

Tropical Forages

Andropogon gayanus

Scientific name



Andropogon gayanus Kunth

Subordinate taxa:

Andropogon gayanus Kunth var. *bisquamulatus* (Hochst.) Hack.

Andropogon gayanus Kunth var. *gayanus*

Andropogon gayanus Kunth var. *polycladus* (Hack.) Clayton

Synonyms

var. ***bisquamulatus***: Basionym: *Andropogon bisquamulatus* Hochst.

var. ***polycladus***: Basionym: *Andropogon appendiculatus* var. *polycladus* Hack.; *Andropogon gayanus* var. *squamulatus* Stapf; *Andropogon squamulatus* Hochst.

Family/tribe

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

Morphological description

A tall perennial grass with short rhizomes, forming tussocks up to 1 m diameter; culms to 4 m. Complex root system: 1) fibrous roots close to the surface (produce the vigorous early growth/post dry season response to first rains); 2) thick cord roots that store starch and anchor the tussock; 3) vertical roots that can extract water at depth during the dry season. Leaves (up to 1 m long) green, becoming bluish under moisture stress, with a strong white midrib; hairy on both surfaces, particularly when young; leaf sheath up to 20 cm long, hairy at base; leaves may appear to have petioles as the leaf blade is reduced almost to the midrib above the ligule. The seed head is borne on tall strong culms; inflorescence is a false panicle (synflorescence) composed of paired racemes (rames) 4–9 cm long, bearing about 17 spikelet pairs; spikelets are sessile and have a long (~30 mm) conspicuous awn. Caryopsis, 2–3 mm long, 1 mm wide, about 890,000/kg, light brown to brownish black.

var. ***gayanus***: rachis internodes and pedicels ciliate along one margin. Pedicelled spikelet glabrous; sessile spikelet 6 mm long; awn of the sessile spikelet 10–20 mm long, and of the pedicelled spikelet 1–2 mm long.

var. ***polycladus***: rachis internodes and pedicels ciliate on both margins. Pedicelled spikelet glabrous or puberulous; sessile spikelet 5–6 mm long; awn of the sessile spikelet 15–30 mm long, and of the pedicelled spikelet 3–7 mm long.



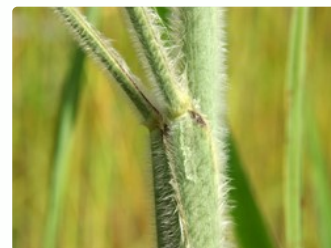
Leafy young growth



A tall perennial grass with short rhizomes, forming tussocks up to 1 m diameter



Leaf with a strong white midrib, hairy on both surfaces



Hairy leaf sheath and petiole-like leaf base with the leaf blade reduced almost to the midrib above the ligule



Inflorescence a false panicle composed of paired racemes (cv. Kent)



Part of inflorescence showing raceme pairs (rames)



Seed units



Seed units



Variability within one accession (CIAT 621)



Grazed stand, Colombia

var. *bisquamulatus*: like var. *polycladus*, but pedicelled spikelet hairy to villous.

cv. Kent grows to 4 m height and has pubescent leaves. Pedicels 4–5 cm long, conspicuously ciliate on both margins. Pedicelled spikelet 4–5 mm long, sessile spikelet 5–8 mm long, glabrous. Awn of sessile spikelet 15–30 mm long, and of pedicelled spikelet 5–10 mm long. Pedicelled spikelet puberulous or villous; hence Kent cannot be assigned to either var. *polycladus* or var. *bisquamulatus*, but resembles the latter in height.

Common names

Africa: grootbaardgras, Rhodesiese andropogon, hohes bartgras (Afrikaans); kota-kota, sola, tete-ialikota (Angola); sméné (Arabic); koumbossou, irouwa (Benin); wa (Gambia); purim pieklega, purim pielega (Ghana); dagué, guelori, kiené, mussa waga, nguon, uaga, waba, waga, wako, zara (Mali); ahamdoroem, ajeghar, dakhié, djabar, gamba, lali, radyaré, ranièré, soobre, subna, subu nya, teebeened, yayere, yawiri, yawur (Niger); bùgàná, dadeppure, ekpo, erè, eruwà, gábàà, , gámà, girman darr daya, igomough, iikube, ikpo, ikpo agu, jimfi, kalawal, madlbak, palawal, sefunkwe, sugu, sugu kal, suwu, suwu bul, suwu kal, waawan ruwa, welho (Nigeria); badoba, cicca, dagué, ebuk, etiub, gandany, ginyidi, guelori, hat, khat, kiené, makas, mediidi, mussa waga, o nduy, okas, soya, uaga, vaba, waga, waga gué, yev, yew, zara (Senegal); kabusa, puile (Sierra Leone); danye, dayye, kagarire, kessé, lanyere, mofogo, mokiri, mopaka, mopoko, pita, ranyere, soporé (Upper Volta); aruwa ako funfun, eruwa, eruwa ako, eruwa funfun (Yoruba)

Asia: sadabahar (India); batag (Tagalog), batad (Bikol), bukakau (Ilokano)(Philippines); ya kumba (Thailand); hung th'ao (Vietnam)

English: gamba grass, bluestem (Africa, Australia); Rhodesian andropogon (southern Africa); Rhodesian blue grass (Zimbabwe); onaga grass, tambuki grass (north-west Africa); bluestem (USA)

Europe: barbon (French); Gambagrass (German)

Latin America: capim andropógon (Brazil); andropogon, gambia, pasto gamba, rabo de zorro (Spanish)

Distribution

var. *bisquamulatus*

Native:

Africa: Benin; Burkina Faso; Cameroon; Central African Republic; Côte d'Ivoire; Gabon; Gambia; Ghana; Guinea; Guinea-Bissau; Mali; Mauritania; Nigeria; Senegal; Sudan

Common in savannah colonising denuded and waste land. Very palatable when young.

Cultivated/naturalized:

Africa, India, Australia, South America

var. *gayanus*

Native:

Africa: Angola; Benin; Burkina Faso; Cameroon (n.); Gabon; Ghana; Mali; Mauritania; Nigeria; Senegal; Sudan; Togo

var. *polycladus*

Native:



With tropical kudzu (*Neustanthus* (*Pueraria*) *phaseoloides*)



With *Seca stylo*, Northern Australia (cv. Kent)



With *Centrosema acutifolium* pasture, Colombia



Invading native forest



Invading native forest, N Australia

Africa: Benin; Botswana; Burkina Faso; Cameroon; Côte d'Ivoire; DRC; Gabon; Ghana; Guinea; Liberia; Malawi; Mali; Mauritania; Mozambique; Namibia; Senegal; Sierra Leone; South Africa (KwaZulu-Natal, Limpopo, Mpumalanga); Swaziland; Tanzania; Togo; Uganda; Zimbabwe

Uses/applications

Forage

Sown as permanent pasture; can be stocked heavily during the wet growing season (at 4–5 head/ha) making it useful for holding paddocks as it can feed a large number of cattle for a short time. Also cut for fresh feed and for fodder conservation by smallholders. Low fertility demand has allowed rehabilitation of run-down paddocks and degraded fields of *Megathyrus maximus* without the use of weed control or fertilizer.

Environment

Used in Nigeria for reclaiming overgrazed land. 10 m wide strips of *A. gayanus* have been planted in fields of millet to reduce wind erosion occurring at start of wet season. Strips captured >2,000 t sand/ha within 3 years.

Other

The thick culms are used for thatch in Africa.

Ecology

Native throughout tropical and subtropical Africa in regions with extended dry seasons. Occurs naturally in xerophytic grasslands on doleritic, sandy or clayey soils at altitudes up to 1,500 m asl.

Soil requirements

Adapted to a wide range of soil types - sands to clays, alkaline to strongly acid (pH 4–7.5), infertile to fertile - but grows best on loams of moderate fertility. Good tolerance of high AI (>80% saturation) through exclusion of the element, but not salinity. Can tolerate some temporary waterlogging. Var. *gayanus* occurs in seasonal swamps and hence has better adaptation to waterlogged soils.

Moisture

Can grow in environments with 400–3,000 mm annual rainfall, and withstand a strong dry season of up to 9 months, but prefers >750 mm rainfall with 3–7 months dry season. Its root system provides excellent drought tolerance with the leaf remaining green. Some types can stand short-term flooding but most have poor tolerance. It will grow with rainfall up to 2,500 mm provided there is a strong dry season, but may be less suitable than *Urochloa* spp. under such conditions.

Temperature

Best growth in lowlands of the tropics and warmer subtropics (to 20° of latitude) as growth is restricted where mean minimum temperature of the coldest month is below 4.4 °C. Leaves are killed by frost. Optimal flowering at 25 °C.

Light

Generally considered to require full sunlight but is productive under light shading or cloudy conditions. In Cuba, significantly reduced yields under the agroforestry tree, *Albizia procera*, were attributed to low light conditions.

Reproductive development

Short-day plant with a critical photoperiod of 12–14 hours. Seed is mature 32–44 days after first flowering.

Defoliation

Highly tolerant of cutting; good regrowth within 30 days. Good tolerance of both continuous and rotational grazing (35 days rest in wet season and 42 days in dry season recommended). Established stands can be grazed heavily (4 animals/ha in wet season, 1 animal/ha in dry season) with the large tussock bases persisting. Gamba grass should be grazed or cut to maintain new green leaf as mature growth of leaf and stem is coarse and of low nutritional value.

Fire

Resistant to fire (much better than *Urochloa decumbens* or *Hyparrhenia rufa*). Gamba tussocks recover well after fire with rapid development of new tillers, and are frequently burned every year in the early dry season. Ungrazed tussocks with dense leaf to 2 m and woody stems to 3 m at the end of the dry season constitute very heavy fuel loads and can generate intense fires.

Agronomy

Guidelines for establishment and management of sown forages.

Establishment

Gamba can be planted from seed (1–10 kg/ha) into prepared or semi-prepared seedbeds; it can also be established from young rooted tillers. Seed is difficult to harvest and clean mechanically so that seed quality may be low (e.g. a ratio of 5–15 kg uncleaned seed to 1 kg

pure seed). Seed should not be sown within 6 months of harvest due to dormancy. The fluffy seed is difficult to spread but can be sown through a drum seeder or out of a fertilizer spinner mixed with fertilizer.

Fertilizer

Gamba grass is tolerant of low fertility but seedling growth may be slow unless some additional P and K is applied on deficient soils. Without added N, it produced twice as much dry matter as *Urochloa decumbens* or *Megathyrsus maximus*.

Compatibility (with other species)

This tall tussock grass will combine well with twining and erect shrub legumes, but may need heavy defoliation to reduce competitiveness.

Companion species

Grasses: not normally sown with other grasses.

Legumes: *Centrosema molle*, *Neustanthus phaseoloides* and *Stylosanthes* spp. Has been grown with *Grona heterocarpa* subsp. *ovalifolia*, *G. heterocarpa* subsp. *heterocarpa*, *Arachis pintoii*, *Centrosema acutifolium* and *C. brasilianum*.

Pests and diseases

Good resistance to spittlebug (*Deois flavopicta*) in Brazil due to antibiotic, physical and anatomical features. In South America, colonies of leaf cutting ants (*Atta* and *Acromyrmex* spp.) can destroy stands of the grass.

Ability to spread

Seeds prolifically; as the light fluffy seed is produced at a height of 2–4 m above the ground, it can be spread by wind to naturalise as desirable or undesirable stands. Experience in northern Australia is that most seed falls within 1 m of the plant tussock but is spread by animals or machinery.

Weed potential

Gamba grass has been declared an environmental weed in monsoonal northern Australia because of its ability to spread and generate intensely hot fires. These fires can cause loss of infrastructure in semi-rural districts where the grass is not grazed; they can also alter the fire regime and change the savannah vegetation. In regions with strong and long dry seasons and light stocking rates, gamba pastures may not be able to be grazed heavily enough during the growing season to prevent excessive fuel loads accumulating.

Feeding value

Nutritive value

Nutritional value is moderate in young growth (on moderately fertile soils). CP 7–10% (up to 18% CP), but P levels can be low due to growth dilution in the wet season. Feed value decreases rapidly after flowering, and so conserved feed is often of little nutritional value.

Mature stems are best used for thatch. Variation in leafiness and intake was observed between genotypes evaluated in Colombia.

IVDMD is up to 63% during the wet season but drops to 30–40% at the end of the dry season.

Palatability/acceptability

Young growth of gamba grass is palatable. Well accepted by cattle throughout the year under moderate grazing pressures, but becomes coarse and fibrous if under-grazed.

Toxicity

No animal disorders reported.

Feedipedia link

April 2020: Page under construction

Production potential

Dry matter

Highly productive but DM yield (4–25 t/ha) up to 30 t/ha will depend on soil fertility and rainfall. In Brazil, *A. gayanus* has out-yielded species of *Urochloa*. In Northern Territory, Australia, annual yields of 4–9 t/ha (up to 20 t/ha) were recorded in regions with a 7–8 month dry season.

Animal production

Animal production on gamba grass savannah is low at 90–120 kg liveweight gain/head/yr because of weight loss during the dry season. Addition of a legume can raise this to 150 kg/head/yr. In the dry tropics of South America, with a 5-month wet season, LWGs up to 250 kg/ha/yr have been recorded.

Genetics/breeding

$2n = 20, 40$. Also aneuploids $2n = 35, 42, 43, 44$. Breeding behaviour is allogamous. Reproduces sexually with cross-pollination by wind. There is ample genetic variation within the species for many important traits.

Seed production

In Bolivia and Brazil (16–19° S), flowering is well synchronised in April, but synchronisation is poor at lower latitudes; flowering can continue during 30–60 days. Seed can be harvested with beater-type harvester or conventional header; production is high with 350 kg/ha being recorded. Commercial range for hand-harvested seed is 65–125 kg/ha. The fluffy seed is difficult to clean and needs to be de-awned to flow through machinery.

Herbicide effects

Gamba grass should be sprayed early in the wet season (when leaves are at least 40 cm long) or well before seeding and potential spread. Spraying early makes herbicide application easier as plants are smaller, less herbicide is required and good coverage is achieved. Every part of the plant should be sprayed to ensure adequate herbicide uptake. Slashing or burning old rank plants will promote fresh growth enabling more effective herbicide application.

Glyphosate 450 at 1 L per 100 L water is often used for spot spraying or 10 L/ha for boom spraying.

Strengths

- Drought-tolerant.
- Adapted to infertile soils but responds to fertility.
- High DM yields with young leaf palatable.

Limitations

- Low quality when mature resulting in management problems.
- Poor seedling vigour and unreliable establishment with low quality seed.
- Rapid spread from wind-blown seed.
- Potential environmental weed without grazing management.
- Susceptibility to leaf-cutting ants.

Internet links

[https://uses.plantnet-project.org/en/Andropogon_gyanus_\(PROSEA\)](https://uses.plantnet-project.org/en/Andropogon_gyanus_(PROSEA))

<https://research.csiro.au/cultivars/wp-content/uploads/sites/162/2017/03/kent.pdf>

https://nt.gov.au/_data/assets/pdf_file/0016/231424/gamba-grass-management-guide.pdf

Selected references

CIAT (1992) Pastures for the tropical lowlands: CIAT's contribution. International Center for Tropical Agriculture (CIAT), Cali, Colombia. <hdl.handle.net/10568/54510>

Schultze-Kraft, R. (1992) *Andropogon gyanus* Kunth. In: Mannerje, L.'t and Jones, R.M. (eds) Plant Resources of South-East Asia No. 4. Forages. Pudoc Scientific Publishers, Wageningen, the Netherlands. p. 42–44. <edepot.wur.nl/327785>

Thomas, D. and Grof, B. (1986) Some pasture species for the tropical savannas of South America. III. *Andropogon gyanus*, *Brachiaria* species and *Panicum maximum*. *Herbage Abstracts* **56**:557–565.

Toledo, J.M., Vera, R., Lascano, C. and Lenné, J.M. (eds). (1990) *Andropogon gyanus* Kunth: A grass for tropical acid soils. International Center for Tropical Agriculture (CIAT), Cali, Colombia. <hdl.handle.net/10568/54190>

Cultivars

All commercial cultivars in tropical America belong to var. *bisquamulatus*.

'**Carimagua 1**' (=CIAT 621, CPI 99640, ILRI 12465) Colombia (1980) CIAT 621 is an introduction from Shika, Nigeria.

'**Planaltina**' Brazil (1980) see 'Carimagua 1'; released in Brazil as alternative to *Urochloa decumbens* for use on acid infertile soils of the Cerrados.

'**Sabanero**' Venezuela and '**Veranero**' Panama (1983); '**San Martin**' Peru (1984); '**Llanero**' Mexico (1986); '**Andropogon**' Cuba (1988); '**Veranero**' Costa Rica, '**Otoreño**' Honduras, '**Gamba**' Nicaragua (1989); '**ICTA-Real**' Guatemala (1992) see 'Carimagua 1'.

'**Kent**' (CPI 2312) Australia (1986) Probably derived by natural selection following crossing within and between CPI 9207 (origin unknown), supplied as var. *squamulatus* (syn. *polycladus*) and CPI 2312 (from Zaria in Nigeria). 'Kent' cannot be assigned to var. *polycladus* or var. *bisquamulatus* as it has some morphological characteristics of each variety.

'Baeti' (EMBRAPA 23) Brazil (1995) Better establishment, more uniform, more productive, better recovery after defoliation than 'Planaltina'. Bred using half-sib progeny of 'Planaltina'.

Promising accessions

None reported.

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