

Taxon: <i>Oroxylum indicum</i>	Family: Bignoniaceae
Common Name(s): Indian trumpet kampong midnight horror oroxylum	Synonym(s): Bignonia indica L.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 17 Apr 2015
WRA Score: 2.0	Designation: EVALUATE	Rating: Evaluate

Keywords: Tropical Tree, Edible Parts, Bat-Pollinated, Malodorous, Wind-Dispersed

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	n
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	n
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	n
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
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	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
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	y
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	n
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	y
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic	y=1, n=-1	n
605	Requires specialist pollinators	y=-1, n=0	y
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)		
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	y
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m ²)	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides		
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
	Rasadah, M.A., 2001. <i>Oroxylum indicum</i> (L.) Kurz[Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 16 Apr 2015]	[No evidence of domestication that reduces weedy traits] "Propagation and planting <i>Oroxylum indicum</i> can be propagated by seed or stem cuttings. As opened fruits will have lost part of their seeds and seed may be affected by fungal attack, seed should be collected from closed fruits. Seed germination is about 50% in 19–25 days. Germination success is enhanced by soaking for 24 h prior to sowing and planting at 0.5 cm depth." ... "Prospects The flavonoids and lapachol isolated from <i>Oroxylum indicum</i> show interesting pharmacological activities in the fields of virus-inhibition and anti-inflammatory activity. These merit further research in order to evaluate their possibilities and potential for future medicine."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2015. 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
	Rasadah, M.A., 2001. <i>Oroxylum indicum</i> (L.) Kurz[Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 15 Apr 2015]	" <i>Oroxylum indicum</i> is found from India eastward to southern China and the Philippines, and throughout South-East Asia; in Indonesia eastward to Sulawesi and the Lesser Sunda Islands. Locally cultivated near human settlements."

202	Quality of climate match data	High
	Source(s)	Notes
	Rasadah, M.A., 2001. <i>Oroxylum indicum</i> (L.) Kurz[Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 15 Apr 2015]	

203	Broad climate suitability (environmental versatility)	y
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Qsn #	Question	Answer
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Climatic amplitude (estimates) - Altitude range: 10 - 1400 m - Mean annual rainfall: 1500 - 5500 mm - Rainfall regime: summer; uniform - Dry season duration: 0 - 4 months - Mean annual temperature: 24 - 32°C - Mean maximum temperature of hottest month: 26 - 38°C - Mean minimum temperature of coldest month: 22 - 28°C - Absolute minimum temperature: > 0°C" [Elevation range exceeds 1000 m, demonstrating environmental versatility]
	Rasadah, M.A., 2001. <i>Oroxylum indicum</i> (L.) Kurz[Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 15 Apr 2015]	"It tolerates a wide range of both climatic and soil conditions, and occurs mostly below 1000 m altitude."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Deka, D. C., Kumar, V., Prasad, C., Kumar, K., Gogoi, B. J., Singh, L., & Srivastava, R. B. (2013). <i>Oroxylum indicum</i> —a medicinal plant of North East India: An overview of its nutritional, remedial, and prophylactic properties. <i>Journal of Applied Pharmaceutical Science</i> 3(S1): S104-S112	"It is native to the Indian subcontinent, in the Himalayan foothills with a part extending to Bhutan and southern China, in Indo-China and the Malaysia ecozone. It is visible in the forest biome of Manas National Park in Assam, India. It is also reported from Sri Lanka (Ceylon) (Theobald, 1981). It is found in Fujian, Guangdong, Guangxi, Guizhou, Sichuan, Taiwan, Yunnan, Cambodia, India, Indonesia (Java, Sumatra), Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand and Vietnam (Lawania et al., 2010; Maciuk et al., 2000)."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	" <i>O. indicum</i> is a small, deciduous, soft-wooded tree between 6 and 12 m tall. It occurs naturally in parts of South and South-East Asia."
	Rasadah, M.A., 2001. <i>Oroxylum indicum</i> (L.) Kurz[Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 15 Apr 2015]	" <i>Oroxylum indicum</i> is found from India eastward to southern China and the Philippines, and throughout South-East Asia; in Indonesia eastward to Sulawesi and the Lesser Sunda Islands. Locally cultivated near human settlements."

205	Does the species have a history of repeated introductions outside its natural range?	n
	Source(s)	Notes

Qsn #	Question	Answer
	Imada, C.T., Staples, G.W. & Herbst, D.R. 2005. Annotated Checklist of Cultivated Plants of Hawai'i. http://www2.bishopmuseum.org/HBS/botany/cultivatedplants/ . [Accessed 16 Apr 2015]	" <i>Oroxylum indicum</i> (Linnaeus) Ventenat Common Names: Tree-of-Damocles, Midnight horror Locations: Harold L. Lyon Arboretum Ho'omaluhia Botanical Garden Limahuli Garden (a satellite garden of National Tropical Botanical Garden) Pacific Tropical Botanical Garden (now National Tropical Botanical Garden) Waimea Arboretum & Botanical Garden"
	Weaver, Jr., R.E. 2005. Botany Section. TRI-ODOLOGY 44(4)	"This plant is more odd than ornamental and is seldom cultivated. (Miami-Dade Co; B2005-451; Rita E. Duncan; 29 July 2005) (Van Steenis 1977)"

301	Naturalized beyond native range	n
	Source(s)	Notes
	Weaver, Jr., R.E. 2005. Botany Section. TRI-ODOLOGY 44(4)	[No evidence in Florida] "This plant is more odd than ornamental and is seldom cultivated. (Miami-Dade Co; B2005-451; Rita E. Duncan; 29 July 2005) (Van Steenis 1977)"
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence
	Wagner, W.L., Herbst, D.R. & Lorence, D.H. 2015. Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/index.htm . [Accessed 16 Apr 2015]	No evidence

302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Pelser, P.B., J.F. Barcelona & D.L. Nickrent (eds.). 2011 onwards. Co's Digital Flora of the Philippines. www.philippineplants.org	[Disturbance-adapted, but not regarded as a weed] "A characteristic, short-lived nomad tree, nowhere gregarious, never in mature rainforest but always in openings, secondary growths and thickets..."
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

304	Environmental weed	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

305	Congeneric weed	n
	Source(s)	Notes
	Rasadah, M.A., 2001. <i>Oroxylum indicum</i> (L.) Kurz[Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed]	[No evidence. One other species] "Other botanical information <i>Oroxylum</i> is a small genus and a second species, <i>Oroxylum flavum</i> Rehder, has been described based on a specimen raised from seed collected in southern China."
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Rasadah, M.A., 2001. <i>Oroxylum indicum</i> (L.) Kurz[Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 15 Apr 2015]	[No evidence] "A semi-deciduous, sparingly branched tree up to 27 m tall; trunk up to 40 cm in diameter, bark grey, with prominent leaf scars, twigs thick, pithy, later hollow, lenticellate. Leaves crowded, imparipinnate, 3—4 times pinnate, 0.5—2 m long; petiole long, rachis swollen at points of insertion; stipules absent; leaflets ovate to oblong, 4—11(—15) cm x 3—9 cm, base cuneate or mostly oblique, apex acuminate, entire, with scattered glands on the lower surface."

402	Allelopathic	n
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	Unknown

403	Parasitic	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	" <i>O. indicum</i> is a small, deciduous, soft-wooded tree between 6 and 12 m tall." [No evidence. Bignoniaceae]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Descriptors: medicinal products; food; fodder; dyestuffs; tanstuffs"
	Ghosh, C., & Das, A. P. (2007). Rhino-Fodders in Jaldapara Wildlife Sanctuary in Duars of West Bengal, India. <i>Our Nature</i> , 5(1): 14-20	"Flowers of <i>Oroxylum indicum</i> are also equally liked by Rhinos but, on the contrary, the species flowers for a much longer period and at a time when there is no dearth of fodder in the sanctuary."

Qsn #	Question	Answer
	Das, B. J., Saikia, B. N., Baruah, K. K., Bora, A., & Bora, M. 2014. Nutritional evaluation of fodder, its preference and crop raiding by wild Asian elephant (<i>Elephas maximus</i>) in Sonitpur District of Assam, India. <i>Veterinary World</i> 7(12): 1082-1089	"Table-5: Available fodder in forest and non-forest area and their utilization by wild Asian elephants." [Includes <i>O. indicum</i>]
	Gokhale, M., & Bansal, Y. K. (2006). Avowal of importance of endangered tree <i>Oroxylum indicum</i> (Linn.) Vent. <i>Natural Product Radiance</i> 5(2): 112-114	"Young shoots, unripe fruits and flowers of this tree are eaten as vegetable. The tree is lopped for fodder."

405	Toxic to animals	n
	Source(s)	Notes
	Gokhale, M., & Bansal, Y. K. (2006). Avowal of importance of endangered tree <i>Oroxylum indicum</i> (Linn.) Vent. <i>Natural Product Radiance</i> 5(2): 112-114	[No evidence] "Young shoots, unripe fruits and flowers of this tree are eaten as vegetable. The tree is lopped for fodder."
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Pests recorded Insects: Dihammus ceroinus Hyblaea puera (teak defoliator)"

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Dev, L. R., Anurag, M., & Rajiv, G. (2010). <i>Oroxylum indicum</i> : A review. <i>Pharmacognosy Journal</i> , 2(9): 304-310	[No evidence, but inadvertent poisoning could possibly occur if used incorrectly as a medicine] " <i>Oroxylum indicum</i> (Bignoniaceae), also known as Sonapatha or Shyonaka is commonly used herbal medicine in Ayurvedic system. Roots, leaves and stems of <i>Oroxylum indicum</i> have been used as a single drug or as a component of certain compound drug preparations in the Indian Ayurvedic system of medicine for treatment of various disorders as well as used as a tonic and Rasayana drug. It contains flavonoids like chrysin, baicalein and Oroxylin-A. Various studies indicated that sonapatha possesses anticancer, antioxidant, hepatoprotective and immunomodulatory properties mainly. Various other effects like antibacterial, analgesic and gastro-protective properties of sonapatha have also been reported. It is a tree that is found generally in damp region. In the present review an attempt has been made to compile and critically analyse various published reports on <i>Oroxylum indicum</i> ."

Qsn #	Question	Answer
	Rasadah, M.A., 2001. <i>Oroxylum indicum</i> (L.) Kurz[Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyaphrathatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 15 Apr 2015]	[No evidence. Used medicinally, but may cause problems if used incorrectly] "Uses Throughout its distribution area, the bitter bark is employed for intestinal complaints. It is credited with astringent and tonic properties, and widely used for diarrhoea and dysentery. In Malaysia, a decoction of the leaves is drunk for stomach-ache. Externally it is employed in cholera, fever, childbirth and rheumatic swellings. The boiled leaves are employed as a poultice during and after childbirth, and in dysentery as well as for an enlarged spleen. Leaf poultices may be further applied for toothache and headache. In Java, the pounded bark mixed with water is taken in gastritis and to purify the blood. In northern Sulawesi, the inner bark is used to arrest bleeding. In the Philippines, a decoction of the root is credited with antirheumatic, antidyenteric and diuretic properties; the leaves are used in antirheumatic baths. In Thailand, the root and root bark are used for diarrhoea and dysentery, while the stem bark is applied for ulcers and abscesses. In Vietnamese folk medicine, a decoction of the seeds is used for cough, bronchitis and gastritis. Externally the seeds are applied to ulcers. A decoction of the dried root bark or stem bark is used in the treatment of allergic diseases, urticaria, jaundice, asthma, sore throat, laryngitis, hoarseness, gastralgia, diarrhoea and dysentery. An alcoholic maceration of the fresh bark is externally applied on allergic dermatitis. In Thai folk medicine, the root is employed as a tonic and antidiarrhoeal, whereas the seed is used as a laxative and expectorant. Throughout South-East Asia, cooked flowers, buds and young pods are highly esteemed as a vegetable. In Java, flowers, young shoots and the stem bark are consumed fresh as a side dish. The wood can be used as a firewood although it is of poor quality."
	Hanelt, P. (ed.) 2001. Mansfeld's encyclopedia of agricultural & horticultural crops: (except ornamentals). Algae, Fungi, Pteridophyta, Gymnospermae, Angiospermae-Dicotyledones: Magnoliaceae-Chrysobalanaceae. Springer, Berlin	[No evidence] "Young leaves and flowers are eaten as vegetable, immature fruits are cooked. Flowers and bark are used as medicine. Bark and parts of the fruit are used in tanning and dyeing (rattan basketry in Sarawak). Matches and matchboxes are made from the wood."
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Rasadah, M.A., 2001. <i>Oroxylum indicum</i> (L.) Kurz[Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyaphrathatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 16 Apr 2015]	[No evidence. Unlikely given low densities in forest] "Ecology <i>Oroxylum indicum</i> is a short-lived nomad tree, nowhere gregarious, always encountered in canopy openings, secondary growth and thickets."

Qsn #	Question	Answer
409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"- Tolerates drought; wind; shade"
	Lim, T.K. 2012. Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	"It grows well in full sun and moist soil and is partially shade tolerant when young."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Rasadah, M.A., 2001. <i>Oroxylum indicum</i> (L.) Kurz[Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 15 Apr 2015]	"It tolerates a wide range of both climatic and soil conditions, and occurs mostly below 1000 m altitude."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Soil descriptors - Soil texture: light; medium - Soil drainage: free - Soil reaction: acid; neutral - Special soil tolerances: shallow"

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"O. indicum is a small, deciduous, soft-wooded tree between 6 and 12 m tall."

412	Forms dense thickets	n
	Source(s)	Notes
	Rasadah, M.A., 2001. <i>Oroxylum indicum</i> (L.) Kurz[Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 15 Apr 2015]	" <i>Oroxylum indicum</i> is a short-lived nomad tree, nowhere gregarious, always encountered in canopy openings, secondary growth and thickets."
	Pelser, P.B., J.F. Barcelona & D.L. Nickrent (eds.). 2011 onwards. Co's Digital Flora of the Philippines. www.philippineplants.org	[Nowhere gregarious] "A characteristic, short-lived nomad tree, nowhere gregarious, never in mature rainforest but always in openings, secondary growths and thickets, rather indifferent to climate and soils, at low to medium altitudes below 1000m."

501	Aquatic	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[Terrestrial] "O. indicum is a small, deciduous, soft-wooded tree between 6 and 12 m tall. It occurs naturally in parts of South and South-East Asia. It is rare in drier regions, often preferring moist places such as ravines."

Qsn #	Question	Answer
502	Grass	n
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 15 Apr 2015]	"Family: Bignoniaceae tribe: Oroxyleae"

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 15 Apr 2015]	[No evidence] "Family: Bignoniaceae tribe: Oroxyleae"

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Rasadah, M.A., 2001. <i>Oroxylum indicum</i> (L.) Kurz[Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyaphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org/ . [Accessed 15 Apr 2015]	"A semi-deciduous, sparingly branched tree up to 27 m tall; trunk up to 40 cm in diameter, bark grey, with prominent leaf scars, twigs thick, pithy, later hollow, lenticellate. Leaves crowded, imparipinnate, 3—4 times pinnate, 0.5—2 m long; petiole long, rachis swollen at points of insertion; stipules absent; leaflets ovate to oblong, 4—11(—15) cm x 3—9 cm, base cuneate or mostly oblique, apex acuminate, entire, with scattered glands on the lower surface."

601	Evidence of substantial reproductive failure in native habitat	y
	Source(s)	Notes
	Najar, Z. A., & Agnihotri, S. (2012). Need and Importance of Conservation of Endangered Tree <i>Oroxylum indicum</i> (Linn.) Vent. <i>Asian Journal of Plant Science and Research</i> , 2(3): 220-223	"The tree is propagated naturally by seeds, which germinate in the beginning of the rainy season. Seedlings require moderate shade in the early stages. However, the seed set is poor and seed viability is low. Problems related with its natural propagation and indiscriminate exploitation for medicinal purpose has pushed <i>O. indicum</i> to the list of endangered plant species of India. Destructive and non-sustainable collection methods coupled with low regeneration and habitat destruction have posed serious threat to the survival and availability of this highly useful tree [Yasodha et al., 2004]."

602	Produces viable seed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Rasadah, M.A., 2001. <i>Oroxylum indicum</i> (L.) Kurz[Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 15 Apr 2015]	" <i>Oroxylum indicum</i> can be propagated by seed or stem cuttings. As opened fruits will have lost part of their seeds and seed may be affected by fungal attack, seed should be collected from closed fruits. Seed germination is about 50% in 19–25 days. Germination success is enhanced by soaking for 24 h prior to sowing and planting at 0.5 cm depth."

603	Hybridizes naturally	
	Source(s)	Notes
	Rasadah, M.A., 2001. <i>Oroxylum indicum</i> (L.) Kurz[Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 15 Apr 2015]	[Unknown] "Other botanical information <i>Oroxylum</i> is a small genus and a second species, <i>Oroxylum flavum</i> Rehder, has been described based on a specimen raised from seed collected in southern China."

604	Self-compatible or apomictic	n
	Source(s)	Notes
	Srithongchuay, T., Bumrungsri, S., & Sripao-roya, E. (2008). The pollination ecology of the late-successional tree, <i>Oroxylum indicum</i> (Bignoniaceae) in Thailand. <i>Journal of Tropical Ecology</i> , 24(05): 477-484	" <i>Oroxylum indicum</i> is highly self-incompatible; cross pollination is vital for pollination success, while selfing is very rare. The breeding system in this plant also supports the prediction based on its pollemovule ratio (Cruden 2000). Such a breeding system appears to be typical of the Bignoniaceae. Of the 38 species (out of 800 species total) of Bignoniaceae in which the breeding system has been examined, self incompatibility has been found in 31 species. Further studies indicated that all examined species are characterized by late-acting self incompatibility (Bittencourt & Semir 2006)."

605	Requires specialist pollinators	y
	Source(s)	Notes
	Srithongchuay, T., Bumrungsri, S., & Sripao-roya, E. (2008). The pollination ecology of the late-successional tree, <i>Oroxylum indicum</i> (Bignoniaceae) in Thailand. <i>Journal of Tropical Ecology</i> , 24(05): 477-484	"Although plant species that attract multiple species of pollinators predominate in tropical plant communities, pollination specialists appear to be at a greater advantage in tropical ecosystems in which pollinators are numerous and many plants flower synchronously." ... "It is confirmed that a fruit bat, <i>Eonycteris spelaea</i> , is the legitimate pollinator. Bats are responsible for all pollen load and the pollen load from only one visit is generally sufficient to initiate fruit set. Although <i>Eonycteris spelaea</i> is effective, it is an inefficient pollinator. Compared with plant species pollinated by multiple animal species, the likelihood of pollination failure resulting from the decline in populations of <i>Eonycteris spelaea</i> will be much more intense in <i>Oroxylum indicum</i> ." ... "With its self-incompatible breeding system, <i>Oroxylum indicum</i> is pollinator-dependent. The results of this study support the hypothesis that <i>O. indicum</i> is solely dependent on the nectarivorous bat, <i>Eonycteris spelaea</i> for pollination, and pollen load from only one visit by the bat is generally sufficient to initiate fruit set of <i>O. indicum</i> ."

Qsn #	Question	Answer
	Rasadah, M.A., 2001. <i>Oroxylum indicum</i> (L.) Kurz[Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 15 Apr 2015]	"The flowers are nocturnal and 1—2 flowers open in the course of one night; before sunrise the corolla falls off. They are pollinated by bats attracted by the foetid smell."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"- Ability to sucker"
	Chauhan, N.S. 1999. Medicinal and aromatic plants of Himachal Pradesh. Indus Publishing, New Delhi	"The tree can be propagated by transplanting root suckers which are produced in great profusion, often forming dense growth round the parent stem."

607	Minimum generative time (years)	
	Source(s)	Notes
	Benthall, A.P. 1946. The Trees of Calcutta and its Neighbourhood. Thacker Spink & Co., Calcutta	"Its growth is very swift, and the saplings shoot upwards rapidly without branching till they reach a height of about fifteen feet when their first flowers appear, after which they almost stop growing"
	Tropical Species Database. 2015. <i>Oroxylum indicum</i> . http://tropical.theferns.info/viewtropical.php?id=Oroxylum+indicum . [Accessed 16 Apr 2015]	"The plant has a curious habit of growth - it grows rapidly from seed to a height of 5 - 10 metres then flowers and stops further upward growth."
	Chauhan, N.S. 1999. Medicinal and aromatic plants of Himachal Pradesh. Indus Publishing, New Delhi	"The rate of growth of the tree is reported to be fast, with a mean annual girth increment of 4-6.4 cm"

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Bedell, P.E. 1998. Seed Science and Technology: Indian Forestry Species. Allied Publishers Limited, New Delhi, India	[Unlikely. Fruits and seeds lack means of external attachment] "In <i>Oroxylum indicum</i> Vent, of Bignoniaceae family, fruit is a large, conspicuous, two valved, flat, woody capsule, 2.5 to 8 cm long and 5 to 9 cm wide containing a large number of winged seeds dispersed by wind."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Lim, T.K. 2012. Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	"The tree is sometimes grown as an ornamental for its strange appearance."
	Trade Winds Fruit. 2015. Midnight Horror - <i>Oroxylum indicum</i> . http://www.tradewindsfruit.com/content/midnight-horror.htm . [Accessed 16 Apr 2015]	[Seeds available commercially] "Seeds are now available at our seed store." ... "The tree is often grown as an ornamental for its strange appearance. The long, podded fruits hang down from bear branches, looking like dangling sickles or swords in the night. The tree is also a night-bloomer and is pollinated naturally by bats. Additionally, after the large leaf stalks wither, they fall off the tree and collect near the base of the trunk, appearing to look like a pile of broken limb bones."

Qsn #	Question	Answer
	Hawaiian Tropical Plant Nursery. 2015. Edible Plants. http://www.hawaiiantropicalplants.com/fruit.html . [Accessed 16 Apr 2015]	[Sold commercially] "This is a new species for us but looks promising for edible landscaping. Flat seeds are about the size of a quarter Seeds germinate in 1 to 2 weeks. Seedling growth is moderate to rapid."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Bedell, P.E. 1998. Seed Science and Technology: Indian Forestry Species. Allied Publishers Limited, New Delhi, India	[Unlikely. Fruits and seeds relatively large] "In <i>Oroxylum indicum</i> Vent, of Bignoniaceae family, fruit is a large, conspicuous, two valved, flat, woody capsule, 2.5 to 8 cm long and 5 to 9 cm wide containing a large number of winged seeds dispersed by wind."

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Rasadah, M.A., 2001. <i>Oroxylum indicum</i> (L.) Kurz [Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 15 Apr 2015]	"Fruit a pendent capsule, sword-shaped, 45—120 cm x 6—10 cm, valves flat, almost woody, finally black. Seed 5—9 cm x 2.5—4 cm, including the membranous and transparent wing." ... "The winged seeds are wind-dispersed as the pods open."

705	Propagules water dispersed	y
	Source(s)	Notes
	Parrish, T. 2002. Krakatau: genetic consequences of island colonization, Ph.D. Dissertation, University of Utrecht, Utrecht	"The tree is common in disturbed habitats such as villages and rice fields and along streams (Ridley, 1930; Corner, 1988)." ... "The seeds are large flat discs (1.5 cm across) surrounded by a large papyrus for wind scattering or water dispersal (Ridley, 1930; Corner, 1988)."
	Lim, T.K. 2012. Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	[Wind-dispersed seeds might be moved by water when trees are growing near rivers] "The species occurs in tropical and subtropical areas, usually at low altitudes of 500–900 m in open forests, river banks, roadsides, slopes, old clearings, by rice fields or in cultivated grounds."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Bedell, P.E. 1998. Seed Science and Technology: Indian Forestry Species. Allied Publishers Limited, New Delhi, India	[Not fleshy-fruited] "In <i>Oroxylum indicum</i> Vent, of Bignoniaceae family, fruit is a large, conspicuous, two valved, flat, woody capsule, 2.5 to 8 cm long and 5 to 9 cm wide containing a large number of winged seeds dispersed by wind."

Qsn #	Question	Answer
707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Bedell, P.E. 1998. Seed Science and Technology: Indian Forestry Species. Allied Publishers Limited, New Delhi, India	[Unlikely. Fruit & seeds lack means of external attachment] "In <i>Oroxylum indicum</i> Vent, of Bignoniaceae family, fruit is a large, conspicuous, two valved, flat, woody capsule, 2.5 to 8 cm long and 5 to 9 cm wide containing a large number of winged seeds dispersed by wind."

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. 2010). Guidance for addressing the Australian Weed Risk Assessment questions. <i>Plant Protection Quarterly</i> , 25(2): 56-74	"Answer 'no' where the taxon is unlikely to be eaten by animals or if seeds are not viable following passage through the gut."
	Datta, A., & Rawat, G. S. (2008). Dispersal modes and spatial patterns of tree species in a tropical forest in Arunachal Pradesh, northeast India. <i>Tropical Conservation Science</i> , 1(3): 163-185	[No evidence of consumption by animals. Wind-dispersed] "Appendix 1. List of identified tree species, fruit type and color, dispersal mode, major consumers and tree density (trees per ha)." [Oroxylum indicum - Dispersal mode = wind]

801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes
	Najar, Z. A., & Agnihotri, S. (2012). Need and Importance of Conservation of Endangered Tree <i>Oroxylum indicum</i> (Linn.) Vent. <i>Asian Journal of Plant Science and Research</i> , 2(3): 220-223	"The tree is propagated naturally by seeds, which germinate in the beginning of the rainy season. Seedlings require moderate shade in the early stages. However, the seed set is poor and seed viability is low."
	Vikas, Gautam, M., Tandon, R., & Mohan Ram, H. Y. (2009). Pollination ecology and breeding system of <i>Oroxylum indicum</i> (Bignoniaceae) in the foothills of the Western Himalaya. <i>Journal of Tropical Ecology</i> , 25(01): 93-96	"The tree propagates naturally by seeds, but fruit-set is extremely poor (~0.45%)." ... "Thus, it is likely that the poor natural fruit-set in <i>O. indicum</i> is caused by pollen limitation and insufficient xenogamous pollination."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	CAB International, 2005. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	"- Seed storage orthodox"
	Baskin, C.C. & Baskin, J.M. 2014. <i>Seeds Ecology, Biogeography, and Evolution of Dormancy and Germination</i> . Second Edition. Academic Press, San Francisco, CA	"TABLE 9.1 Dormancy class or nondormancy (D/ND) in seeds of nonpioneer trees of evergreen rainforests. *5type of dormancy is inferred from information on time required for initiation of germination and from characteristics of seeds in that family." [Oroxylum indicum = ND - non dormant]

Qsn #	Question	Answer
	Thapliyal, R. C., & Phartyal, S. S. (2005). Dispersal and germination syndromes of tree seeds in a monsoonal forest in northern India. <i>Seed Science Research</i> , 15(01): 29-42	[Prolonged viability] "Therefore, timing of emergence in these species is determined by timing of dispersal; their viability span lasts only until the rainy season. At the other extreme are species that maintain a high level of viability until the beginning of the next seeding cycle, or beyond, e.g. <i>Oroxylum indicum</i> , <i>Pterospermum acerifolium</i> , <i>Terminalia alata</i> , <i>T. belerica</i> and <i>Wrightia arborea</i> . The prolonged viability of seeds of these species means that they have several opportunities to germinate, the only limiting factor being low temperature during the cold season. Their high viability and relative ease of germination will be a disadvantage when germination induced by pre-monsoon showers results in high mortality during a subsequent interval of drought."
	Singh, M., Singh, K. K., & Badola, H. K. (2014). Effect of Temperature and Plant Growth Regulators on Seed Germination Response of <i>Oroxylum indicum</i> -A High Value Threatened Medicinal Plant of Sikkim Himalaya. <i>Journal of Plant Science & Research</i> 1(4): 115	[Viability decreases after 6 months] "Obtaining commercially useful seedlings of economically important <i>Oroxylum</i> tree is hindered by innumerable factors including uneven germination, reducing seed longevity and hence viability [11,12]. The results of viability test using TTC showed that the seed viability decreased from 83.33 to 41.67 % after six months of storage at room temperature. Loss of moisture content and very low reserve of nutrients are most probably the main reasons of <i>Oroxylum</i> seed deterioration during storage conditions."

803	Well controlled by herbicides	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Misbahuzzaman, K., & Alam, M. J. (2006). Ecological restoration of rainforest through aided natural regeneration in the denuded hills of Sitakunda, Chittagong, Bangladesh. <i>International Journal of Agriculture and Biology</i> , 8(1): 778-782	"Table I. Composition and types of regenerating tree species in Sitakunda Botanical Garden and Eco-park, Chittagong" [<i>Oroxylum indicum</i> - Type of regeneration = coppice, root-suckers, seedlings] ... "Two tree species such as <i>Oroxylum indicum</i> and <i>Bombax insigne</i> appeared to have regeneration in all three modes – coppices, root-suckers and seedlings."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Thrives in tropical climates
- Tolerates shade at younger growth stages
- Tolerates many soil types
- Reproduces by seeds, by suckering and coppicing
- Seeds dispersed by wind, water & people
- Rapid growth rate

Low Risk Traits

- No reports of invasiveness or naturalization, but no evidence of widespread introduction outside native range
- Unarmed (no spines, thorns or burrs)
- Provides fodder for livestock
- Ornamental, medicinal & edible uses
- Requires specialized pollinators (fruit-bats)
- Self-incompatible
- Seed set is low

Second Screening Results for Tree/tree-like shrubs

(A) Shade tolerant or known to form dense stands?> Yes. Shade tolerant

(B) Bird or clearly wind-dispersed?> Yes. Wind-dispersed

(C) Life-cycle <4 years? Unknown. Rapid growth rate

Outcome = Evaluate Further