

Tropical Forages

Sesbania grandiflora

Scientific name



Sesbania grandiflora (L.) Poir.

Synonyms

Basionym: *Robinia grandiflora* L.; *Aeschynomene grandiflora* (L.) L.; *Agati grandiflora* (L.) Desv.; *Coronilla grandiflora* (L.) Willd.

Family/tribe

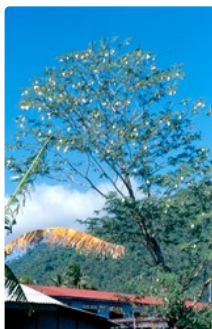
Family: *Fabaceae* (alt. *Leguminosae*) subfamily: *Faboideae* tribe: *Sesbanieae*.

Morphological description

A relatively short-lived (to c. 20 years), open branching tree 4–10 (–15) m tall, trunk 10–25 (–30) cm diameter; bark light gray, corky and deeply furrowed. Roots normally heavily nodulated with large nodules; adventitious floating roots develop during periods of flooding. Stems tomentose, unarmed. Stipules obliquely lanceolate, to 8 mm, caducous (early deciduous). Leaves alternate, paripinnate, 15–30 (–40) cm long including petiole 7–15 mm long, 20–60-foliolate; rachis terete, densely appressed pubescent when young, glabrescent; pinnae opposite or nearly so, oblong to elliptical, (12–) 20–40 (–50) mm × (5–) 8–16 mm, smaller at both ends of rachis than in middle, rounded to obtuse to slightly emarginate at the apex, glabrous or sparsely pubescent on both surfaces; stipels filiform, 0.75–1 mm long, pubescent, persistent. Raceme axillary, pendulous, 2–4 (–5) flowered, rachis 4–7 cm long; peduncle 1.5–3.5 cm long, tomentose; pedicels 1.5–1.8 cm long, pubescent; bracts ovate to ovate-lanceolate, 3–6 (–10) mm long, early deciduous; calyx campanulate, 15–22 (–29) mm long, closed in young buds, splitting or breaking at anthesis, the basal part persistent in the fruit; corolla white, yellowish, rose-pink or red; standard oblong-ovate to broadly ovate, 5–7.5 (–10.5) × 3.5–5 (–8) cm, reflexed at anthesis, no appendages at the claw; wings 5–10.5 × 2–3 cm without a basal tooth, staminal tube 10–12 cm long, curved for most of its length; ovary and style glabrous. Pod pendulous, linear to slightly falcate, 20–60 cm × 6–9 mm with broad sutures; 15–50-seeded, septa 7.5–10 mm apart, glabrous, apex tapering into a 3–4 cm beak, indehiscent. Seed ellipsoid to subreniform, 5–6.5 × 2.5–4 mm, reddish brown to dark brown, slightly compressed, turgid, slightly glossy. 16,000–30,000 seeds per kg.

Similar species

S. grandiflora is almost indistinguishable from the closely related *Sesbania formosa* (F. Muell.) N.T. Burb., a species endemic to northern Australia and viewed by some taxonomists as a synonym.



Relatively short-lived, open-branching tree, mostly 4 - 10m tall



Young red flowering tree, Laos



Leaves mostly 15 - 30cm long, paripinnate with 10 or more leaflet pairs



Pendulous axillary raceme comprising mostly 2-4 flowers



White flowered form



Pink flowered form, Brunei



Red flowered form, Laos



Pods pendulous, linear to slightly falcate, up to 60 cm long.



Seeds



Sesbania grandiflora (L.) Poir. - 1, flowering branch; 2, flower bud; 3, flower; 4, fruit.

Line illustration

Common names

Asia: 白田菁 da hua tian jing, 白田菁 bai se hua pin zhong, 白田菁 mu tian jing (Chinese); gauai-gauai, katuray, katurai, pan (Tagalog /Filipino); bunga turi, daun turi, kacang turi, kembang turi, petai belalang, pokok turi, sesban getih, toroy, turi, tuwi (Indonesian); 白田菁 agachi, 白田菁 shiro gochou, 白田菁 shiro gochou, shiro gocho (Japanese); ângkiédèi (angkea dey), 白田菁 pka angkea dey (Khmer); 白田菁 kh'ê: kha:w (Lao); kacang turi, petai belalang, sesban, sesban getih (Malay); 白田菁 agasti (Nepali); kathuru (katura) murunga (Sinhalese); แค khae, ดอกแค dok khae, ดอกแคบ้าน dok khae baan, แคบ้าน khae baan, แคบ้านดอกแดง khae ban dok daeng , แคแดง khae daeng, kae-ban, ton kae (Thai); agst (Urdu); so đũa (Vietnamese)

English: agati sesbania, August flower, Australian corkwood tree, flamingo bill, grandiflora, heron flower, sesban, swamp pea, tiger tongue, scarlet wistaria-tree, vegetable-hummingbird, West Indian pea tree, white dragon tree

French: agati à grandes fleurs, colibri végétal, fagotier, fleur papillon, gros mourongue, papillon, pois valette, pois vallièr, sesbanie à larges fleurs; pwa valet, pwa valye (Creole Patois)

India: bakphul, bokphul (Assamese); 白田菁 bokful (Bengali); agathio (Gujarati); 白田菁 agasti (aagasti), 白田菁 agasati, 白田菁 basna, 白田菁 gaach-munga, hathya, 白田菁 hatiya, 白田菁 , 白田菁 / 白田菁 (Hindi); agase (Kannada); 白田菁 akatti (Malayalam); 白田菁 houwaimal (Manipuri); akatti, 白田菁 shevari, 白田菁 hatga, 白田菁 heta (Marathi); 白田菁 agastee (Oriya); 白田菁 agasti , agati, agastya, drigapalaka, munipriya, varnari (Sanskrit); agathi, agatti, akatti, 白田菁 akatthi, 白田菁 agathi keeray, peragathi (Tamil); 白田菁 avisi, agise, agisi, bakapushpam, ettagise, sukanasamu (Telugu)

Latin America: agasto, sesbânia (Brazil); agati, baculo, chorreque de arbolito, cresta de gallo, gallito, paloma, pico de flamenco, sesbania agata, zapatón blanco (Spanish)

Pacific Islands: ohai ke'oke'o (Hawaii); caturay, katurai (Marianas, Palau); pakphul (Pohnpei); sepania (Samoa); afai, ofai, ouai, oufai (Tahiti)

Distribution

Native:

Although *Sesbania grandiflora* is common across tropical Asia, from India, through Myanmar and Malaysia to Indonesia and Philippines, its precise centre of origin is uncertain, although India and Indonesia are variously favoured in this regard.

Cultivated/naturalized:

Africa: Benin; Burkina Faso; Cameroon; Chad; Cote d'Ivoire; Djibouti; Eritrea; Ethiopia; Gambia; Ghana; Guinea; Guinea-Bissau; Kenya; Liberia; Mali; Mauritania; Niger; Nigeria; Senegal; Sierra Leone; Somalia; South Africa; Tanzania; Togo; Uganda

Asia: Laos; Nepal; Vietnam

Northern America: Mexico; USA

Caribbean: Cuba; Dominican Republic; Guadeloupe; Haiti; Martinique; Mauritius; Puerto Rico

Uses/applications

Forage

S. grandiflora is valued as a fodder, the green leaves and pods being fed to cattle and goats, particularly for dry season feeding.

Environment

S. grandiflora nodulates freely, fixing significant amounts of nitrogen. It is commonly grown on paddy bunds, and around gardens or cropping fields for its nitrogen contribution. Fruits, falling leaflets and flowers make excellent green manure or mulch and improve soil



Planted on rice bunds, Lombok, Indonesia



Planted on rice bunds, Lombok, Indonesia



Used as a hedge, Indonesia

fertility. Because it is fast to establish, it can be sown densely as a green manure, grown for a relatively short period, before ploughing under to improve soil before planting food crops. It is valued for rehabilitating eroded hills, providing its growth is not inhibited by nematodes or very low soil pH. The canopy is sufficiently dense for it to be suitable as a shade or nurse tree for crops such as black pepper, coffee, tea and cocoa, as well as nurseries, and to be a useful component for windbreaks for citrus, banana and coffee. However, it is sufficiently open not to significantly interfere with nearby sun-loving crops and gardens.

Other

Young leaves and pods as well as flowers are popular as human food in southeast Asia. *S. grandiflora* is commonly planted as an ornamental because of its giant showy flowers and long pods, and often incorporated into living fences. Intolerant of strong winds which may break the stem or branches. The timber has some value in gum and tannin production, as well as for manufacture of low quality pulp and paper. However, the low density wood makes poor firewood and is not durable as a timber. Considered to be a poor quality fuelwood as it smokes when burn and deteriorates in storage.

Ecology

Soil requirements

S. grandiflora is adapted to a wide range of soils. It appears to grow best in clay loams and heavy clays, plants reaching a height of 3.2 m in 9 months in loamy soils, compared with 1.8 m in sandy soils. While growing best in soils with pH in the alkaline to slightly acid range, it can be grown in more acid soils of pH as low as 4.5. It is fairly tolerant of saline and low fertility conditions.

Moisture

Best adapted to regions with annual rainfall of 2,000–4,000 mm, but has been grown successfully in semi-arid areas with 800 mm annual rainfall and up to 9 months dry season. In low rainfall situations the tree tends to be deciduous to conserve moisture. Tolerant of poor drainage and short-duration flooding.

Temperature

S. grandiflora is adapted to lowland tropical environments, up to 800 (–1,000) m asl, with annual mean temperatures of 22–30 °C. It is frost sensitive and intolerant of extended periods below about 10 °C.

Light

Poor shade tolerance, less than that of *S. sesban*. Its rapid early growth and erect habit usually enable *S. grandiflora* to access sunlight by overtopping neighbouring vegetation.

Reproductive development

The large hermaphroditic flowers are pollinated by birds. *S. grandiflora* is able to produce ripe pods 9 months after planting. Significant variation exists in flowering time, with early flowering varieties being preferred (and progressively selected for by local farmers) in Lombok, Indonesia where flowers are an important food crop. Later flowering varieties predominate in West Timor, Indonesia where the species is primarily used as a cut-and-carry cattle feed.

Defoliation

Intolerant of severe and regular pruning when young. In Lombok, Indonesia, side branches are cut for feed, leaving the trees to develop tall poles. After the tree has reached a height of 3 m or more, the leader can be cut back above 1.5 m height. In Timor, large trees are heavily pruned during the long dry season without significant mortality. Cutting regularly (5 times a year) to form a low hedgerow (1 m tall) resulted in almost 100% mortality in northeast Thailand. For this reason *S. grandiflora* often appears poorly productive in agronomic trials. Low hedgerows can be achieved by regular replanting from seed.

Fire

Tolerates low to medium intensity grass fires in Eastern Indonesia.

Agronomy

Guidelines for establishment and management of sown forages.

Establishment

Establishes rapidly from seed or by vegetative propagation from stem and branch cuttings. Scarification may improve uniformity of establishment but is not considered essential. Generally much faster to establish compared with other common tree legumes (*Leucaena*, *Gliricidia*, *Calliandra*). Commonly planted as individual trees or in rows, spaced 1–2 m apart along fence lines, field borders and the bunds of rice paddies. In fertile sites, can attain a height of 5–6 m in 9 months. Height increments are greatly reduced in the second year. Planted at high densities (up to 3,000 stems/ha) to produce pole timber, or sparsely to produce dry-season forage and fuelwood.

Fertilizer

Tolerant of low fertility soils so little or no fertilizer is generally indicated.

Compatibility (with other species)

Not generally directly grazed by livestock as high plant mortality will occur. Combined in grazed paddocks as mature trees out of browse height, or as cut-and-carry forage integrated into cropping systems.

Companion species

Grasses: Has been grown in association with guinea grass (*Megathyrsus maximus*). Can be grown on crop margins with little reduction in sunlight to the crop due to its sparse canopy and erect habit.

Pests and diseases

S. grandiflora is susceptible to severe pest attacks from leaf webbers, leaf feeders and stem borers. The sesbania stem borer (*Azygophleps scalaris*) has caused occasional damage in India. Larvae of the seed chalcid (*Bruchophagus mellipes*) infest and damage seed. Highly susceptible to the root-knot nematode (*Melodogyne incognita*). Susceptible to grey leaf spot (*Pseudocercospora sesbaniae*), degree of susceptibility depending on provenance (accessions from Malabar more tolerant than those from the Southern Ghats in India). Sesbania mosaic virus (SeMV) is reported in India and is spread from infected growing trees.

Ability to spread

Moderate, from seed.

Weed potential

Moderate weed potential. Seeds freely, but seed is short-lived, deteriorating rapidly in viability from 1–2 years onwards without low humidity and low temperature storage. Open thickets occur in some range areas of eastern Indonesia. Does not become a weed in managed agro-ecosystems.

Feeding value

Nutritive value

Contains 25–30% crude protein. Supplementation with *S. grandiflora* of goats fed guinea grass hay increased intake by 25% and supported a positive N balance. *In sacco* digestibility was 75% in 12 hours. Other *in vitro* and *in sacco* studies report the very high forage quality of *S. grandiflora*.

Palatability/acceptability

Highly palatable to ruminant livestock. Leaves contains low quantities of condensed tannins which can adversely affect palatability of herbage. Also generally well accepted by monogastrics.

Toxicity

There is no evidence of leaf material being toxic to herbivores. Seed contains canavanine, a non-protein amino acid that is concentrated in the seeds of certain leguminous plants and acts as a deterrent to herbivores. Seeds contain a toxin poisonous to fish. Feeding either leaf or seed meal to chickens has a deleterious effect on growth and has resulted in death.

Feedipedia link

<https://www.feedipedia.org/node/254>

Production potential

Dry matter

One of the characteristics of *S. grandiflora* is its rapid early growth, reaching heights of up to 2 m in 12 weeks, 4–5 m in one year and about 8 m in 3 years. An annual yield of 27 kg of green leaf/tree was achieved by harvesting side branches A green manure yield of 55 t/ha green material in 6.5 months was achieved in Java. Wood yields of 20–25 m³/ha/year are achieved in commercial plantations in Indonesia.

Animal production

No long-term animal production studies have been reported, but *S. grandiflora* is a major component of ruminant diets in eastern Indonesia where it may comprise up to 70% of total forage allowance during the dry season. Anecdotal reports of high liveweight gains in cattle are common. In India, milk yield was increased by 8% (9.2–9.9 L/day) when cattle were fed 5 kg fresh leaf/day. In Western Samoa, goats failed to gain weight when supplemented with *S. grandiflora*, although the reasons for this poor result were not identified. The authors suggested that supplementation with *S. grandiflora* should be limited to 30% of total feed on the basis of this experiment. Poor weight gains in chickens has led to the recommendation that supplementation of poultry feeds with *S. grandiflora* should be limited to 2% of total ration.

Genetics/breeding

x = 6, 7; 2n = 14, 24. Little or no breeding work has been undertaken.

Seed production

S. grandiflora sets seed into lengthening days with early and late varieties being preferred in different locations. Seed is immediately germinable without requirements for scarification and deteriorates rapidly in viability if not stored well (cool, low humidity). *S. grandiflora* seeds lose their viability after about one year when stored at ambient conditions. It is able to produce ripe pods nine months after planting.

Herbicide effects

No information available.

Strengths

- Rapid establishment from seed.
- Tolerant of a wide range of soil types and rainfall environments.
- High palatability and forage quality.
- Tolerant of waterlogging.

Limitations

- Intolerant of cool temperatures and frost.
- Low to moderate tolerance of regular defoliation.
- Unsuitable to direct grazing by ruminants.
- Limited or no potential as a forage for non-ruminants.

Selected references

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Cultivars

No cultivars of *S. grandiflora* have been formally released.

Promising accessions

Few accession details are given in the research literature examining *S. grandiflora*. Landrace details in the literature reveal significant variability in flowering time and disease resistance. Several authors have suggested that the genetic and agronomic diversity in *S. grandiflora* deserves further attention.

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