
Family:**Taxon:** *Toona ciliata***Synonym:** *Cedrela toona* Roxb. ex Willd.
Cedrela velutina DC.
Toona australis (Kuntze) Harms**Common Name:** Australian red cedar
Australian cedar
red-cedar

Questionnaire :	current 20090513	Assessor:	Patti Clifford	Designation:	H(HPWRA)
Status:	Assessor Approved	Data Entry Person:	Patti Clifford	WRA Score	12
101	Is the species highly domesticated?			y=-3, n=0	n
102	Has the species become naturalized where grown?			y=1, n=-1	
103	Does the species have weedy races?			y=1, n=-1	
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)	n
303	Agricultural/forestry/horticultural weed			n=0, y = 2*multiplier (see Appendix 2)	
304	Environmental weed			n=0, y = 2*multiplier (see Appendix 2)	y
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			y=1, n=0	
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			y=1, n=0	
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
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	
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	y=1, n=-1	
604	Self-compatible or apomictic	y=1, n=-1	
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	>3
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
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	
801	Prolific seed production (>1000/m2)	y=1, n=-1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	n
803	Well controlled by herbicides	y=-1, n=1	
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)	y=-1, n=1	

Designation: H(HPWRA)

WRA Score 12

Supporting Data:

101	2011. WRA Specialist. Personal Communication.	[Is the species highly domesticated? No] No evidence of domestication that reduces invasiveness.
102	2011. WRA Specialist. Personal Communication.	[Has the species become naturalized where grown? NA]
103	2011. WRA Specialist. Personal Communication.	[Does the species have weedy races? NA]
201	2011. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network (GRIN) [Online Database Index]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"? High Native Range: Western Asia: Afghanistan China: China - Guangdong, Hainan, Sichuan, Yunnan; Indian Subcontinent: Bangladesh; Bhutan; India; Nepal; Pakistan; Sri Lanka Indo-China: Cambodia; Laos; Myanmar; Thailand; Malesia: Indonesia; Malaysia; Papua New Guinea; Philippines; Australia: Australia - New South Wales [e.], Queensland
202	2011. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network (GRIN) [Online Database Index]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Quality of climate match data? High] Native Range: Western Asia: Afghanistan China: China - Guangdong, Hainan, Sichuan, Yunnan; Indian Subcontinent: Bangladesh; Bhutan; India; Nepal; Pakistan; Sri Lanka Indo-China: Cambodia; Laos; Myanmar; Thailand; Malesia: Indonesia; Malaysia; Papua New Guinea; Philippines; Australia: Australia - New South Wales [e.], Queensland
203	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Broad climate suitability (environmental versatility)? Yes] The species occurs from about 0-1500 m above sea level within its natural range.
203	2011. Forestry Nepal. Forestry Nepal - <i>Toonia ciliata</i> . http://www.forestrynepal.org/resources/trees/toonia-ciliata	[Broad climate suitability (environmental versatility)? Yes] It is found in Nepal from the Terai up to about 1700 m, mainly in forests near rivers and in moist localities. It is a characteristic species of Stainton's (1972) Tropical Evergreen Forest, Subtropical Evergreen Forest, and Subtropical Semi-evergreen Forest, but, also occurs in other forest types.
203	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toonia ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Broad climate suitability (environmental versatility)? Yes] Altitude: 0-1500 m, Mean annual temperature: -1 - deg. C Mean annual rainfall: 750-4000 mm
204	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Native or naturalized in regions with tropical or subtropical climates? Yes] In Hawai'i, "extensively planted, primarily in forestry areas, and now at least sparingly naturalized in mesic to wet, disturbed habitats, 25-610 m"
204	2011. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network (GRIN) [Online Database Index]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Native or naturalized in regions with tropical or subtropical climates? Yes] Native Range: Western Asia: Afghanistan China: China - Guangdong, Hainan, Sichuan, Yunnan; Indian Subcontinent: Bangladesh; Bhutan; India; Nepal; Pakistan; Sri Lanka Indo-China: Cambodia; Laos; Myanmar; Thailand; Malesia: Indonesia; Malaysia; Papua New Guinea; Philippines; Australia: Australia - New South Wales [e.], Queensland
205	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Does the species have a history of repeated introductions outside its natural range? Yes] "Because of its high quality timber, the species has been trialled in many countries. It has been extensively tested in Hawaii and Central/South America (Argentina and Costa Rica), Sri Lanka and Africa (Republic of South Africa, Zimbabwe, Malawi, Zambia and Tanzania). The species has been grown on small South Pacific oceanic islands such as Fiji, Samoa, Tonga, and Solomon Islands (Streets, 1962). Small plantations can be found in Hawaii, Argentina, Puerto Rico and Tonga. From 1959 to 1973, the Hawaii Division of Forestry planted about 5000 acres of <i>T. ciliata</i> using seed of Australian origin (Walters and Wick, 1973). Small but significant plantings also occur on the Tongan island of 'Eua."
205	2011. Walters, G.A./Francis, J.F.. <i>Toonia ciliata</i> Roemer In: Woody plant seed manual. U.S. Forest Service, http://www.nsl.fs.fed.us/wpsm/Toona.pdf	[Does the species have a history of repeated introductions outside its natural range? Yes] <i>Toonia</i> was introduced to Hawaii in 1914 as a forestry species. It was also introduced to Puerto Rico.
205	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toonia ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Does the species have a history of repeated introductions outside its natural range? Yes] First recorded in Zimbabwe in 1903, and now one of the most commonly planted trees there. Introduced to Zambia in 1917 and successfully established at 1200 m. Planted fairly extensively in Tanzania, South Africa and Uganda.

301	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Naturalized beyond native range? Yes] In Hawai'i, "extensively planted, primarily in forestry areas, and now at least sparingly naturalized in mesic to wet, disturbed habitats, 25-610 m"
302	2003. Macdonald, I.A.W./Reaser, J.K./Bright, C./Neville, L.E./Howard, G.W./Murphy, S.J./Preston, G. (eds.). Invasive alien species in southern Africa: national reports & directory of resources.. Global Invasive Species Programme, Cape Town, South Africa	[Garden/amenity/disturbance weed?] <i>Toona ciliata</i> is an environmental weed in Zambia where it invades forest margins and forest gap displacing native species. It is considered a serious invader of native ecosystems. [scored as an environmental weed]
302	2003. Nyoka, B.I.. Biosecurity in forestry: a case study on the status of invasive forest trees species in Southern Africa. Forest Biosecurity Working Paper FBS/1E. Forestry Department. FAO, Rome http://www.fao.org/DOCREP/005/AC846E/ac846e00.htm#Contents	[Garden/amenity/disturbance weed?] <i>Toona ciliata</i> is considered an invasive weed in Zimbabwe. (moderately invasive)
303	2010. invasives.org. Invasive species in South Africa - <i>Toona ciliata</i> . http://invasives.org.za/	[Agricultural/forestry/horticultural weed ?] <i>Toona ciliata</i> is an invasive weed in South Africa where it invades forest gaps, plantations, river banks and roadsides. It is classified as a category 1b invasive. Class 1b : remove and destroy. Invasive species controlled as part of an invasive species control programme.
303	2010. Jackson, W.J./Howard, G.W.. Unwelcome guests: the threat of invasive species to tropical forests. Tropical Forest Update. 20: 22-24. http://www.cbd.int/iyb/doc/prints/iyb-itt-topicalforest-publication-en.pdf#page=22	[Agricultural/forestry/horticultural weed ?] In tropical eastern Africa some pine plantations are being invaded by toona (<i>Toona ciliata</i>) that was introduced decades ago from Asia and widely planted as a shade tree in Parks. Toona is considered a sleeper weed in central Africa.
304	2003. Macdonald, I.A.W./Reaser, J.K./Bright, C./Neville, L.E./Howard, G.W./Murphy, S.J./Preston, G. (eds.). Invasive alien species in southern Africa: national reports & directory of resources.. Global Invasive Species Programme, Cape Town, South Africa	[Environmental weed? Yes] <i>Toona ciliata</i> is an environmental weed in Zambia where it invades forest margins and forest gap displacing native species. It is considered a serious invader of native ecosystems. <i>Toona ciliata</i> is considered a category 3 plant. Ornamentally used species that may no longer be planted; existing plants may remain, as long as all reasonable steps are taken to prevent the spreading thereof, except within the flood line of watercourses and wetlands.
304	2010. invasives.org. Invasive species in South Africa - <i>Toona ciliata</i> . http://invasives.org.za/	[Environmental weed? Yes] <i>Toona ciliata</i> is an invasive weed in South Africa where it invades forest gaps, plantations, river banks and roadsides. It is classified as a category 1b invasive. Class 1b : remove and destroy. Invasive species controlled as part of an invasive species control programme.
305	2007. Randall, R.P.. Global Compendium of Weeds - Index [Online Database]. http://www.hear.org/gcw/	[Congeneric weed? No] No evidence.
401	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Produces spines, thorns or burrs? No] " <i>Toona ciliata</i> is a large deciduous tree with a spreading crown, commonly attaining a height of 20-30 m and a girth of 1.8-3 m. Bark dark grey or reddish-brown, smooth up to middle age, afterwards rough, with shallow reticulate cracks exfoliating in irregular woody scales. Blaze 1.3-1.5 m, fibrous throughout, pink or pinkish-brown, sometimes with just a few white bands towards the outside, turning brown on exposure, bitter to the taste, juice turning purple on the blade of a knife. Leaves 30-50 cm long, on young trees up to 90 cm long, usually imparipinnate, sometimes paripinnate by the abortion of the terminal leaflet; leaflets 11-29, opposite or alternate, 5-15 x 2-6 cm, lanceolate or ovate-lanceolate, acuminate, glabrous, pubescent, margin entire or wavy, base oblique; petiolules 0.3-1.3 cm long. "
402	2011. WRA Specialist. Personal Communication.	[Allelopathic? Unknown]
403	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Parasitic? No] Meliaceae.
404	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Unpalatable to grazing animals? No] The fodder value of <i>T. ciliata</i> has been assessed by several authors (Khatta and Katoch, 1983; Negi, 1977; Nag and Matai, 1992) in India and in Pakistan (Khan, 1979). In general <i>Toona</i> foliage contains around 13% crude protein and 14% crude fibre. Khatta and Katoch (1983) report that it has good nutritive value but its palatability is poor. Khan (1979) found crude a protein level of 13.6%, crude fibre 22.3%, fats 3.6%, total ash 14.6% and carbohydrates 36.1%.

404	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Unpalatable to grazing animals? No] Leaves are used as fodder. Seedlings and saplings are browsed readily by deer and cattle.
405	2011. National Center for Biotechnology Information. PubMed. U.S. National Library of Medicine, Bethesda, Maryland http://www.ncbi.nlm.nih.gov/	[Toxic to animals? No] No evidence.
405	2011. Specialized Information Services, U.S. National Library of Medicine. TOXNET toxicology data network [online database]. National Institutes of Health, http://toxnet.nlm.nih.gov/	[Toxic to animals? No] No evidence.
406	2011. Forestry Nepal. Forestry Nepal - <i>Toonia ciliata</i> . http://www.forestrynepal.org/resources/trees/toona-ciliata	[Host for recognized pests and pathogens?] The stem borer <i>Hypsipyla robusta</i> is a serious pest. No reports of damage by this insect have yet been recorded from Nepal, but as it occurs almost throughout the Old World tropics where trees of the family Meliaceae are found, it is unlikely that it will not occur here also. <i>Hypsipyla</i> is a moth.
406	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Host for recognized pests and pathogens?] Several species of insect attack and damage forest trees and young plantations. Two main ones are <i>Hypsipyla robusta</i> (mahogany collar-borer) and <i>Pagiophloeus longiclavis</i> (toon and mahogany shootborer). <i>T. ciliata</i> is susceptible to attack by dry-wood termites, Anobium borers and <i>Lyctus</i> . In some places, young saplings are attacked and even killed by the parasite <i>Loranthus scurrula</i> . Plantation material is reported to have very little natural resistance to attack by decay fungi. The most important are <i>Ganoderma lucidum</i> , causing root and butt rot, which may be lethal, <i>Phellinus</i> spp., causing white rot of fallen timber or gaining access through wounds exposing dead sapwood, and <i>Trametes straminea</i> (white stringy rot), usually saprophytic but also a wound parasite causing trunk rot.
407	2011. National Center for Biotechnology Information. PubMed. U.S. National Library of Medicine, Bethesda, Maryland http://www.ncbi.nlm.nih.gov/	[Causes allergies or is otherwise toxic to humans? No] No evidence.
407	2011. Specialized Information Services, U.S. National Library of Medicine. TOXNET toxicology data network [online database]. National Institutes of Health, http://toxnet.nlm.nih.gov/	[Causes allergies or is otherwise toxic to humans? No] No evidence.
408	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Creates a fire hazard in natural ecosystems? No] Seedlings are sensitive to fire.
409	2011. Forestry Nepal. Forestry Nepal - <i>Toonia ciliata</i> . http://www.forestrynepal.org/resources/trees/toona-ciliata	[Is a shade tolerant plant at some stage of its life cycle? Yes] In youth it is moderately shade-tolerant and young plants need protection from strong sun; older trees need full light.
409	2011. Walters, G.A./Francis, J.F.. <i>Toona ciliata</i> Roemer In: Woody plant seed manual. U.S. Forest Service, http://www.nsl.fs.fed.us/wpsm/Toona.pdf	[Is a shade tolerant plant at some stage of its life cycle? Yes] Australian toon seedlings grow slowly at first and should be given shade for 2 months.
410	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? Yes]Soil descriptors - Soil texture: medium; heavy - Soil drainage: free; seasonally waterlogged - Soil reaction: acid; neutral - Soil types: acid soils; red soils; swamp soils; tropical soils; volcanic soils; podzoluvisols
410	2011. Forestry Nepal. Forestry Nepal - <i>Toonia ciliata</i> . http://www.forestrynepal.org/resources/trees/toona-ciliata	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)?] It grows best on well-drained, deep, rich, loamy soils, and on dry hill slopes the growth is stunted. Indeed it is a demanding species, and should only be planted on fertile sites.
410	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)?] Prefers well-drained, deep, fertile soils and does not do well on wet, compacted or poor sandy ones.

411	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Climbing or smothering growth habit? No] Tree.
412	2011. WRA Specialist. Personal Communication.	[Forms dense thickets? Unknown.]
501	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Aquatic? No] Terrestrial; tree.
502	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Grass? No] Meliaceae.
503	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Nitrogen fixing woody plant? No] Meliaceae.
504	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] Tree.
601	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Evidence of substantial reproductive failure in native habitat? No] Natural regeneration is profuse even in areas outside its natural range. Good natural reproduction can be induced by clearing the ground in the vicinity of seed bearers. For a high germination percentage, the seeds are best collected off the tree.
602	2011. Walters, G.A./Francis, J.F.. <i>Toona ciliata</i> Roemer In: Woody plant seed manual. U.S. Forest Service, http://www.nsl.fs.fed.us/wpsm/Toona.pdf	[Produces viable seeds? Yes] Australian toon seeds can be sown in Hawaii and Puerto Rico during any month of the year, but best results in Hawaii are obtained from March to November sowings and in Puerto Rico from April and May sowings. Seeds for bareroot seedling production are broadcast into precut lines.
602	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Produces viable seeds? Yes] Natural regeneration is profuse even in areas outside its natural range. Good natural reproduction can be induced by clearing the ground in the vicinity of seed bearers. For a high germination percentage, the seeds are best collected off the tree.
603	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Hybridizes naturally?] Edmonds (1995, 1993) considers <i>T. ciliata</i> to be a species complex in which the floral and vegetative variation could either represent the extreme ranges of a single polymorphic species or be genetically stable and possibly eco-geographically correlated; thus warranting formal taxonomic recognition at the infraspecific level. This is an important comment about <i>T. ciliata</i> as a taxonomic entity, and it could be expected that considerable provenance variation also exists; which is not surprising for a species with such a wide-spread natural distribution. To date little is known of provenance variation in growth rates. Range-wide provenance collections were only recently attempted in eastern Australia and it is unlikely that detailed provenance collections have been made elsewhere.
603	2011. WRA Specialist. Personal Communication.	[Hybridizes naturally? Unknown]
604	2011. WRA Specialist. Personal Communication.	[Self-compatible or apomictic? Unknown]
605	1972. Styles, B.T.. <i>The Flower Biology of the Meliaceae and its Bearing on Tree Breeding</i> . <i>Silvae Genetica</i> . 21(5): 175-182.	[Requires specialist pollinators? No] The structure of the Meliaceae flowers suggests that they are entomophilous.
605	1994. McDade, L.A.. <i>La Selva: ecology and natural history of a neotropical rain forest</i> . University of Chicago Press, http://books.google.com/books?id=FLqa_WpbRO0C&pg=PA162&lpg=PA162&dq=meliaceae+%2B+%22pollinator%22&source=bl&ots=pqrR0Eyxbl&sig=RsbNNH40x	[Requires specialist pollinators? No] Moths and small diverse insects were documented as pollinators of <i>Cedrela</i> , <i>Guarea</i> , and <i>Tichilia</i> species at La Selva. [Meliaceae]

605	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Requires specialist pollinators? No] The flowers of Meliaceae all show features associated with entomophily. Bees and moths are now believed to be the chief pollen vectors. The flowers of Meliaceae, including <i>T. ciliata</i> have a powerful scent which would serve to attract pollinators of various kinds. Gupta et al. (1990) found that insects (bees) visited the flowers (<i>Apis mellifera</i> and <i>A. dorsata</i>) in India.
606	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Reproduction by vegetative fragmentation? Yes] It coppices well and produces plentiful root suckers. It has a spreading superficial root system, which may have adverse effects on the growth of agricultural crops.
607	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Minimum generative time (years)? >3] Trees in open situations produce seed after 6-8 years.
607	2011. Walters, G.A./Francis, J.F.. <i>Toona ciliata</i> Roemer In: Woody plant seed manual. U.S. Forest Service, http://www.nsl.fs.fed.us/wpsm/Toona.pdf	[Minimum generative time (years)? >3] Trees begin to produce seeds as early as 5 years of age, but generally do not do so with regularity or in quantity until they are 10 to 15 years old
701	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? Yes] Popular street tree in India. Widely planted in Tanzania, South Africa and Uganda. A reforestation tree. [Taxa in heavily trafficked areas such as farm paddocks, agricultural lands, railways or roadsides are unintentionally dispersed.]
702	2003. Macdonald, I.A.W./Reaser, J.K./Bright, C./Neville, L.E./Howard, G.W./Murphy, S.J./Preston, G. (eds.). Invasive alien species in southern Africa: national reports & directory of resources.. Global Invasive Species Programme, Cape Town, South Africa	[Propagules dispersed intentionally by people? Yes] Widely cultivated as a forest species.
702	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Propagules dispersed intentionally by people? Yes] Widely cultivated as a forest species.
703	2011. WRA Specialist. Personal Communication.	[Propagules likely to disperse as a produce contaminant? No] No evidence of contamination.
704	2011. Forestry Nepal. Forestry Nepal - <i>Toonia ciliata</i> . http://www.forestrynepal.org/resources/trees/toona-ciliata	[Propagules adapted to wind dispersal? Yes] It is distributed by wind, but seed on the ground is carried by the water from the heavy rains until it lodges under bushes, walls, or similar obstacles.
704	2011. Walters, G.A./Francis, J.F.. <i>Toona ciliata</i> Roemer In: Woody plant seed manual. U.S. Forest Service, http://www.nsl.fs.fed.us/wpsm/Toona.pdf	[Propagules adapted to wind dispersal? Yes] The harvested fruit should be spread on trays in the sun to dry. The light brown, membranous winged seeds fall from the capsule as the fruit dehisces.
704	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Propagules adapted to wind dispersal? Yes] Seeds are light and wind dispersed.
705	2011. Forestry Nepal. Forestry Nepal - <i>Toonia ciliata</i> . http://www.forestrynepal.org/resources/trees/toona-ciliata	[Propagules water dispersed? Yes] It is distributed by wind, but seed on the ground is carried by the water from the heavy rains until it lodges under bushes, walls, or similar obstacles.
705	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Propagules water dispersed? Yes] <i>Toona ciliata</i> grows in moist localities such as ravines, banks of streams and even swamps.
706	2011. Forestry Nepal. Forestry Nepal - <i>Toonia ciliata</i> . http://www.forestrynepal.org/resources/trees/toona-ciliata	[Propagules bird dispersed? No] Wind and water dispersed.
707	2011. Forestry Nepal. Forestry Nepal - <i>Toonia ciliata</i> . http://www.forestrynepal.org/resources/trees/toona-ciliata	[Propagules dispersed by other animals (externally)? No] Wind and water dispersed.

707	2011. Walters, G.A./Francis, J.F.. <i>Toona ciliata</i> Roemer In: Woody plant seed manual. U.S. Forest Service, http://www.nsl.fs.fed.us/wpsm/Toona.pdf	[Propagules dispersed by other animals (externally)? No] Dehiscent capsule with winged seeds.
708	2011. WRA Specialist. Personal Communication.	[Propagules survive passage through the gut? Unknown.]
801	2000. Meyer, J-Y./Malet, J-P.. Forestry and agroforestry alien trees as invasive plants in the Pacific Islands. FAO Workshop Data Collection for the Pacific Region. 4-8 September 2000 Apia, Samoa.	[Prolific seed production (>1000/m2)? Yes] 200 000-300 000 seeds/kg for <i>Toona ciliata</i> .
801	2011. Forestry Nepal. Forestry Nepal - <i>Toonia ciliata</i> . http://www.forestrynepal.org/resources/trees/toona-ciliata	[Prolific seed production (>1000/m2)?] The seed, which is produced in copious amounts, falls after the early pre-monsoon rains or during the early monsoon.
801	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Prolific seed production (>1000/m2)?] There are 280 000-425 000 seeds/kg.
802	2011. Walters, G.A./Francis, J.F.. <i>Toona ciliata</i> Roemer In: Woody plant seed manual. U.S. Forest Service, http://www.nsl.fs.fed.us/wpsm/Toona.pdf	[Evidence that a persistent propagule bank is formed (>1 yr) No] <i>Toona</i> seeds can be stored dry in sealed polyethylene bags at about 1 EC. Even with this apparent orthodox storage behavior, however, storage life is reported to be only from 6 to 12 months.
802	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Evidence that a persistent propagule bank is formed (>1 yr) No] Germplasm Management Orthodox seed storage behaviour; 90% germination after 12 months' storage in polythene bags at 5-8 deg. C with 34-12.9% mc; complete loss of viability after 3 months at room temperature.
803	2011. WRA Specialist. Personal Communication.	[Well controlled by herbicides? Unknown]
804	2000. Meyer, J-Y./Malet, J-P.. Forestry and agroforestry alien trees as invasive plants in the Pacific Islands. FAO Workshop Data Collection for the Pacific Region. 4-8 September 2000 Apia, Samoa.	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] <i>Toona ciliata</i> resprouts from the base after high-intensity fires.
804	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] Trees coppice profusely after cutting.
804	2011. World Agroforestry Centre. Agroforestry Tree Database - <i>Toona ciliata</i> . PROSEA, http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=1649	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] Seedlings are sensitive to fire, cannot withstand severe drought and are susceptible to suppression by weeds. The tree is frost hardy. It coppices well and produces plentiful root suckers. It has a spreading superficial root system, which may have adverse effects on the growth of agricultural crops.
805	2011. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown]