

## Acacia tortilis

(Forssk.) Hayne

Fabaceae - Mimosoideae

### LOCAL NAMES

Afrikaans (haak-en-steek); Arabic (sammar,samar,samor,samra,sayyal,seyyal,seyal); English (umbrella thorn,karamoja); Hindi (Israeli babool); Ndebele (isanqawe,umsasane,umshishene,umtshatshatsha); Nyanja (nyoswa,nsangunsangu,mzunga,nsangu); Somali (abak,kura); Swahili (mgunga,mugumba,munga); Tigrigna (aqba,alla,akiba,akba); Tongan (mukoka,ngoka,muzungu); Tswana (mosu,mosunyana); Zulu (umSasane)

### BOTANIC DESCRIPTION

Acacia tortilis is a small to medium-sized evergreen tree or shrub that grows up to 21 m tall; well-developed multiple boles support a flat-topped or rounded, spreading crown; bark grey to black or dark brown, rough, fissured or smooth; young branchlets densely pubescent or glabrous to subglabrous and red to brown; spines paired, 2 types-long, straight and white, or short, brownish and hooked; they range from 1.2 to 8 cm in length.

Leaves glabrous to densely pubescent, glandular, short at 1.25-3.75 cm long; petiole 0.2-0.9 cm long, with a gland; rachis 0.3-2 cm long, glabrous to densely pubescent, with a small gland at the junction of the apical pair of pinnae; pinnae 2-10 pairs; leaflets 4-22 pairs per pinnae, 0.5-4 (6 max.) x 0.2-1 mm, glabrous to densely pubescent on the underside; margins with or without cilia, linear to linear oblong.

Inflorescence globose heads; peduncle white, pubescent, 0.4-2.5 cm long, with involucrel on the lower half; flowers white or pale yellowish-white, sessile or shortly pedicellate, scented, 0.5-1.1 cm in diameter, on axillary peduncles; calyx 1-2 mm long; corolla 1.5-2.5 mm long.

Pods variable, indehiscent, spirally twisted or rarely almost straight, 7-10 cm long, 6-10 (max. 13) mm broad, longitudinally veined, leathery, glabrous to tomentellous or villous, somewhat constricted between the seeds; seeds oblique or parallel to long axis of pod, 4-7 x 3-6 mm, compressed; areole 3-6 x 2-4 mm.

The generic name 'acacia' comes from the Greek word 'akis', meaning a point or a barb. The name 'tortilis' means twisted and refers to the pod structure.

### BIOLOGY

A. tortilis is a hermaphrodite. Gravity or propulsion from drying dehiscent pods initiates seed dispersal. In India, trees flower between May and June and fruit by mid July, and in Nigeria flowers appear in May-June and fruits in July.



Nine-year-old plantation of Acacia tortilis planted at 4 x 4m spacing for sand dune stabilization, near Jodhpur, Rajasthan, India. (Colin E. Hughes)



Goats browsing nine-year old Acacia tortilis planted for sand dune stabilization near Jodhpur, Rajasthan, India. (Colin E. Hughes)



14-year old plantation of Acacia tortilis, planted for sand dune stabilization, near Jodhpur, Rajasthan, India. (Colin E. Hughes)

**ECOLOGY**

*A. tortilis* is drought resistant, can tolerate strong salinity and seasonal waterlogging and generally forms open, dry forests in pure stands or mixed with other species. The long taproot and numerous lateral roots enable it to utilize the limited soil moisture available in the arid areas. It tolerates a maximum temperature of 50 deg. C and a minimum temperature close to 0 deg. C.

**BIOPHYSICAL LIMITS**

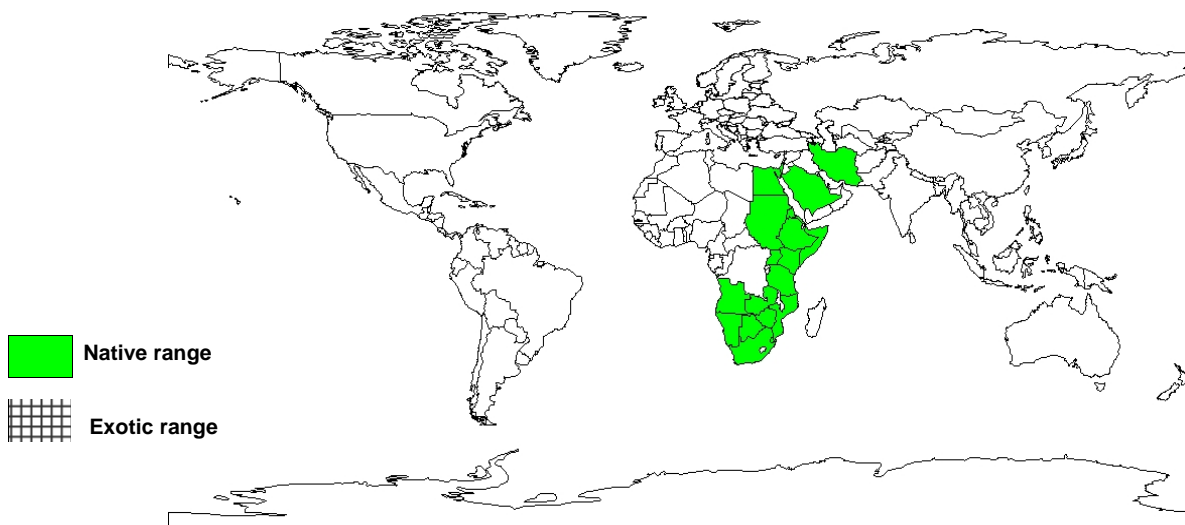
Altitude: 0-1 000 m, Mean annual temperature: 23.4-31.3 deg. C, Mean annual rainfall: 100-1000 mm.

Soil type: The tree favours alkaline soils and grows in sand dunes, sandy loam, rocky soils and other soils that drain well. It also does well on light brown, sandy soil with little or no calcium carbonate, and pH ranges of between 7.95-8.30.

**DOCUMENTED SPECIES DISTRIBUTION**

Native: Angola, Botswana, Egypt, Eritrea, Ethiopia, Iran, Israel, Kenya, Mozambique, Namibia, Qatar, Saudi Arabia, Somalia, South Africa, Sudan, Swaziland, Tanzania, Uganda, United Arab Emirates, Zambia, Zimbabwe

Exotic: Benin, Burkina Faso, Cameroon, Chad, Cote d'Ivoire, Gambia, Ghana, Guinea, India, Liberia, Mali, Mauritania, Niger, Nigeria, Pakistan, Senegal, Sierra Leone, Togo



The map above shows countries where the species has been planted. It does neither suggest that the species can be planted in every ecological zone within that country, nor that the species can not be planted in other countries than those depicted. Since some tree species are invasive, you need to follow biosafety procedures that apply to your planting site.

**PRODUCTS**

**Food:** In Kenya, the Turkana make porridge from the pods after extracting the seed; the Maasai eat the immature seeds.

**Fodder:** It is an important source of fodder for cattle in India, West Africa, Somalia and Ethiopia. Foliage and fruits form important browse. The leaves are fed green as well as dry. A 10-year-old *A. tortilis* yields about 4-6 kg dry leaf and 10-12 kg pods per year. Fruits are preferred for stall-fed animals and should be ground to make them more nutritious. Crude protein and digestibility coefficients of *A. tortilis* are about 18% and 46.2%, respectively. Over 90% of the flowers abort and drop to the ground, providing additional important forage.

**Fuel:** *A. tortilis* starts producing fuelwood at the age of 8-18 years, at the rate of 50 kg/tree. Its fast growth and good coppicing behaviour, coupled with the high calorific value for its wood (4400 kcal/kg), make it suitable for firewood and charcoal.

**Timber:** The sapwood and heartwood are white and lustrous, with the heartwood aging to reddish-brown. Growth rings are distinct and separated by brown lines. The wood is moderately soft, not very strong, and is readily attacked by decay-causing fungi and insects. It should be promptly converted after felling and subjected to rapid drying conditions. The timber is not durable in the open but moderately so under cover. It is used for planking, boxes, poles, moisture-proof plywood, gun and rifle parts, furniture, house construction and farm implements. It is believed that Noah of the Old Testament made his ark from the wood of *A. tortilis*.

**Tannin or dyestuff:** The bark is reported to be a rich source of tannin.

**Poison:** *A. tortilis* is a powerful molluscicide and algicide; in Sudan, fruits are placed in fish ponds to kill the snail species that carry schistosomiasis, without affecting the fish.

**Medicine:** The dried, powdered bark is used as a disinfectant in healing wounds; in Senegal it serves as an anthelmintic. In Somalia the stem is used to treat asthma. Seeds are taken to treat diarrhoea.

**SERVICES**

**Erosion control:** Due to its drought hardiness and fast growth, the species is considered more useful than many indigenous species growing in the arid zone of India. It is a promising species for afforesting shifting sand dunes, refractory sites, hill slopes, ravines and lateritic soils.

**Shelter or shade:** In India, it has been grown successfully with *Azadirachta indica* in shelterbelts.

**Nitrogen fixing:** *A. tortilis* nodulates and hence is nitrogen fixing.

**Boundary, barrier or support:** The thorny branches are suitable material for erecting barriers.

**Intercropping:** Poor herbaceous growth under *A. tortilis* has been reported. In India clusterbean, cowpea and mothbean are said to have failed when planted in association with *A. tortilis*. However, yields of mungbean, and sorghum have been shown to increase when lateral roots of *A. tortilis* are trenched.

**TREE MANAGEMENT**

Initial integrated soil and water conservation measures help check mortality and boost early growth and establishment of trees in very unfavourable conditions. The fast-growing tree develops a long lateral root system and creates problems in marshy fields, paths and roadways. It grows fairly well even on shallow soils less than 25 cm deep. However, the plant assumes shrubby growth and must be widely spaced for the lateral root growth. It responds vigorously to felling by producing numerous coppice shoots, provided there is no interference from browsing animals. Lopping of entire branches does not seem to affect the vitality of the tree. Studies conducted on its nitrogen-fixing ability, photosynthetic efficiency, seedling morphology and drought resistance have shown that it is relatively a better species than *Prosopis juliflora*. A tree 6-7 years old on average yields about 5-6 kg of clean seeds. Planting is done in pits 60 cm deep dug at a spacing of 5 x 5 m and filled with weathered soil. If raised as a windbreak, 3 rows are planted spaced at 9 x 10 m, and 50 gm/plant of ammonium sulphate is applied at watering time. Plants grow to about 1.5 m in 2 years, should be protected from grazing and mulching should be practised. 2 weedings in the 1st year and 1 in the 2nd year are considered sufficient.

**GERMPLASM MANAGEMENT**

Seed storage behaviour is orthodox; viability can be maintained for several years in hermetic storage at 10 deg. C with 4.5-9% mc. There are about 12 000-25 000 seeds/kg.

**PESTS AND DISEASES**

Powder pest beetles (*Sinoxylon anale* and *S. crassum*) are serious pests of *A. tortilis* timber in India. They can reduce felled timber to dust in weeks. Prophylactic treatment is recommended to protect the timber, with 1.5% lindane 20 EC water emulsion or 1.5% endosulfan 35 EC water emulsion. Other recorded pests are *Callosobruchus chinensis* and *Caryedon gonogara* (bruchid). In plantations and seed production areas, pod and seed insects can be controlled by treating individual branches with 0.25% endosulfan or fenitrothion water emulsions. Seed stored in gunny bags can be dusted with 5% folithion for short-period treatment. If the seeds are to be stored for longer periods, 10% BHC should be applied with a duster. Fumigation with carbon disulphide, aluminium phosphide or chlorosal will kill seed- and pod-boring bruchids. Pyrethrum mixed with seed in a seed-dressing drum also acts as an insect repellent. *A. tortilis* is also susceptible to attack by other beetles, caterpillars and blight.

**FURTHER READING**

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**SUGGESTED CITATION**

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