growth. Survival under frosted winter conditions varies with cultivar. While *S. secundatum* has received more research attention by virtue of its widespread turf use, both have proved well-adapted beyond their native range.

Light

Both are found in open grassland and in forest situations, and are among the more shade tolerant tropical grasses. *S. secundatum* has been grouped with *Urochloa subquadripara*, *Axonopus compressus* and *Paspalum conjugatum* in terms of relative shade tolerance, maintaining yields down to 40% sunlight.

Reproductive development

S. dimidiatum flowers December-January in S India. While *S. secundatum* flowers October to May in subtropics in southern hemisphere, there is considerable variation in flowering time and intensity among naturalized and bred lines. The Vanuatu type flowers throughout the year whereas cv. Floratam is late flowering. Neither produces much seed at all relative to most other grasses, relying on vegetative spread. Diploid *S. secundatum* types are fertile, but triploid types produce very little seed, and tetraploid types are completely sterile.

Defoliation

Extremely tolerant of regular grazing or mowing, one recommendation being that it should be grazed every second week down to 6 cm.

Fire

No data available. Generally growing in areas where fire is not an issue.

Agronomy

Guidelines for establishment and management of sown forages.

Establishment

Propagated vegetatively (seed not commercially available), using well-rooted sprigs or 7-10 cm plugs, planted 30 cm apart in rows 60-70 cm apart. Can also be established by broadcasting stolons or sprigs at 3.5-7 m²/ha and discing them into the soil, and rolling. Can plant 10 ha from 1 ha of stolons. May take 5-6 months to form a complete cover, but less under light to moderate shade.

Fertilizer

Survive under low fertility, but responds well to N and P fertilization.

Compatibility (with other species)

Once established, they are very competitive, suppressing weeds. Can grow with twining stoloniferous and rhizomatous legumes.

Companion species

Grasses: Rarely found with other grasses.

Legumes: *Macroptilium atropurpureum*. Found in association with *Grona heterophylla*, *D. incanum*, *G. heterocarpa* subsp. *ovalifolia*, *G. triflora*, *Desmanthus leptophyllus*, *D. pernambucanus*, *Teramnus labialis*. Also planted with hedgerows of *Leucaena leucocephala* on coastal coralline plains or *Gliricidia sepium* on acid soils.

Pests and diseases

Attacked by southern chinch bug (*Blissus insularis*) in Florida and the hairy chinch bug (*Blissus leucopterus*) in Hawai'i (overcome using resistant varieties). Webworm and armyworm are also a problem, encouraged by high levels of N fertilizer. Susceptible to a range of nematodes including root knot (*Meloidogyne* spp.), reniform nematode (*Rotylenchulus reniformis*) and cyst nematode (*Heterodera leuceilyma*). Fungal diseases include brown patch (*Rhizoctonia solani*), grey leaf spot (*Pyricularia grisea*), dollar spot (*Sclerotinia*-like fungi) and flower smut (*Ustilago cynodontis*), mostly favoured by excessive precipitation. These diseases tend to be more a problem in the turf industry than with grazed native or naturalized swards. St Augustine decline (SAD) is a mosaic disease caused by a *Panicum* mosaic virus.

Ability to spread

Most spread is through the vigorous stolons. However, dissemination from seed does take place, evidenced by adventive occurrences away from existing populations.

Weed potential

Poses no serious weed threat. Reported as a minor weed in coastal environments. There are some reports of the plant invading native habitats

Feeding value

Nutritive value

Important to graze frequently. As with other tropical grasses, quality declines rapidly with age of regrowth, with N concentrations dropping from 2.7% to 1.0%, crude protein digestibility from 53% to 31%, and dry matter digestibility from 60% to 50%.

Palatability/acceptability

Both are palatable when young, being eaten by small and large ruminants.

Toxicity

Levels of oxalate in the dry matter are about 1% and unlikely to cause problems. *Stenotaphrum secundatum* has been implicated in a calcinosis (build-up of calcium deposits in the tissues) in cattle in Jamaica known as Manchester wasting disease, although livestock throughout the tropics have grazed the grass without apparent adverse effects.

Production potential

Dry matter

DM yields for both species vary considerably, probably reflecting differences in fertilizer use and growing conditions in general. DM yields of the order of 5 t/ha/yr DM are common in *S. secundatum*, although one estimate of >50 t green feed/ha/yr consumed by cattle is claimed. In *S. dimidiatum* DM yields over a 10 month period varied from about 2.8 t/ha cutting every 4 weeks to 6.4 t/ha with 12 week cuts. Unusually for a tropical grass, crude protein percentage remained quite high, averaging 17.6% at 4 weeks and 14.8% at 12 weeks.

Animal production

Long-term steer gains of 0.25-0.4 kg/hd/day are commonly reported in humid-tropical locations. Higher liveweight gains (0.61 kg/hd/day) have been reported over shorter grazing periods (6 months). When N fertilized, can produce 1,000 kg liveweight gain/ha, although 400 kg/ha or less under poorer conditions. Stocking rates vary from 1 or 2 head/ha, up to 7 yearlings/ha, depending on inputs.

Genetics/breeding

The base chromosome number for *S. dimidiatum* is $x=9$ with diploids ($2n=18$), tetraploids ($2n=36$), and aneuploids ($2n=48, 56$). The base chromosome number of *S. secundatum* is also $x=9$, with diploids ($2n=2x=18$), triploids ($2n=3x=27$), tetraploids ($2n=4x=36$), hexaploids ($2n=6x=54$), and aneuploids ($2n=28-32$). It is believed that *S. secundatum* emanates from a fertile diploid form of *S. dimidiatum*. There are two distinct variants of *S. secundatum* in South Africa, a sterile, triploid originating at the Cape of Good Hope, and a fertile diploid variant emanating from the Natal region of South Africa. Morphological mutation in the triploids is common, hence the considerable diversity that exists. The diploid forms of *S. secundatum* tend to be lower growing with narrower, translucent, bright green leaf blades, while the polyploids have coarser, thicker leaf blades that are blue/green and less saturated in color. Genetic resistance to grey leaf spot disease caused by *Pyricularia grisea*, the sting nematode and the southern chinch bug have been transferred from *S. dimidiatum* to *S. secundatum* in plant breeding programs.

Seed production

Both produce little or no seed and are propagated vegetatively.

Herbicide effects

Susceptible to 2,4-D when young. Susceptible to MSMA and CMA moderately so to atrazine when the herbicide is applied to sandy soil. Tolerant to oxadiazon and clopyralid. Controlled by glyphosate.

Strengths

- Extremely shade tolerant (excellent under coconuts).
- Good ground cover.
- Grows on poor soils.
- Salt tolerant (perhaps more so in *S. secundatum*).
- Stands heavy grazing.

Limitations

- Unpalatable when mature,
- Susceptible to nematodes,
- Must be established vegetatively,

Selected references

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Cultivars

Many cultivars of *S. secundatum* have been developed for use as turfs in the southern states of USA. However, no cultivars of either species have been specifically selected or bred for use as forages.

Promising accessions

Vanuatu ecotype of *S. secundatum*. Selected in Vanuatu and Indonesia. Strongly stoloniferous triploid type used extensively as a pasture/ground cover under coconuts throughout the Pacific Islands. Established more rapidly than 'Floratam' in agronomic trials in Indonesia. This is probably the variety from South Africa called 'Cape deme' (morphological subgroup) by Sauer (1972).

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