

cientific name

Sesbania sesban (L.) Merr.

Synonyms

Aeschynomene sesban L.
Emerus sesban (L.) Kuntze
Sesban aegyptiaca Poiret
Sesbania aegyptiaca Poiret
Sesbania confaloniana (Chiov.) Chiov.
Sesbania pubescens sensu auct.

Family/tribe

Family: *Fabaceae* (alt. *Leguminosae*) subfamily: *Faboideae* tribe: *Robinieae*. Also placed in: *Papilionaceae*.

Common names

Egyptian pea; jayanti, janti, puri (Indonesia); katuray, katodai (Philippines); yay-tha-kyee, yethugyi (Myanmar); snao kook (Cambodia); sapao lom (Laos); sami, saphaolom (Thailand); dien-dien (Vietnam).

Morphological description

Shrub or short-lived tree up to 8 m tall. Stem up to 12 cm in diameter, usually pubescent, sometimes becoming glabrous. Leaves, including a short petiole, 2-18 cm long, pinnately compound; leaflets in 6-27 pairs, linear, oblong, up to 26 mm x 5 mm, glabrous or almost so above, sometimes pubescent beneath, often pilose at the margins; stipules narrowly triangular, up to 7 mm long, pubescent. Racemes 2-20 flowered, up to 20 cm long; glabrous or sparsely pilose; peduncle up to 5 cm long; pedicels 4-12 mm long, glabrous. Pod subcylindrical, straight or slightly curved, up to 20-30 cm x 2-5 mm, straw-coloured, often with a brown or reddish-brown blotch over each septum, 10-15 seeded, glabrous. Seed subcylindrical, 3-4.5 mm x 2 mm x 2 mm, olive-green or brown, usually mottled. There are 55-80 seeds/g.

Distribution

Native to or naturalized in:

Africa: Egypt, Chad, Djibouti, Ethiopia, Somalia, Sudan, Kenya, Uganda, Cameroon, Rwanda, Cote D'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo, Angola, Malawi, Zambia, Zimbabwe, Botswana, South Africa - Natal, Transvaal, Swaziland.

Asia: Bahrain, Oman, Saudi Arabia, Yemen, Afghanistan, Iran, Iraq, China (Yunnan), India, Pakistan, Cambodia, Laos, Thailand, Vietnam, Indonesia, Malaysia.

Australia: Northern Territory, Queensland.

Africa is the centre of diversity, with subsequent distribution most likely by man.

Uses/applications

S. sesban has a long history of use in India, primarily as a green manure and a source of cut and carry forage. Planted, or assisted to establish as a volunteer, as an improved fallow in maize fields in southern and east Africa because it improves crop yields and provides fuelwood. Can be intercropped with corn, beans, cotton and many other field crops. Harvested leaves make a rich compost. Its leaves are a good source of protein for cattle and sheep. Used as a grazed forage in sub-tropical Australia and Kenya. Has been used as a reclamation species of saline spoils in southern China.

It produces a light fuelwood suitable for cooking and charcoal production.

It has been used as a live support for black pepper, grapes, cucurbits and betel vine and as a shade tree for coffee and turmeric.

Ecology

Soil requirements

Grows in a wide range of soils from loose sands to heavy clays. Tolerates saline soils (1.0% salt concentration in the seedling stage to 1.4% at maturity); alkaline soils (pH <10); and acidic soils, as well as water-logging and flooding. Tolerant of low P, but P application has a positive effect on growth and nodulation. Tolerant of metalliferous mine tailings high in Cu, Zn and Pb.

Moisture

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S. sesban is native to monsoonal, semi-arid to sub-humid regions with 500-2,000 mm annual rainfall. Grows best where periodic waterlogging or flooding is followed by a progressively drier season.

Temperature

S. sesban is tolerant of cool highland-tropical or sub-tropical conditions, growing at up 2,300 m altitude in Kenya and as far south as 27° latitude in Australia. These environments experience cool winter temperatures, with mean monthly minimum temperatures for the coldest month of 7-10°C and average annual temperatures ranging from 17-20°C. Tolerates light frosts, but will be killed by heavy frost.

Light

Has moderate shade tolerance.

Reproductive development

Flowering of *S. sesban* is prolific and will occur within 12 months of sowing. It is photoperiod sensitive, flowering into short days (peak flowering occurs in April-May in Queensland, Australia). Seed matures in 2-3 months.

Defoliation

Normally used as a cut and carry species. With appropriate cutting

Normally used as a cut and carry species. With appropriate cutting management will persist for up to 5 years. Can be cut after the plant reaches 1-2 m height. Delaying cutting until the plant is >4 m tall, and low cutting at <50 cm, will result in plant deaths. Best results are achieved when *S. sesban* is cut to 75-100 cm height and some foliage is retained. Can be defoliated up to 5 times/year depending on use and environment. More frequent cutting will decrease the lifespan of the plants.

Direct grazing by cattle will result in considerable breakage of stems, but regrowth below the break is rapid. Direct grazing by goats resulted in 80% mortality because of ring-barking 8-20 cm above ground level. *S. sesban* is browsed by ruminants in its native range.

Fire

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Unknown, unlikely to be tolerant to severe fire.

Agronomy

Guidelines for the establishment and management of sown pastures.

Establishment

Spatial arrangements depend on usage. As a fence it is planted at 1-2 m spacings in single rows; as an alley crop, single or double rows are planted 2-10 m apart, with plants spaced 25-50 cm apart within rows; and as a protein bank it is planted in rows 1-2 m apart with plants spaced 25-50 cm apart within rows.

S. sesban nodulates readily with native rhizobia and inoculation is not generally required. Its rapid early growth generally enables *S. sesban* to overcome weed competition easily and weed management is generally not required.

Scarification of seed is required to achieve uniform germination, although many publications report no requirement for scarification. Ninety-nine percent germination of a seed lot was achieved at 3-24 days after sowing. Seed should be acid or abrasively scarified in preference to hot-water scarification as the latter results in large percentages of non-viable seed.

Fertiliser

Not generally applied, although will respond to added P on deficient soils, especially during establishment.

Compatibility (with other species)

Grown in hedgerows 2-10 m apart with crops or pasture grasses in the inter-rows. Its rapid growth can prove overly competitive with understorey companion crops.

Companion species

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Grasses: Grown in hedgerows with para grass (*Brachiaria mutica*) in India and experimentally with signal grass (*Brachiaria decumbens*) in Australia.

Legumes: As an improved fallow *S. sesban* has been grown in

Legumes. As an improved forage, *S. sesban* has been grown in combination with *Macroptilium atropurpureum* (siratro), *Tephrosia vogelii* or *Crotalaria grahamiana*.

Pests and diseases

The leaf-eating beetle, *Mesoplatys ochroptera*, can reduce forage yield if not controlled during establishment (2 months after planting). The weevil, *Alcidodes buho*, damages the plant and the larvae of *Azygophelps scalaris* bore through the stems. The bacterium, *Xanthomonas sesbaniae* affects the stems and foliage. The seeds are often destroyed by a number of bruchid and other beetles.

Ability to spread

Will not spread under grazing. May have some potential to spread in ungrazed situations.

Weed potential

S. sesban seeds prolifically but seed is short-lived unless stored at low temperature and humidity. Seedlings establish readily on moist bare soil. Despite this, *S. sesban* rarely develops as a serious weed.

Feeding value

Nutritive value

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Crude protein content ranges from 25-30% of DM. *In vitro* digestibility varies considerably among accessions depending on polyphenolic compounds present and their concentrations. In an ILCA (now ILRI) evaluation, *S. sesban* had high N intake, high N retention and moderate faecal N, making it a useful source of protein for ruminants.

Palatability/acceptability

Moderately well accepted by ruminants in cut-and-carry feeding systems.

Under direct grazing in Queensland, Australia, young, novice cattle were slow to accept *S. sesban*, taking about 3 months to become fully accepting of the forage. Subsequent liveweight gains were excellent.

Toxicity

S. sesban does not contain condensed tannins, but does contain phenolic compounds including saponin which has spermicidal and haemolytic activity and was found to depress feeding activity in moth larvae. The inclusion of *S. sesban* in poultry diets (10% of diets) proved fatal to young chicks.

S. sesban ILCA (now ILRI) 1198 caused negative effects on oestrus in ewes when fed as a supplement at 13.3 g/kg DM liveweight, reducing the number of ewes showing oestrus by 30% of potential. In comparison, supplementation at 8.2 and 10.9 g/kg DM liveweight had no effect on oestrus in ewes. Other studies have reported reproductive irregularities when feeding high percentages (>30%) of *S. sesban* to ruminants.

Production potential

Dry matter

S. sesban has an advantage over most other tree forages in its rapid establishment. It was reported to attain a height of 4-5 m at 6 months after planting in India and produced 4 times the forage yield of *Leucaena leucocephala* at 3 months after planting in Australia. Under favourable conditions DM yields of up to 20 t/ha/year have been achieved, with edible fraction ranging from 30-60% depending on cutting frequency and growing conditions.

Var. *nubica* accessions were generally found to be more productive and leafier than var. *sesban* accessions in agronomic trials in Australia.

Animal production

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S. sesban cv. Mt Cotton grown in hedgerows in a signal grass (*Brachiaria decumbens*) pasture supported an average liveweight gain of 0.70 kg/head/day in yearling heifers over a 15-month period, compared with 0.40 kg/head/day for a N-fertilised signal grass control pasture. Pastures were direct grazed in this trial and some damage and death of individual *S. sesban* plants occurred.

Sheep fed *S. sesban* leaves in feeding trials gained 48 g/day over 90 days. This placed *S. sesban* with *Vicia dasycarpa* as the best of the legume hay treatments.

The literature varies as to the suitability of *S. sesban* as a feed for monogastrics, but there are reports of high mortalities to chickens.

Genetics/breeding

There is reported to be relatively little agronomic variation among 3 of the 5 varieties of *S. sesban* (var. *sesban*, var. *nubica*, and var. *bicolour*) despite botanical differences. Relatively little is known of var. *zambesiaca* and var. *punctata*. Relatively little selection and breeding work has been conducted with *S. sesban*, but considerable variation in presence and concentrations of soluble phenolic and insoluble proanthocyanidin compounds. There may be potential to develop cultivars that support high liveweight gains, with little or no negative effects on reproduction in ruminants.

S. sesban is primarily out-crossing where suitable pollinators and heterozygous individuals in neighbouring populations are available. Self-pollination may occur late in the flowering period if pollinators fail to visit the flowers.

Seed production

Seed production can be as high as 1-2 t/ha. Very susceptible to insect attack and should not be stored for more than 1 year.

Herbicide effects

No information available.

Strengths

- Rapid establishment and early growth.
- High nutritive quality for ruminants.
- Acid-soil, waterlogging and salinity tolerances.

Limitations

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- Short-lived (1-5 years).
- Low palatability to novice animals.
- Requires specific cutting management for perennation.
- Causes decreased reproductive performance in female ruminants when fed at high supplementation rates.

Other comments

Ground preparations from the flowers, leaves and seeds of *S. sesban* are reported to be effective contraceptives in rats and mice and may have future application in humans.

Selected references

Evans, D.O. (2001) *Sesbania sesban* : Widely distributed multipurpose NFT. In: Roshetko, J.M. (ed.) *Agroforestry Species and Technologies* . pp. 157-158. (Winrock International, Morilton, USA).

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Internet links

<http://www.fao.org/ag/AGP/AGPC/doc/Gbase/data/pf000170.htm>

<http://www.fao.org/ag/AGP/AGPC/doc/Publicat/Gutt-shel/x5556e08.htm>

<http://www.winrock.org/forestry/factpub/factsh/SESBAN.HTM>

<http://www.treesff.org/sesban.htm>

Cultivars

Cultivars	Country/date released	Details
'Mt Cotton'	Australia (1994)	Sourced from ILRI as accession ILCA 15036 (now ILRI 15036). 'Mt Cotton' was selected for its persistence. high DM

	production and strongly branching habit . ILCA 15022 (now ILRI 15022) was similarly productive and persistent in related trials.
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Promising accessions

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Promising accessions	Country	Details
ILRI 1198 and 15019	Ethiopia	Used in animal production and nutrition experiments.
ILRI 15022	Australia	Used in animal production experiments.
ILRI accessions 1238, 1261, 1265, 1284, 1290, 10865, 15019, 15021, 15036	Ethiopia	Recommended by ILRI as elite accessions for forage production.
ILRI accessions 1303, 15020, 1215, 15018 and 1221	Tanzania	Highest yielding of 74 <i>S. sesban</i> accessions evaluated for forage production in Tanga, Tanzania.





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