

Taxon: *Senna siamea* (Lam.) H. S. Irwin & Barneby

Family: Fabaceae

Common Name(s): Siamese cassia
Siamese senna
Thai cassia
Thailand shower

Synonym(s): *Cassia siamea* Lam. (basionym)

Assessor: Assessor

Status: Assessor Approved

End Date: 9 Apr 2021

WRA Score: 11.0

Designation: H(HPWRA)

Rating: High Risk

Keywords: Naturalized, Weedy Tree, Allelopathic, Toxic, Coppices

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	y
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed		
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic	y=1, n=0	y
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals	y=1, n=0	y
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	y
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	n
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed		
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m ²)	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	No evidence

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2021). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2021). Personal Communication	NA

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	High
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"S. siamea is indigenous to southern India, Sri Lanka, Myanmar, Thailand, Malaysia and parts of Indonesia (Sumatra). Latitude between 25°N and 5°S"

202	Quality of climate match data	High
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	

Qsn #	Question	Answer
203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"S. siamea is capable of growing under a wide variety of climatic conditions ranging from humid through to arid. It has been grown in regions with low rainfall (500 mm in Cyprus) and high rainfall (2800 mm), and can endure a dry season which may last 4 to 6 months. In India, a minimum of 1000 mm rainfall is recommended for good development (Troup and Joshi, 1983). In its natural habitat, the absolute maximum shade temperature varies from 24-36°C. It can grow at altitudes of up to 1380 m (Von Carlowitz, 1991). Mean annual temperature is within the range 20-28°C (Heinsleigh and Holaway, 1988)." ... "Climatic amplitude (estimates) <ul style="list-style-type: none"> - Altitude range: 0 - 1380 m - Mean annual rainfall: 500 - 2800 mm - Rainfall regime: summer; bimodal; uniform - Dry season duration: 4 - 6 months - Mean annual temperature: 20 - 28°C - Mean maximum temperature of hottest month: 24 - 36°C - Mean minimum temperature of coldest month: 14 - 22°C - Absolute minimum temperature: > 10°C"

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"S. siamea is indigenous to southern India, Sri Lanka, Malaysia, Cambodia, Thailand and Myanmar, although it has been introduced widely into many states of India and also many countries in tropical Africa."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Lau, A. and Frohlich, D. 2012. New plant records from O'ahu for 2009. Bishop Museum Occasional Papers 113: 7-26	"It has commonly become naturalized in areas where it has been introduced (Staples & Herbst 2005). It has been in Hawai'i since the 1870s, and has been planted both for forestry and as a street tree. In total, 1,461 were planted in forest reserves throughout the state (Skolmen 1980)."
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"Location of introductions: S. siamea was originally introduced mainly as an avenue shade tree for roadside planting. To date it has been extensively cultivated throughout India, both within forest areas, and also in wasteland afforestation projects, for example in Uttar Pradesh, Bihar, Madhaya Pradesh, West Bengal and Gujarat; in these and in other states it has become naturalized. It is planted in degraded and dry areas for rehabilitation of forests and holds promise for reclamation of mined areas (Shyam Lal, 1991). It has also been planted in areas of river valley projects. The species has been introduced into East Asia, Cyprus, Africa and the New World."

301	Naturalized beyond native range	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"...kassod tree has also become locally naturalized in many places where it was introduced; in the Hawaiian Islands it dates back to the 1870s."
	Wu, S., Aleck Yang, T.Y., Teng, Y.C., Chang, C.Y., Yang, K.C. and Hsieh, C.F. (2010). Insights of the latest naturalized flora of Taiwan: change in the past eight years. <i>aiwania</i> , 55 (2), 139-159	"Appendix 1. List of naturalized species of Taiwan." [Includes <i>Senna siamea</i>]
	Queensland Government. (2021). Weeds of Australia. <i>Senna siamea</i> . https://keyserver.lucidcentral.org/weeds . [Accessed 9 Apr 2021]	"Locally naturalised in northern Queensland, and possibly also naturalised in south eastern Queensland and in the northern parts of the Northern Territory. Also widely naturalised in Africa, in other parts of south-eastern Asia, on Mauritius, in the Caribbean (e.g. Puerto Rico and the Dominican Republic), in Central and South America and on some Pacific islands (e.g. Fiji and French Polynesia)."
	Liogier, A.H. & Martorell, L.F. (2000). Flora of Puerto Rico and adjacent islands: a systematic synopsis. Second Edition Revised. La Editorial, UPR, San Juan, Puerto Rico	"Planted for shade and ornament and naturalized in Puerto Rico; a native to tropical Asia, much planted and naturalized in the tropics."
	IUCN .(2012). Guide to some invasive plants affecting Lake Tanganyika. IUCN ISI and Lake Tanganyika Authority. Nairobi, Kenya	" <i>S. siamea</i> is widely planted as an agroforestry species for its shade, small timber, poles, firewood, charcoal, livestock fodder, bee-forage, mulch, windbreaks and erosion control. This tree was mostly not invasive for the first many decades of its use in Africa, but has recently ended its "lag-phase" and is beginning to spread."
	Lau, A. and Frohlich, D. 2012. New plant records from O'ahu for 2009. Bishop Museum Occasional Papers 113: 7-26	" <i>Senna siamea</i> was seen sparingly naturalized on Wheeler air force Base, growing in small gulches of mixed nonnative secondary forest and scrub. It was a common street tree in the surrounding area, but not the immediate vicinity. Material examined. O'AHU: Wheeler afB, near corner of Wright ave and airdrome rd. 6 m tall tree, flowering profusely. Commonly planted in Schofield/Wheeler roadside areas and sparingly naturalized on base, 4 Sep 2009, OED 2009090403."

302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	IUCN .(2012). Guide to some invasive plants affecting Lake Tanganyika. IUCN ISI and Lake Tanganyika Authority. Nairobi, Kenya	[A potential environmental weed of unspecified impacts] "This tree was mostly not invasive for the first many decades of its use in Africa, but has recently ended its "lag-phase" and is beginning to spread."
	Anning, A. K., & Yeboah-Gyan, K. (2007). Diversity and distribution of invasive weeds in Ashanti Region, Ghana. <i>African Journal of Ecology</i> , 45(3), 355–360	[<i>Senna siamea</i> listed as a weed of unspecified impacts] "Table 1 List of the 43 invasive weed species identified in the study and their relative frequencies across various habitats in the Ashanti Region"

Qsn #	Question	Answer
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Several references listing this species as naturalized and/or a weed] "References: Guyana-W-32, Puerto Rico-CW-261, southeast Asia-W-191, Australia-N-368, United States of America-CE-617, Caribbean-N-707, Taiwan-N-777, Global-NI-714, Global-N-85, United States of America-N-101, Pacific-E-621, Mexico-N-791, Swaziland-N-825, Mozambique-nC-943, Australia-N-354, Wallis, Futuna and Alofi Islands-E-1080, Philippines-nC-1099, Chad-nC-640, Gal pagos Islands-CN-1157, Australia, northern-ENZD-1183, China-N-1215, Caribbean-NI-1201, Global-W-1324, Australia-A-1331, French Guiana-N-1346, Zimbabwe-U-1365, Global-W-1376, Taiwan-N-1403, Global-I-1404, Australia-E-1456, Chad-N-1503, Brazil-N-1597, Australia, northern-W-1204, Global-CD-1611, Brazil-N-1733, Eastern Caribbean-N-1742, Taiwan-W-1748, Puerto Rico and the Virgin Islands-C-1821, Mexico-NI-1881, India-I-1904, Australia-WD-1934, Angola-N-2028, Ghana-ERI-2066, United States of America-N-2092, Angola-W-1977, Antigua and Barbuda-W-1977, Australia-W-1977, Bahamas-W-1977, Bangladesh-W-1977, Barbados-W-1977, Belize-W-1977, Benin-W-1977, Brazil-W-1977, Brunei Darussalam-W-1977, Burundi-W-1977, Cote d'Ivoire-W-1977, Cambodia-W-1977, Cameroon-W-1977, Chad-W-1977, Colombia-W-1977, Comoros-W-1977, Cook Islands-W-1977, Democratic Republic of the Congo-W-1977, Djibouti-W-1977, Dominica-W-1977, Dominican Republic-W-1977, Ecuador-W-1977, El Salvador-W-1977, Ethiopia-W-1977, Fiji-W-1977, Ghana-W-1977, Guatemala-W-1977, Haiti-W-1977, Honduras-W-1977, India-W-1977, Jamaica-W-1977, Lao People's Democratic Republic-W-1977, Malawi-W-1977, Malaysia-W-1977, Maldives-W-1977, Mali-W-1977, Mauritius-W-1977, Mexico-W-1977, Micronesia (Federated States of)-W-1977, Mozambique-W-1977, Nicaragua-W-1977, Niger-W-1977, Nigeria-W-1977, Niue-W-1977, Palau-W-1977, Panama-W-1977, Papua New Guinea-W-1977, Saint Vicent and the Grenadines-W-1977, Senegal-W-1977, Sierra Leone-W-1977, Solomon Islands-W-1977, South Africa-W-1977, Sudan-W-1977, Taiwan-W-1977, Togo-W-1977, Tonga-W-1977, Uganda-W-1977, 3125 Venezuela-W-1977, Viet Nam-W-1977, Zambia-W-1977, Zimbabwe-W-1977."
	WRA Specialist. (2021). Personal Communication	Now frequently regarded as a weed with potentially detrimental environmental impacts, although sufficient evidence of negative effects on biodiversity or ecosystem processes have yet to be specifically documented

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Weed of: Pastures" [May impact pasture productivity. Impacts not quantified]

304	Environmental weed	
	Source(s)	Notes

Qsn #	Question	Answer
	CABI. (2021). <i>Senna siamea</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Few specific impacts of <i>S. siamea</i> invasion have been identified. It has positive economic and environmental impacts via the production of a high quality timber, fuel, fodder and mulch, and for its use as an agroforestry species, for shade, shelter and soil amelioration. It also has aesthetic value as an ornamental and street tree. Negative impacts include, if used as a timber, contact with the wood shavings can irritate the skin, and that the leaves, pods and seeds are reportedly toxic to pigs. Negative environmental impacts in the countries where it has been reported as invasive have not as yet been described."
	Sánchez-Blanco, J., Sánchez-Blanco, C., Sousa S, M., & Espinosa García, F. J. (2012). Assessing introduced Leguminosae in Mexico to identify potentially high-impact invasive species. <i>Acta Botanica Mexicana</i> , (100), 41-77	[No evidence. Low Priority in Mexico] "We classified seven species as low priority: <i>Cassia javanica</i> , <i>Cercis siliquastrum</i> , <i>Crotalaria pallida</i> , <i>Senna siamea</i> , <i>Sesbania grandiflora</i> , <i>Sutherlandia frutescens</i> , and <i>Vicia villosa</i> . These species are distributed in fewer localities than expected according to residence time and most have native and introduced relatives."
	Queensland Government. (2021). Weeds of Australia. <i>Senna siamea</i> . https://keyserver.lucidcentral.org/weeds . [Accessed 9 Apr 2021]	[Potentially. No description of impacts] "Kassod tree (<i>Senna siamea</i>) is regarded as an environmental weed in northern Queensland and as a potential environmental weed in the Northern Territory and other parts of northern Australia."
	Csurhes, S. & Edwards, R. 1998. Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	[Potentially] "The plant is showing signs of weediness in the Northern Territory (Dunlop, pers. comm.). In north Queensland, the plant has invaded forests near towns and is spreading along river banks on lower Cape York (Stanton, pers. comm.). It is believed to have escaped from the 'old Laura homestead' and is now spreading down Laura River."

305	Congeneric weed	y
	Source(s)	Notes
	Weber, E. (2017). <i>Invasive Plant Species of the World</i> , 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	" <i>Senna alata</i> ... Where invasive it forms dense thickets, shading out all other plants and preventing any regeneration of native species. The shrub establishes quickly in disturbed sites. Heavy infestations may restrict access to water for livestock and wildlife (Parsons and Cuthbertson, 2001)." ... " <i>Senna didymobotrya</i> ... Christmas bush forms extensive and dense thickets climbing over native vegetation, impeding growth and regeneration of native species. The shrub grows abundantly along rivers and in savannas. Extensive thickets affect wildlife by reducing habitats and restricting access to water (Macdonald, 1983; Henderson, 2001). Little is known about the ecology of this plant as an invader."
	Weber, E. (2003). <i>Invasive Plant Species of the World</i> . A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	<i>Senna alata</i> , <i>S. bicapsularis</i> , <i>S. didymobotrya</i> , <i>S. obtusifolia</i> , <i>S. pendula</i> [listed as significant weeds of natural areas]

401	Produces spines, thorns or burrs	n
	Source(s)	Notes

Qsn #	Question	Answer
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	[No evidence] "S. siamea is a medium-size tree rarely exceeding 20 m in height, more usually 10 to 12 m. It has a dense, round, evergreen crown and a short bole with smooth, grey bark, slightly fissured longitudinally (Heinsleigh and Holaway, 1988). It has a shallow root system, which can easily be uprooted by strong winds. Foliage Leaves alternate, 15-30 cm long, pinnately compound with 6-14 pairs of leaflets which are oblong, 3-7 cm long, 12-20 mm wide, dark green, with midrib ending in a bristle."

402	Allelopathic	y
	Source(s)	Notes
	Ayeni, M. J. (2017). Effect of aqueous extracts of the leaves of <i>Senna siamea</i> Lam. and <i>Pinus caribaea</i> (Jacq.) ex. Walp. on the germination and seedling growth of <i>Euphorbia heterophylla</i> L. World Scientific News 87: 12-23	"The herbicidal potentials of the aqueous extracts of the leaves of <i>Senna siamea</i> and <i>Pinus caribaea</i> on the germination and seedling growth of <i>Euphorbia heterophylla</i> were investigated. The results showed that the leaf aqueous extracts of the two plants brought about considerable inhibition on the germination of <i>E. heterophylla</i> seeds and reduction in the radicle and plumule lengths of <i>E. heterophylla</i> seedlings. The degree of inhibition increased with increase in the concentration of the extracts, thus suggesting that the effect of the extracts were concentration dependent. The results obtained revealed that the inhibition was pronounced in both extracts such that no germination of <i>E. heterophylla</i> seeds and plumule occurred until 48hrs and 96hrs of the experiment respectively. It was apparent that <i>Senna siamea</i> extracts had more inhibitory effect on <i>E. heterophylla</i> seeds than those of <i>Pinus caribaea</i> treated seeds as no radicle growth was clearly observed in the <i>Senna siamea</i> treated seeds until 72hours experimental time whereas in <i>Pinus caribaea</i> treated seeds, radicle growth was observed at 48hours of the experiment. Statistical analysis ($P < 0.05$) revealed that significant differences were observed in the germination, radicle and plumule lengths of the two extracts treated seeds when compared to the control experiments. The inhibitory effects of the aqueous extracts derived from the leaves of <i>Senna siamea</i> and <i>Pinus caribaea</i> might be useful in the control of <i>E. heterophylla</i> in farmlands. Further studies should be carried out to ascertain the bio- herbicidal potentials of these plants."

Qsn #	Question	Answer
	<p>Kamara, A. Y., Akobundu, I. O., Chikoye, D., & Jutzi, S. C. (2000). Selective control of weeds in an arable crop by mulches from some multipurpose trees in Southwestern Nigeria. <i>Agroforestry Systems</i>, 50(1), 17-26</p>	<p>"The use of agroforestry systems in which pruning from trees is used to mulch the companion crops is an important area of research in the tropics. However, previous studies mostly evaluated the contribution of mulch to soil improvement and rarely examined the effect of mulch on weeds. Field experiments were conducted during the 1995 and 1996 growing seasons to investigate the effects of mulch from three woody fallow species on weed composition, biomass and maize grain yield. Treatments consisted of mulch from <i>Leucaena leucocephala</i>, <i>Gliricidia sepium</i>, and <i>Senna siamea</i> applied at rates of five and three tons dry matter ha⁻¹ at planting and three weeks after planting (WAP), respectively, an unmulched treatment that received 90 kg N ha⁻¹ of inorganic fertiliser, and an unmulched control plot that received no fertiliser. In both years and sampling dates, plots mulched with <i>G. sepium</i> and <i>S. siamea</i> had significantly lower weed density and biomass than the control plot in each of the sampling times and year of study. There was no significant difference in either weed density or biomass between the plot mulched with <i>L. leucocephala</i> and the unmulched plots. Mulches from <i>G. sepium</i> and <i>S. siamea</i> reduced weed density and weed biomass, while <i>L. leucocephala</i> was less effective in reducing weed biomass and weed density. Weed reduction by the mulches was in the order <i>G. sepium</i> ≥ <i>S. siamea</i> > <i>L. leucocephala</i>. Sedges were the dominant species in all the treatments except in <i>G. sepium</i> plots, where <i>Talinum triangulare</i> and other broadleaved species were dominant."</p>
	<p>Abugre, S., Apetorgbor, A. K., Antwiwaa, A., & Apetorgbor, M. M. (2011). Allelopathic effects of ten tree species on germination and growth of four traditional food crops in Ghana. <i>Journal of Agricultural Technology</i>, 7(3), 825-834</p>	<p>[Not in this study] "Tree species selection to inter-cultivate with food crops has often been made on the basis of traditional knowledge by farmers in Ghana. Lately, Taungya system has been introduced to enable farmers produce food and at the same time retain the forest cover in communities bordering forest reserves. Fresh matured leaves and roots extracts of ten tree species were examined for their allelopathic effects on four agricultural crops to explore the allelopathic potential of the tree species and to recommend the appropriate tree species to be used under the Modified Taungya System in Ghana. Germination of <i>Hibiscus esculentus</i> seeds was significantly reduced in all the root and leaf extracts while germination of <i>Zea mays</i> seeds increased in all the root extracts except in that of <i>Terminalia superba</i>. Roots extract of <i>Senna siamea</i> promoted germination of both <i>Zea mays</i> and <i>Lycopersicon esculentum</i> seeds. Plumule and radicle extension of seedlings of the four crops were significantly reduced by all the root and leaf extracts with the exception of <i>Zea mays</i> whose plumule and radicle development was increased by <i>Eucalyptus grandis</i> leaf extracts. On the basis of the results obtained in this study the following tree species (<i>Senna siamea</i>, <i>Albizia lebeck</i>, and <i>Jatropha curcas</i>) could be recommended for planting."</p>
	<p>Hauser, S. (1993). Effect of <i>Acioa barteri</i>, <i>Cassia siamea</i>, <i>Flemingia macrophylla</i> and <i>Gmelina arborea</i> leaves on germination and early development of maize and cassava. <i>Agriculture, Ecosystems & Environment</i>, 45(3-4), 263-273</p>	<p>[Yes] "Experiments were conducted to investigate the potential allelopathic effects of <i>Acioa barteri</i>, <i>Cassia siamea</i>, <i>Gmelina arborea</i> and <i>Flemingia macrophylla</i> leaf material on the germination of maize and early growth of cassava cuttings. Incubation of maize seeds with freshly added <i>G. arborea</i> and <i>C. siamea</i> leaf material reduced germination by 35%. " ... "Under sterile conditions <i>G. arborea</i> and <i>C. siamea</i> leaf material reduced germination and root number per seedling significantly at 7 days after inoculation (DAI)."</p>

Qsn #	Question	Answer
	Prawoto, A. A. (1997). A study of allelopathy effect of <i>Cassia siamea</i> and <i>Adenanthera microsperma</i> to cocoa. <i>Pelita Perkebunan</i> , 13(1), 16-23	[Yes] "Research on the allelopathic effects of <i>C. siamea</i> , <i>A. microsperma</i> and <i>Leucaena glauca</i> [<i>L. leucocephala</i>] (used as shade trees for cocoa) on cocoa clone ICS 60 was conducted in greenhouses at the Indonesian Coffee and Cocoa Research Institute, using the Salisbury & Ross method. Cocoa seedlings were grown in polybags for 1 month and then watered with leachate from growing medium in which <i>C. siamea</i> , <i>A. microsperma</i> or <i>L. leucocephala</i> had been growing for 2 months. Control plants were watered with ground water and other set of seedlings were treated with leachate from growing medium without plants to assess the effects of the nutrients supplied from this source. Every 2 days, each seedling was treated with 200 ml leachate/water. Leachate from <i>C. siamea</i> and <i>A. microsperma</i> retarded cocoa growth, but that from <i>L. leucocephala</i> did not. Stem expansion and dry weight increase were significantly inhibited. The leachate from the growing medium without plants increased cocoa seedling growth indicating that the inhibitory effect of allelopathins from the shade tree species was actually greater than that recorded for the leachates from the growing media of the shade tree species. Thus, use of <i>C. siamea</i> and <i>A. microsperma</i> as cocoa shade trees must be reconsidered."

403	Parasitic	n
	Source(s)	Notes
	CAB International. (2005). <i>Forestry Compendium</i> . CAB International, Wallingford, UK	" <i>S. siamea</i> is a medium-size tree rarely exceeding 20 m in height, more usually 10 to 12 m." [Fabaceae]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	CAB International. (2005). <i>Forestry Compendium</i> . CAB International, Wallingford, UK	"Grazing livestock can severely damage small trees (Heinsleigh and Holaway 1988)."
	Orwa C., Mutua, A., Kindt R., Jamnadass, R., & Anthony, S. (2009). <i>Agroforestry Database: a tree reference and selection guide version 4.0</i> . http://www.worldagroforestry.org . [Accessed]	" <i>S. siamea</i> 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 <i>S. siamea</i> plantations."

405	Toxic to animals	y
	Source(s)	Notes
	Orwa C., Mutua, A., Kindt R., Jamnadass, R., & Anthony, S. (2009). <i>Agroforestry Database: a tree reference and selection guide version 4.0</i> . http://www.worldagroforestry.org . [Accessed 9 Apr 2021]	"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 <i>S. siamea</i> plantations."
	CAB International. (2005). <i>Forestry Compendium</i> . CAB International, Wallingford, UK	"The leaves, pods and seeds may be eaten by pigs, but are toxic to them."

Qsn #	Question	Answer
	Oakes, A. J., & Butcher, J. O. (1962). Poisonous and injurious plants of the US Virgin Islands. Miscellaneous Publication No. 882. Agricultural Research Service, US Department of Agriculture, Washington, D.C .	"The leaves, stems, and seeds of <i>Cassia siamea</i> contain an alkaloid that causes death to hogs very quickly after being consumed (1). In Puerto Rico, farmers have suffered severe losses of hogs from <i>Cassia siamea</i> poisoning. Hogs relish the leaves of the plant and readily consume any within reach. Although cattle and sheep are apparently not affected (1), it is advisable to take precautionary measures to prevent them from eating portions of the plant."
	Little, Jr. E.L. & Wadsworth, F.H. (1964). Common trees of Puerto Rico and the Virgin Islands. Agriculture Handbook No. 249. USDA Forest Service, Washington, D.C	"The seeds, pods, and foliage are toxic to hogs and cause death quickly after being eaten. As hogs relish the poisonous leaves, farmers in Puerto Rico have suffered losses."

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Orwa C., Mutua, A., Kindt R., Jamnadass, R., & Anthony, S. (2009). Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 9 Apr 2021]	"Liable to browsing damage, susceptible to attack by scale insects, and sapwood is susceptible to <i>Lyctus</i> beetles. In Vietnam the butterfly <i>Captosilia crocale</i> is a serious pest, its larvae feeding on the foliage of <i>S. siamea</i> . The fungus <i>Phaeolus manihotis</i> occasionally causes damage to the root system. In Indonesia, the fungus <i>Ganoderma lucidum</i> is locally a serious disease of <i>S. siamea</i> , causing a wood rot in young plants."
	Gutteridge, R.C. (1997). <i>Senna siamea</i> (Lamk) Irwin & Barneby. In: Faridah Hanum, I & van der Maesen, L.J.G. (Editors): Plant Resources of South-East Asia No 11: Auxiliary plants. PROSEA Foundation, Bogor, Indonesia. Database record: prota4u.org/prosea	"No serious diseases or pests have been recorded for <i>Senna siamea</i> , but minor damage has occurred in a number of locations. The fungus <i>Phaeolus manihotis</i> occasionally causes damage to the root system. In Indonesia, <i>Ganoderma lucidum</i> is locally a serious disease, causing wood rot on young plants. In Vietnam, the butterfly <i>Catopsylia crocale</i> is a serious pest, its larvae feeding on the foliage. The castor slug caterpillar <i>Parasa lepida</i> has been observed feeding on the leaves of <i>Senna siamea</i> in India, while the caterpillar <i>Enerma blanda</i> has caused damage to the terminal buds in plantations in Sri Lanka."

Qsn #	Question	Answer
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	<p>"S. siamea is fairly resistant to termites but is susceptible to scale insects, caterpillars (<i>Eurema blanda</i>) and defoliating insects (Heinsleigh and Holaway, 1988). Some of these pests are: <i>Catopsilia crocale</i>, which defoliates young plants; <i>Xyleutes persona</i>, a bee hole borer; <i>Indarbela</i> sp., a caterpillar which damages bark; <i>Celosterna scabrator</i>, which bores tunnels in the stem and roots; and caterpillars of <i>Labdia</i> sp., which bore into dry pods. Among the fungal diseases, <i>Ganoderma lucidum</i> causes spongy-rot and butt rot. <i>Fomes lucidus</i> is a parasitic wound fungus that invades the tree through the roots, causing a white soft decay in the lower stem. After the tree dies, the blood red sporophore appears. <i>Phaeolus manihotis</i> [<i>Polyporus baudonii</i>] is a serious root disease causing dieback. Suggested control of pests and diseases includes biological control by parasites and predators, slow release insecticides, use of pheromones and silvicultural methods. Grazing livestock can severely damage small trees (Heinsleigh and Holaway 1988).</p> <p>Pests recorded</p> <p>Insects:</p> <ul style="list-style-type: none"> <i>Catopsilia crocale</i> <i>Catopsilia pyranthe</i> <i>Cerosterna scabrator</i> <i>Diapromorpha belteata</i> <i>Eurema blanda</i> <i>Frankliniella schultzei</i> (thrips, cotton) [1] <i>Indarbela quadrinotata</i> (bark eating caterpillar) <i>Maconellicoccus hirsutus</i> (pink hibiscus mealybug) <i>Megalurothrips distalis</i> [2] <i>Mesoplatys ochroptera</i> (sesbanie beetle) <i>Scirtothrips bispinosus</i> [3] <i>Thrips tabaci</i> (potato thrips) [1] <i>Xyleutes persona</i> <i>Zeuzera coffeae</i> (coffee carpenter) [4] <p>Fungus diseases:</p> <ul style="list-style-type: none"> <i>Ganoderma lucidum</i> (basal stem rot: <i>Hevea</i> spp.) <p>Parasitic plants:</p> <ul style="list-style-type: none"> <i>Erianthemum ulugurense</i> [5]"

407	Causes allergies or is otherwise toxic to humans	y
	Source(s)	Notes
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Pods and leaves sometimes fatal to men and livestock, to pigs."
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"Wood sawdust can cause irritation when in contact with the skin." [Such contact would rarely occur]
	Orwa C., Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. (2009). Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 9 Apr 2021]	[Potentially, if working with wood] "Poison: Sawdust may cause some irritation to the nose, throat and eyes."

408	Creates a fire hazard in natural ecosystems	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Gutteridge, R.C. (1997). <i>Senna siamea</i> (Lamk) Irwin & Barneby. In: Faridah Hanum, I & van der Maesen, L.J.G. (Editors): Plant Resources of South-East Asia No 11: Auxiliary plants. PROSEA Foundation, Bogor, Indonesia. Database record: prota4u.org/prosea	[No evidence. Generally occurs in wetter habitats] " <i>Senna siamea</i> will grow in a range of climatic conditions, but is particularly suited to the lowland tropics with a monsoon climate with a mean annual rainfall of 500—2800 mm with an optimum of about 1000 mm. Under semi-arid conditions (500—700 mm), <i>Senna siamea</i> will grow only when its roots have access to groundwater."
	CABI. (2021). <i>Senna siamea</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	Not listed among negative impacts

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	Orwa C., Mutua, A., Kindt R., Jamnadass, R., & Anthony, S. (2009). Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 9 Apr 2021]	"Its light requirements are high."
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	" <i>S. siamea</i> is a strong light demander and is sensitive to poor drainage."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	" <i>S. siamea</i> is not exacting in soil requirements, but prefers moist soils with good drainage (Troup and Joshi, 1983) and a soil pH of 5.5-7.5 (Gutteridge, 1997). In West Bengal, it has been grown in lateric soil after deep soil working. It tolerates denuded shallow soils (Hocking, 1993), but its growth will stagnate in dry areas, with the tree becoming stunted after 4 to 5 years; coppice growth will also be reduced. <i>S. siamea</i> is suitable for use on vertisols, xerosol/calciols, aerisol/alisols, ferrasols, and nitosol/nitisols (FAO classification). It flourishes on both flat terrain and hill slopes, Soil descriptors - Soil texture: light; medium; heavy - Soil drainage: free - Soil reaction: acid; neutral - Special soil tolerances: shallow; infertile - Soil types: fluvisols; ferrasols; alfisols; lateritic soils; nitisols; vertisols; calcareous soils"
	Gutteridge, R.C. (1997). <i>Senna siamea</i> (Lamk) Irwin & Barneby. In: Faridah Hanum, I & van der Maesen, L.J.G. (Editors): Plant Resources of South-East Asia No 11: Auxiliary plants. PROSEA Foundation, Bogor, Indonesia. Database record: prota4u.org/prosea	" <i>Senna siamea</i> 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. It grows poorly on infertile, poorly drained podzolic soils. It is not tolerant of salinity, but is reasonably tolerant of acid soil conditions."

411	Climbing or smothering growth habit	n
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Qsn #	Question	Answer
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"S. siamea is a medium-size tree rarely exceeding 20 m in height, more usually 10 to 12 m."
412	Forms dense thickets	y
	Source(s)	Notes
	IUCN .(2012). Guide to some invasive plants affecting Lake Tanganyika. IUCN ISI and Lake Tanganyika Authority. Nairobi, Kenya	"This species can produce seedlings ("wildlings") around its base and area of influence and when this happens in a plantation within natural woodland, the resulting spread of senna can result in a monoculture – eventually excluding all other species." ... "S. siamea is increasingly forming thickets of young plants which slowly spread and dominate (and exclude) native vegetation."
501	Aquatic	n
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"It flourishes on both flat terrain and hill slopes," [Terrestrial]
502	Grass	n
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	Fabaceae
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	Orwa C., Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. (2009). Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 9 Apr 2021]	"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."
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"It is now well accepted that S. siamea does not fix nitrogen through Rhizobium symbiosis in nodules, although there is some evidence that nitrogen-fixing activity may occur in the warty, lenticellate bark (Gutteridge, 1997). It is thus not recommended for use on infertile soils."
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"S. siamea is a medium-size tree rarely exceeding 20 m in height, more usually 10 to 12 m."
601	Evidence of substantial reproductive failure in native habitat	n

Qsn #	Question	Answer
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"There are no records of ex situ conservation of <i>S. siamea</i> . As it is common within its natural distribution range, and is planted extensively, it does not seem to be endangered, nor is it considered liable to genetic erosion (Sosef et al., 1998)."

602	Produces viable seed	Y
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"It regenerates naturally by seed, and seeds may lie dormant on the ground for many years until favourable conditions occur for germination. It has spread naturally in the dry deciduous forests of southern India, and is reported to regenerate naturally in West Bengal."

603	Hybridizes naturally	
	Source(s)	Notes
	WRA Specialist. (2021). Personal Communication	Unknown. No evidence found

604	Self-compatible or apomictic	
	Source(s)	Notes
	Marazzi, B., & Endress, P. K. (2008). Patterns and development of floral asymmetry in <i>Senna</i> (Leguminosae, Cassiinae). <i>American Journal of Botany</i> , 95(1), 22-40	[Unknown] "In monomorphic enantiostylous taxa, such as <i>Senna</i> , the presence of both left and right floral morphs on the same plant and the observation that many of these plants are self-compatible indicate that geitonogamous self-pollination between different morphs is possible."
	East, E. M. (1940). The distribution of self-sterility in the flowering plants. <i>Proceedings of the American Philosophical Society</i> 82: 449-518	[Unknown] "There was an indication of self-sterility in three species not in the above list. The first was <i>Cassia siamea</i> Lam. As fourteen other species of <i>Cassia</i> were highly self-fertile, and the flower mechanism is not particularly variable, this case is suspicious-the more so because 49 per cent of the pollen was empty

605	Requires specialist pollinators	n
	Source(s)	Notes
	Willmer, P. (2011). <i>Pollination and Floral Ecology</i> . Princeton University Press, Princeton, NJ	"The special system of buzz pollination is used almost exclusively by bees and can greatly increase their foraging efficiency." ... "Table 7.4. Typical Buzz-Pollinated Flowers" [Includes genus <i>Cassia</i> or <i>Senna</i>]
	Marazzi, B., & Sanderson, M. J. (2010). Large-scale patterns of diversification in the widespread legume genus <i>Senna</i> and the evolutionary role of extrafloral nectaries. <i>Evolution</i> , 64(12), 3570-3592	[No. Utilizes bees which are represented by both native and non-native species in the Hawaiian fauna] " <i>Senna</i> has long been of interest because of the structural specialization of its buzz-pollinated flowers in relation to its unusual pollination biology (e.g., Müller 1883; Buchmann 1974; Gottsberger and Silberbauer-Gottsberger 1988), including outstanding androecial diversity and diverse floral asymmetry patterns (Venkatesh 1957; Marazzi et al. 2007; Marazzi and Endress 2008)."

Qsn #	Question	Answer
	Kaur, R., & Kumar, N. R. (2013). Pollen foraging activity of <i>Apis mellifera</i> during autumn season in Chandigarh. <i>Halteres</i> , 4, 12-14	[Visited and presumably pollinated by honeybees] "Foraging activity of honeybee <i>Apis mellifera</i> was studied during autumn season in Chandigarh. The collection of pollen by worker bees was influenced by number of factors including both internal and external. Internal factors like higher area under brood in the colony stimulated the foragers to collect more pollen. External factors such as temperature, light, wind, rain, clouds also influenced the pollen foraging activities. Number of pollen foragers returning with pollen loads at the hive entrance was counted for 5 minutes (September-November, 2011) at intervals of 1 hour each from 10:00 a.m. to 04:00 p.m., twice a week in five honeybee colonies during autumn season. The mean maximum number of pollen foragers was recorded as 218.38 ± 33.27 at 12:00 noon when air temperature ranged from 15°C to 32°C. This pollen collecting activity decreased after 03:00 p.m. Number of trips depended upon various conditions including weather, forage availability, strength of colony etc. The results of findings revealed that 12:00 noon was the hour of peak pollen collecting activity during autumn season and <i>Cassia siamea</i> present in large number near the colonies was the main source of collected pollen."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	CABI. (2021). <i>Senna siamea</i> . In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. www.cabi.org/isc	"The plants begin to bear seed annually at the age of 2-3 years. It regenerates naturally by seed, and seeds may lie dormant on the ground for many years until favourable conditions occur for germination. It has spread naturally in the dry deciduous forests of southern India, and is reported to regenerate naturally in West Bengal."

607	Minimum generative time (years)	2
	Source(s)	Notes
	CAB International. (2005). <i>Forestry Compendium</i> . CAB International, Wallingford, UK	"The plants begin to bear seed annually at the age of 2-3 years. The pods ripen towards the end of the hot season and hang in clusters on the tree."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Orwa C., Mutua, A., Kindt R., Jamnadass, R., & Anthony, S. (2009). <i>Agroforestry Database: a tree reference and selection guide version 4.0</i> . http://www.worldagroforestry.org . [Accessed 9 Apr 2021]	[No evidence, although seeds could potentially be moved with soil] "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." [Unlikely, as pods & seeds lack means of external attachment]

702	Propagules dispersed intentionally by people	y
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Qsn #	Question	Answer
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"Location of introductions: <i>S. siamea</i> was originally introduced mainly as an avenue shade tree for roadside planting. To date it has been extensively cultivated throughout India, both within forest areas, and also in wasteland afforestation projects, for example in Uttar Pradesh, Bihar, Madhya Pradesh, West Bengal and Gujarat; in these and in other states it has become naturalized. It is planted in degraded and dry areas for rehabilitation of forests and holds promise for reclamation of mined areas (Shyam Lal, 1991). It has also been planted in areas of river valley projects. The species has been introduced into East Asia, Cyprus, Africa and the New World."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"Pods are flat, 15 to 25 cm long, soft and ribbon-like when young, brown when ripe, indented between the seeds; there are 20-30 seeds per pod. Seeds are bean-shaped, shiny dark-brown, 8 mm long." [No evidence, and unlikely given relatively large size of pods and seeds]

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	CABI. (2021). <i>Senna siamea</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Pods are flat, 15-25 cm long, soft and ribbon like when young, brown when ripe, indented between the seeds; there are 20 30 seeds per pod. Seeds are bean-shaped, shiny dark-brown, 8 mm long." [No apparent adaptations for wind dispersal]

705	Propagules water dispersed	y
	Source(s)	Notes
	CABI. (2021). <i>Senna siamea</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Seed pods and seeds are spread by water."

706	Propagules bird dispersed	
	Source(s)	Notes
	CABI. (2021). <i>Senna siamea</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"It is not known whether birds, mammals or other animals play a role in seed dispersal." [Uncertain. Pods and seeds lack adaptations for bird frugivory]
	David, J. P., Manakadan, R., & Ganesh, T. 2015. Frugivory and seed dispersal by birds and mammals in the coastal tropical dry evergreen forests of southern India: A review. <i>Tropical Ecology</i> , 56(1): 41-55	"Species consumed by birds and mammals but adapted for other dispersal modes" [Includes <i>Cassia siamea</i> which has Autochory listed as the other dispersal mode. Effectiveness of birds as dispersers is not discussed in this publication]

707	Propagules dispersed by other animals (externally)	n
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Qsn #	Question	Answer
	Source(s)	Notes
	CABI. (2021). <i>Senna siamea</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Pods are flat, 15-25 cm long, soft and ribbon like when young, brown when ripe, indented between the seeds; there are 20 30 seeds per pod. Seeds are bean-shaped, shiny dark-brown, 8 mm long." [Pods and seeds lack means of external attachment]

708	Propagules survive passage through the gut	y
	Source(s)	Notes
	IUCN .(2012). Guide to some invasive plants affecting Lake Tanganyika. IUCN ISI and Lake Tanganyika Authority. Nairobi, Kenya	[Propagules survive passage through the gut? Yes] "The pods and seeds can be eaten by ruminants (but are poisonous to non-ruminants) and then spread when the animals disperse."

801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"There are between 35,000 and 41,000 seeds per kilogram (Sosef et al., 1998). The number of plants that can be expected from a kilogram of seeds is about 32,200. " ... "Pods are flat, 15 to 25 cm long, soft and ribbon-like when young, brown when ripe, indented between the seeds; there are 20-30 seeds per pod. Seeds are bean-shaped, shiny dark-brown, 8 mm long." [Unlikely. Requires 33-50 pods per square meter, not often likely]

802	Evidence that a persistent propagule bank is formed (>1 yr)	y
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"...seeds may lie dormant on the ground for many years until favourable conditions occur for germination." ... "S. siamea seeds are orthodox, and will keep for several years in dry storage at ambient temperature (Heinsleigh and Holaway, 1988). There are between 35,000 and 41,000 seeds per kilogram (Sosef et al., 1998). The number of plants that can be expected from a kilogram of seeds is about 32,200."

803	Well controlled by herbicides	y
	Source(s)	Notes
	Oakes, A. J., & Butcher, J. O. (1962). Poisonous and injurious plants of the US Virgin Islands. Miscellaneous Publication No. 882. Agricultural Research Service, US Department of Agriculture, Washington, D.C .	"Young plants are susceptible to basal or foliar applications of 2,4-D or related herbicides."
	IUCN .(2012). Guide to some invasive plants affecting Lake Tanganyika. IUCN ISI and Lake Tanganyika Authority. Nairobi, Kenya	[Efficacy unknown] " <i>Senna siamea</i> is most often seen as a beneficial tree and so there are few protocols for its control. Management in thickets would be by uprooting – preferably before any flowering begins - to ensure that no seed bank is established beneath the thicket. As with other trees that can coppice, removal of well-grown trees would require herbicide application to the stumps of cleared trees or complete removal of the larger roots– which can be quite widespread."

Qsn #	Question	Answer
	Weber, E. (2003). <i>Invasive Plant Species of the World. A Reference Guide to Environmental Weeds.</i> CABI Publishing, Wallingford, UK	Several <i>Senna</i> species effectively controlled by various herbicides.

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	CAB International. (2005). <i>Forestry Compendium.</i> CAB International, Wallingford, UK	"It is suitable for both coppicing and pollarding, and these properties, combined with rapid growth, make it suitable for fuelwood production. It coppices vigorously, and continues to yield well over 4 or 5 rotations. Experiments in Tanzania indicated that coppicing gave better results than pollarding in plantations (Troup and Joshi, 1983)."
	Gutteridge, R.C. (1997). <i>Senna siamea</i> (Lamk) Irwin & Barneby. In: Faridah Hanum, I & van der Maesen, L.J.G. (Editors): <i>Plant Resources of South-East Asia No 11: Auxiliary plants.</i> PROSEA Foundation, Bogor, Indonesia. Database record: prota4u.org/prosea	" <i>Senna siamea</i> is very tolerant of coppicing, lopping, or pollarding. Plantations can be harvested for fuelwood every 5–7 years, although shorter rotations are often practised in favourable environments. Where mulch or leaf production is the primary aim of a plantation, the first cut may be 12–18 months after sowing, followed by 3–4 cuts per year thereafter."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Gutteridge, R.C. (1997). <i>Senna siamea</i> (Lamk) Irwin & Barneby. In: Faridah Hanum, I & van der Maesen, L.J.G. (Editors): <i>Plant Resources of South-East Asia No 11: Auxiliary plants.</i> PROSEA Foundation, Bogor, Indonesia. Database record: prota4u.org/prosea	[Unknown for Hawaiian Islands] "Diseases and pests No serious diseases or pests have been recorded for <i>Senna siamea</i> , but minor damage has occurred in a number of locations. The fungus <i>Phaeolus manihotis</i> occasionally causes damage to the root system. In Indonesia, <i>Ganoderma lucidum</i> is locally a serious disease, causing wood rot on young plants. In Vietnam, the butterfly <i>Catopsylia crocale</i> is a serious pest, its larvae feeding on the foliage. The castor slug caterpillar <i>Parasa lepida</i> has been observed feeding on the leaves of <i>Senna siamea</i> in India, while the caterpillar <i>Enerma blanda</i> has caused damage to the terminal buds in plantations in Sri Lanka."

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in tropical climates
- Broad climate suitability
- Elevation range exceeds 1000 m
- Naturalized in a number of locations
- A potential environmental weed
- A number of *Senna* species have become invasive
- Allelopathic properties
- Seeds, pods, and foliage are toxic to pigs and non-ruminants
- Sawdust may cause some irritation to the nose, throat and eyes
- Tolerates many soil types
- Reported to form dense thickets in Africa
- Spreads by seeds (human, animal and water mediated)
- Viable seeds pass through guts of animals
- Forms a persistent seed bank
- Coppices vigorously

Low Risk Traits

- Despite history of naturalization and invasiveness, negative impacts have not been extensively documented to date
- Unarmed (no spines, thorns, or burrs)
- Palatable fodder plant to cattle and other ruminants
- High light demander (may not spread into understory of intact forests)
- Not a nitrogen fixing tree
- Valued as a shade tree
- Pods and seeds are relatively large, which could limit long-distance dispersal
- Herbicides may provide effective control