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. *hemispherica* (Ali & Faruqi) 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. *subalata* (Vatke) Kyal. & Boatwr.

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 scorpioides* (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*.

* Azani, N. et al. [97 authors from 54 institutions] 2017. A new subfamily classification of the Leguminosae based on a taxonomically comprehensive phylogeny. *Taxon* **66**: 44–77.

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.


Shrub or tree, mostly 2.5–10 m tall. N Queensland, Australia


Long spines in young trees, Queensland Australia


Spines in axillary pairs, 5–7.5 cm long in young trees, commonly absent in mature trees.


Leaves bipinnate often with petiolar glands on rachis between adaxial pinnae; peduncles clustered at nodes; golden yellow flowers in globulous heads


Pods fleshy when young, becoming black and hard but indehiscent at maturity


Pods straight or slightly curved with constrictions between the seeds (torulose)


Seeds


Seed


Trees spreading along bore drains, W Queensland, Australia


Serious environmental weed - one of 20 plants regarded as the worst weeds in Australia (Weed of National Significance)

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, indehiscent, becoming black and hard at maturity. Seeds deep blackish-brown, smooth, sub-circular, compressed, areole 6–7 mm long, 4.5–5 mm wide. 5,000–16,000 seeds per kg.

Spread into grasslands and pastures favoured by the introduction of cattle. Central Queensland, Australia

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: lekkeruikpeul (Afrikaans); bagana (Bambara); bagaruwa, bararuwa, marjee, namijin bagaruwa (Hausa); isanqawe,umtshanga (Ndebele); tuger (Somali); mgunga (Swahili); chea, gered chea, ghered (Tigrinya); motlabokgosi (Tswana)

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

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

Indian Ocean: fantsikasia (Madagascar)

Indian subcontinent: ■■■■■ babala (Bengali); babaria (Gujarati); ■■■■ babool, ■■■■ babur, ■■■■ kikar (Hindi); nalla tumma (Telugu); babli (Kannada); karivelam (Malayalam); ■■■■ babul (Marathi); ■■■■■■■ karuvelai (Tamil)(India); babar, ببول babul , ببور 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

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Fagg, C. (2001) *Acacia nilotica*: Pioneer for dry lands. In: Roshetko, J.M. (ed) Agroforestry Species and Technologies: A compilation of the highlights and factsheets published by NFTA and FACT Net 1985-1999. Winrock International, Morrilton, AR, USA. p. 23–24.

Mackey, A.P. (1996) Prickly Acacia (*Acacia nilotica*) in Queensland. Department of Natural Resources and Mines, Brisbane, Queensland, Australia. bit.ly/2R4DLuk

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Cultivars

None released.

Promising accessions

None reported.