Senna siamea (Lamarck) Irwin et Barneby

Fabaceae - Caesalpinioideae

LOCAL NAMES

Amharic (yeferenji digita); Creole (kasya); English (kassod tree,yellow cassia,cassia,Thailand shower,thai copper pod,iron wood,Siamese senna,Bombay blackwood,black-wood cassia); Filipino (robles); French (casse de Siam,bois perdrix,cassia); Hindi (minjri,manje-konna,kassod,ponavari,vakai,simaiavari,kilek); Indonesian (bujuk,dulang,johar); Javanese (johar); Khmer (ângkanh'); Lao (Sino-Tibetan) ('khi:z hlek,`khi² `lek); Malay (sebusok,guah hitam,juah,petai belalang,johor); Nepali (casia); Swahili (mjohoro); Thai (khilek,khilek-luang,khilek-yai,phak chili,khi lek ban); Vietnamese (humbo,c[aa]y mu[oof]ng den,mu[oof]ng,mu[oof]ng xi[ee]m,muoofng xieem)

Ornamental tree (Rafael T. Cadiz)

Fruit and trunk (Rafael T. Cadiz)

Plant with flowers and pod at Hamakuapoko Maui, Hawaii (Forest & Kim Starr)

BOTANIC DESCRIPTION

Senna siamea is a medium-size, evergreen tree growing up to 18 m tall, with a straight trunk of up to 30 cm in diameter; bole short, crown usually dense and rounded at first, later becoming irregular and spreading with drooping branches. Bark grey or light brown, smooth but becoming slightly fissured with age. The root system consists of a few thick roots, growing to considerable depth, and a dense mat of rootlets in the top 10-20 cm of soil, which may reach a distance of 7 m from the stem in 1 year and eventually a distance up to 15 m.

Leaves alternate, pinnately compound, 23-33 cm long, with slender, green-reddish, tinged axis; leaflets 6-12 pairs on short stalks of 3 mm, oblong, 3-7 cm long, 12-20 mm wide, rounded at both ends, with tiny bristle tip.

Flower clusters are upright at ends of twigs, large branched, 20-30 cm long, 13 cm broad, with many bright yellow flowers 3 cm across, pentamerous; sepals imbricate, obtuse at the apex; petals subequal to heteromorphic, yellow; stamens 10, accrescent toward the abaxial side of the flower; filaments straight and not more than twice as long as the anthers; ovary superior, linear and curved.

Pods numerous, long, narrow, 5-25 cm long, 12-20 mm broad, flat, dark brown, strap shaped, stipitate, terete to compressed, dehiscent, with septae between the numerous seeds; seeds are bean shaped, shiny, dark brown, 8 mm long, with distinct areole.

BIOLOGY

S. siamea starts flowering and fruiting at the age of 2-3 years. Once established, it flowers precociously and abundantly throughout the year.

ECOLOGY
S. siamea will grow in a range of climatic conditions but is particularly suited to lowland tropics with a monsoon climate. It will grow only when its roots have access to groundwater, and the maximum length of the dry period should not exceed 4-8 months. It is susceptible to cold and frost and does not do well at altitudes above 1300 m. Its light requirements are high.

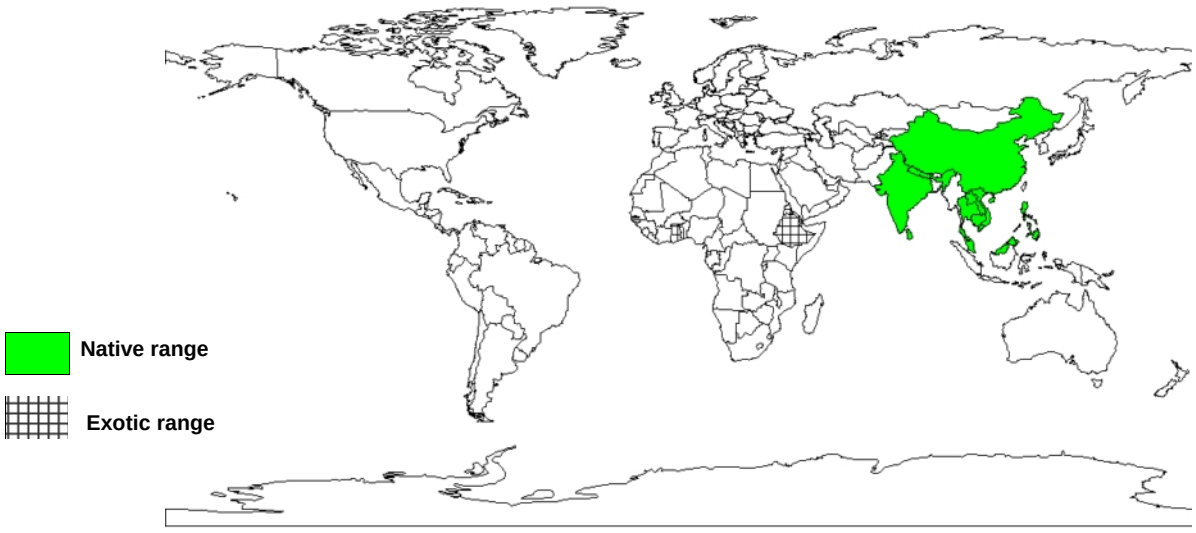
BIOPHYSICAL LIMITS
Altitude: 0-1 200 m, Mean annual temperature: 20-31 deg. C, Mean annual rainfall: 400-2 800 mm

Soil type: Performs best on deep well-drained fertile soils with pH 5.5-7.5, but will grow on degraded lateritic soils provided drainage is not impeded. The species is intolerant of saline soils.

DOCUMENTED SPECIES DISTRIBUTION

Native: Brunei, Cambodia, China, India, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam

Exotic: Antigua and Barbuda, Barbados, Cuba, Dominica, Dominican Republic, Eritrea, Ethiopia, Ghana, Grenada, Haiti, Jamaica, Kenya, Nigeria, Puerto Rico, Sierra Leone, South Africa, St Lucia, St Vincent and the Grenadines, Tanzania, Togo, Trinidad and Tobago, Uganda, Virgin Islands (US), Zambia



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 Thailand, young fruits and leaves are eaten as a vegetable. During preparation the cooking liquid is replaced 3 times to remove toxins. In Sri Lanka, the flowers and young fruits are used in curries.

Fodder: S. siamea is widely grown for fodder, but the trees can be browsed. The alkaloids and other secondary plant compounds in the leaves, flowers and pods are highly toxic to non-ruminants, such as pigs and poultry, and these animals should be kept away from S. siamea plantations.

Fuel: The dense, dark-coloured wood of S. siamea makes good fuel, although it produces some smoke when burning. The energy value of the wood is 22 400 kJ/kg, and the density is 600-800 kg/m^3. The wood was formerly preferred for locomotive engines. Its charcoal is also of excellent quality.

Timber: S. siamea yields a medium-weight to heavy hardwood with a density of 600-1010 kg/m^3 at 15% mc. Heartwood is black-brown with paler streaks, sharply demarcated from the 6-cm wide, pale sapwood; grain is interlocked and occasionally straight; texture is slightly coarse but even. Shrinkage of the wood during seasoning is moderate to high but it seasons with little degradation. The wood is hard to very hard, resistant to termites, strong, durable, difficult to work, with a tendency to pick up in planing and it takes a high polish. Sapwood is permeable to pressure impregnation. The dark heartwood of S. siamea, which is often nicely figured, is used for joinery, cabinet making, inlaying, handles, sticks and other decorative uses. The wood has also been used for poles, posts, bridges, mine poles and beams.

Tannin or dyestuff: All parts of the plant can be used for tanning. The concentrations of tannin vary slightly from 17% in the leaves to 9% in the bark and 7% in the fruits.

Medicine: In traditional medicine, the fruit is used to charm away intestinal worms and to prevent convulsions in children. The heartwood is said to be a laxative, and in Cambodia a decoction is used against scabies.

Poison: Sawdust may cause some irritation to the nose, throat and eyes.

Other products: S. siamea is used in China as a host plant for the lac insect.

SERVICES
Erosion control: When used as a hedgerow, it effectively increases topsoil infiltration, reducing runoff and combating soil erosion.

Shade or shelter: S. siamea is grown as a shade tree along roads and in cocoa, coffee and tea plantations. It is also planted as a dense windbreak and shelterbelt.

Reclamation: Used extensively for rehabilitation of degraded land, for example, to re-vegetate aluminium mine tailings.

Soil improver: Leaves are used as green manure, and a well-grown tree can yield 500 kg/year of fresh leaves. S. siamea forms ecto-mycorrhizae and provides very useful mulch, especially in alley-cropping systems.

Ornamental: S. siamea is often planted as an ornamental for its abundant yellow flowers.

Boundary or barrier or support: It is pruned into hedgerows and used as a live fence around food crops.

Intercropping: Although not a nitrogen-fixing tree, S. siamea has been increasingly used in alley cropping systems, largely because of its coppicing ability and high biomass production.

Other services: In India, it is used as a host for sandalwood (Santalum spp.), a parasitic tree producing the well-known aromatic.

TREE MANAGEMENT
Weeding is necessary in the 1st 1 or 2 years of growth. Moisture conservation measures (trenching, microcatchments) help establishment and growth for S. siamea planted in semi-arid areas. Unless carefully pruned, the tree ages ungracefully, the crown becoming straggling and misshapen with upright and drooping branches. Planting density varies according to use. In fuelwood plantations, spacing ranges from 1 x 1 m to 1x 3 m. In hedges used for alley cropping or as a shelterbelt, spacing between plants in the row should be 25-50 cm. Trees develop according to the Scarrone's architectural tree model, characterized by an intermediate trunk bearing tiers of orthotropic branches, which branch sympodially as a result of terminal flowering. A clear bole volume of 77 m/m^3 after 15.5 years and a mean annual increment of wood of 20-35 m/ha are observed in a 10-year-old plantation. Trees grow fast even in comparatively infertile soils. For the production of fuelwood and charcoal, plantations are generally pollarded or regenerated by coppice leaving 2-3 shoots/stump after 1 year. It has been reported that sapwood should be removed as soon as possible after felling to prevent insect attack of the heartwood.

GERMPLASM MANAGEMENT
Storage behaviour is orthodox. Mature seed has a hard seed coat, and scarification is required. Immersion in concentrated sulphuric acid for 10-30 min has been effective. With the 1st method, germination is about 90% within 60 days. Germination of untreated seeds is about 75% in 4-29 days. Viability can be maintained for 3 years in hermetic storage at room temperature with 11-15% mc. There are 35 000-45 000 seeds/kg.

PESTS AND DISEASES
Liable to browsing damage, susceptible to attack by scale insects, and sapwood is susceptible to Lyctus beetles. In Vietnam the butterfly Captosilia crocale is a serious pest, its larvae feeding on the foliage of S. siamea. The fungus Phaeolus manihotis occasionally causes damage to the root system. In Indonesia, the fungus Ganoderma lucidum is locally a serious disease of S. siamea, causing a wood rot in young plants.

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SUGGESTED CITATION

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