Vachellia nilotica

Scientific name

Vachellia nilotica (L.) P.J.H. Hurter & Mabb.

Subordinate taxa:

Vachellia nilotica (L.) P.J.H. Hurter & Mabb. subsp. adstringens (Schumach.) Kyal. & Boatwr.
Vachellia nilotica (L.) P.J.H. Hurter & Mabb. subsp. cupressiformis (J.L. Stewart) Ragup. et al.
Vachellia nilotica (L.) P.J.H. Hurter & Mabb. subsp. indica (Benth.) Kyal. & Boatwr.
Vachellia nilotica (L.) P.J.H. Hurter & Mabb. subsp. kraussiana (Benth.) Kyal. & Boatwr.
Vachellia nilotica (L.) P.J.H. Hurter & Mabb. subsp. nilotica
Vachellia nilotica (L.) P.J.H. Hurter & Mabb. subsp. tomentosa (Benth.) Kyal. & Boatwr.

Synonyms

subsp. nilotica: Acacia arabica (Lam.) Willd.; Acacia nilotica (L.) Delile; Acacia nilotica subsp. nilotica (L.) Delile; Acacia scorpioidea (L.) W. Wight; Acacia vera Willd.

Note: Most published material refers simply to “Acacia nilotica”, without reference to subspecies.

Family/tribe

Family: Fabaceae (alt. Leguminosae)
subfamily: Caesalpinioideae (mimosoid clade*) tribe: Acacieae.


Morphological description

Variable species; perennial shrub or tree, 2.5–10 (~20) m tall. Branches spreading, forming a dense flat or rounded crown with dark to black coloured stems; branchlets purple-brown, shortly or densely pubescent, with lenticels. Bark rough, longitudinally fissured, deep red-brown to black. Deep tap root where conditions permit (well-drained, deep soil), but predominance of lateral roots in less well-drained situations. Spines thin, straight, light-grey in axillary pairs, 5–7.5 cm long in young trees, mature trees commonly without spines.
Leaves bipinnate 30–70 mm long, often with 1–2 petiolar glands and other glands between all or only the uppermost pinnae; pinnae 2–11 (–17) pairs, with 7–25 pairs of pinnules (1.5–7 mm long) per pinna. Peduncles clustered at nodes of leafy and leafless branchlets.

Flowers prolific, golden yellow, in globulous heads 1.2–1.5 cm in diameter. Pods straight or slightly curved, 5–15 cm long on a pedicel, 0.5–1.2 cm wide, with constrictions between the seeds (torulose), fleshy when young, indescent, becoming black and hard at maturity. Seeds deep blackish-brown, smooth, subcircular, compressed, areole 6–7 mm long, 4.5–5 mm wide. 5,000–16,000 seeds per kg.

Morphological groups

subsp. nilotica, tomentosa, cupressiformis, indica group: largely tall riverine trees that grow in seasonally flooded areas; pods have a characteristic "necklace" shape with constrictions between the seeds.

subsp. adstringens, kraussiana, leiocarpa, subalata group: grows in drier areas and has straight-edged pods, often with less-pronounced constrictions between the seeds.

Common names

Africa: lekkeruipeul (Afrikaans); bagana (Bambara); bagaruwa, bararuwa, marjee, namijin bagaruwa (Hausa); isanqawe, umtshanga (Ndebele); tugur (Somali); mgunga (Swahili); chea, gered chea, ghered (Tigrinya); mottlakgosi (Tswana)

English: babul acacia, black babul, Egyptian acacia, Indian gum-arabic-tree, prickly acacia, scentedthorn, thorn-mimos, thorny acacia

European: acacia à gomme, gommier rouge, acacia de Cayenne, acacia de savane (French); arabische Gummiaakazie, arabischer Gummibaum (German)

Indian Ocean: fantsikasia (Madagascar)

Indian subcontinent: सुल्तान बाबूल babala (Bengali); babaria (Gujarati); बबूल babool, बबर babur, किकर kikar (Hindi); nalla tumma (Telugu); babli (Kannada); karivelai (Tamil)(India); babar, لوَبَ babul, روَبَ babur (Urdu)(Pakistan); baabulu, katu kihiri (Sinhalese, Sri Lanka).

Spanish: acacia gomifera, goma arabica

Note: There are many more vernacular names under both *Acacia nilotica* and *Acacia arabica*.

Distribution

Native:

Africa: Algeria; Angola; Botswana; Chad; Egypt; Ethiopia; Gambia; Ghana; Guinea-Bissau; Kenya; Libya; Malawi; Mali; Mozambique; Namibia; Niger; Nigeria; Senegal; Somalia; South Africa (Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, North West); Sudan; Swaziland; Tanzania; Togo; Uganda; Zambia; Zimbabwe

Asia: Iran; Iraq; Israel; Oman; Saudi Arabia; Syria; Yemen

Indian Subcontinent: India; Nepal; Pakistan.

Naturalized:

Africa: Cape Verde

Asia: Sri Lanka; Indonesia

Australasia: Australia

South America: Ecuador (Galapagos Islands)

Caribbean: West Indies

Cultivated:

Asia: Indonesia; Myanmar; Pakistan; Sri Lanka

Caribbean: West Indies
Uses/applications

Forage
Browse and drought forage; foliage and seeds eaten by a wide range of herbivores.

Environmental
Used as pioneer species in land rehabilitation and as a barrier to desertification.

Other
Timber has been used to produce railway sleepers, fence-posts and as fuel-wood. Source of gum/resin, tannin/dyestuff; traditional medicine and vertebrate poisons. In the Sudan, timber trees are managed on a 15–20 year rotation, primarily for use as railway sleepers. The wood is heavy and durable and is used for heavy construction as well as tool handles and carts. Makes high quality charcoal and fuelwood.

Ecology

Soil requirements
Tolerates a wide range of soil types, thriving in alluvial and heavy clay soils with pH 5.0–9.0. When used in land reclamation, V. nilotica can be planted onto degraded saline/alkaline soils with a soluble salt content below 3%. Tolerance to clay, drought, heat, heavy soil, high pH, salinity and waterlogging.

Moisture
Adapted to annual rainfall of 300–2,200 mm. Vigorous in seasonally flooded environments.

Temperature
Grows from 0 to 1,340 m altitude, with an annual mean temperature of 18–28 °C. Tolerates extremes of temperature (-1–50 °C) when established, but is frost sensitive as a seedling.

Light
Seedlings are shade intolerant.

Reproductive development
Flower initiation is triggered by declining temperature and possibly by declining soil moisture (generally throughout autumn); green pods form during the dry season and ripen into the late dry/early wet season.

Defoliation
Tolerant of regular grazing and defoliation. Protected from severe grazing by the presence of long thorns. Heavy grazing by goats (12 head/ha) can be used to control V. nilotica, although only a small percentage of trees will be killed.

Fire
While seedlings and saplings are susceptible, mature plants are tolerant of fire.

Agronomy

Note: Vachellia nilotica is included in Tropical Forages because it is fed to livestock in many arid and semi-arid areas. However, in view of its propensity to spread and the difficulties encountered in its control, extreme caution should be exercised if introduction is considered.

Guidelines for establishment and management of sown forages.

Establishment
Seed is hard-coated and must be scarified (mechanical abrasion, acid, or hot-water treatment) before planting. Can be established by direct seeding of scarified seeds or by transplanting of nursery-grown seedlings. Can be aerially seeded. Young seedlings require full sun and are susceptible to competition so should receive frequent weeding.

Fertilizer
No information available.

Compatibility (with other species)
Has formed thickets where the rate of utilisation is low. Stands of 25–30% tree canopy have reduced productivity of Mitchell grass (Astrebla spp.) in Australia by up to 50%.

Companion species
Not generally planted in combination with other forage species. May be integrated as a hedgerow species or windbreak.
Pests and diseases
Affected by a wide range of pests and diseases across the native range. The stem borer *Cerostema scabrator* damages young plantations in India. A number of bruchid beetles infest seed, destroying up to 70% of seed crops. A range of leaf-eating insects occasionally defoliate stands in India. Fungal pathogens can also be damaging.

Ability to spread
Cattle eat the mature pods and at least 40% of seed remains viable after passing through the gut. Seed germinates readily in the dung. Viability of seed eaten by sheep and goats is much lower than for cattle because sheep and goats tend to chew the seed. Seed can also be transported by water.

Weed potential
Introduced into Myanmar, Iran, Vietnam, Indonesia, the Caribbean and Australia where it is spreading vigorously in many locations. Is classed as a “weed of national significance” in Australia, infesting over 7 million ha of rangelands in the arid and semi-arid tropics. With the exception of *V. nilotica* subsp. *kraussiana* in southern Africa, the tree is not known to be weedy in its native range because seed numbers are greatly reduced by a wide range of herbivores and insects.

Feeding value
Nutritive value
Leaves contain 13.7–16.3% CP, 16.9–20.0% NDF, 13.3–14.1% ADF, 7.2–8.7 MJ/kg energy, 10–21% crude fibre and 6–9% condensed tannins. Pod and seed contain 10.0–13.8% N, 10 MJ/kg energy, 12–18% crude fibre and 4–7% condensed tannins. Pods alone contain 12.5% N, 25% NDF, 17% ADF.

In digestibility trials conducted in Zimbabwe, of several species browse species tested, intake of *V. nilotica* was the lowest.

Palatability/acceptability
Leaves and pods are generally well accepted by small ruminants. Cattle require prior experience or an extended period of adaptation. Dried pods are relished by herbivores in the native range.

Toxicity
While *V. nilotica* contains a number of anti-nutritional substances such as tannins and saponins, there is no clear evidence of lethal toxicity, except in the case of excessive intake of pods.

Feedipedia link
https://www.feedipedia.org/node/346

Production potential
Dry matter
No reports of DM production were cited. Forage use is generally as a browse for sheep and goats, or as a drought relief feed.

Animal production
Used as a protein supplement in semi-arid and sub-humid rangelands to increase the protein content of grasses during the dry season. Replacing conventional concentrate feeds of both weaner kids and lambs with 25% mango seed kernels and 23% *V. nilotica* seeds reduced feed costs without affecting feed intake, nutrient utilization, growth rate, blood profile and carcass traits. In Australia, *V. nilotica* is kept under control when grazed by sheep, goats and camels, whereas it continues to spread in paddocks grazed solely by cattle.

Genetics/breeding
Wide range of intraspecific diversity exists and agronomic assessments of provenances have been conducted. The taxa form a polyploid complex. Most are tetraploids including subsp. *adstringens*, (2n = 4x = 52), but higher numbers have been found in subsp. *nilotica* (2n = 8x = 104) and subsp. *tomentosa* (2n = 16x = 208).

Seed production
Flowers prolifically over an extended period, but only a very small proportion (0.1%) may form pods. Seed production varies with provenance, but mature trees can produce up to 2–4 kg seed in a good fruiting season. Seed viability declines rapidly and 95% of seed may be dead after 2 years. However, a small percentage of seed will remain viable for up to 15 years.

Herbicide effects
Can be controlled by basal bark spray or cut stump application of common arboricides such as fluroxypyr and triclopyr. Young plants can be controlled using an overall foliar spray. Soil-applied herbicides such as hexazinone have also been successfully used.

Strengths

- Readily established from seed.
- Extremely drought tolerant.
- Tolerant of salinity, high pH and waterlogging.
- High CP content in leaves and pods.

Limitations

- Extremely invasive in exotic habitats.
- Large spines reduce consumption of the foliage by ruminants.
- Anti-nutritive compounds reduce forage quality.
- Susceptible to a wide range of pests and diseases in native range.

Selected references


Cultivars

None released.

Promising accessions

None reported.

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