Family: ***Celastraceae***

Taxon: ***Gymnosporia emarginata***

Synonym: *Celastrus emarginatus Willd.*
Catha emarginata (Willd.) G. Don
Maytenus emarginata (Willd.) Ding Hou

Common Name: tai wan luo shi
Kankera

Questionaire : current 20090513 **Assessor:** Chuck Chimera **Designation:** EVALUATE
Status: Assessor Approved **Data Entry Person:** Chuck Chimera **WRA Score 2**

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**	**n**
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**	
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)**	
401	**Produces spines, thorns or burrs**	**y=1, n=0**	**y**
402	**Allelopathic**	**y=1, n=0**	**n**
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**	
409	**Is a shade tolerant plant at some stage of its life cycle**	**y=1, n=0**	
410	**Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)**	**y=1, n=0**	

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**	
607	**Minimum generative time (years)**	**1 year = 1, 2 or 3 years = 0, 4+ years = -1**	
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**	
706	**Propagules bird dispersed**	**y=1, n=-1**	**y**
707	**Propagules dispersed by other animals (externally)**	**y=1, n=-1**	
708	**Propagules survive passage through the gut**	**y=1, n=-1**	**y**
801	**Prolific seed production (>1000/m2)**	**y=1, n=-1**	
802	**Evidence that a persistent propagule bank is formed (>1 yr)**	**y=1, n=-1**	
803	**Well controlled by herbicides**	**y=-1, n=1**	
804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	**y=1, n=-1**	
805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	**y=-1, n=1**	

Designation: EVALUATE **WRA Score** 2

Supporting Data:

101	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Note: this name is now considered to apply only to plants from India and Sri Lanka. The name is therefore misapplied to plants in the Flora Malesiana region. Specimens previously named Maytenus emarginata by Ding Hou in 1962, occurring in Malesia (Philippines, Celebes, Moluccas and New Guinea) and northern Queensland in Australia now belong to Gymnosporia inermis." [no evidence that species is highly domesticated]
102	2011. WRA Specialist. Personal Communication.	NA
103	2011. WRA Specialist. Personal Communication.	NA
201	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Distribution and habitat: S India and Sri Lanka. Growing in scrub, on coastal plains, up to 500 m."
202	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Distribution and habitat: S India and Sri Lanka. Growing in scrub, on coastal plains, up to 500 m."
203	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Distribution and habitat: S India and Sri Lanka. Growing in scrub, on coastal plains, up to 500 m." [distribution suggests restriction to hot tropical climates at lower elevations]
204	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Distribution and habitat: S India and Sri Lanka. Growing in scrub, on coastal plains, up to 500 m."
205	2011. WRA Specialist. Personal Communication.	No evidence of repeated introductions outside native range.
301	2007. Randall, R.P.. Global Compendium of Weeds [Online Database]. http://www.hear.org/gcw/	No evidence of naturalization documented
301	2010. Lau, J-W.. Botanical Survey of unmaintained areas surrounding McBryde Garden, National Tropical Botanical Garden, Kaua'i. Kaua'i Community College, Lihue, HI	"Distribution: Four distinct seedlings of M. emarginata were located in the E. citriodora forest from the area north of Dillingham Memorial to the unmanaged forest north of the Apocynaceae section in Middle Valley. Stage: All naturalized M. emarginata examined were under one foot and immature, without fruit or flowers. The one accessioned M. emarginata plant (870781.003) on the main garden road was heavily bearing immature fruit at the time of the survey, but no ripe fruit could be seen." [showing signs of naturalization]
302	2007. Randall, R.P.. Global Compendium of Weeds [Online Database]. http://www.hear.org/gcw/	No evidence
303	2007. Randall, R.P.. Global Compendium of Weeds [Online Database]. http://www.hear.org/gcw/	No evidence
304	2007. Randall, R.P.. Global Compendium of Weeds [Online Database]. http://www.hear.org/gcw/	No evidence
305	2007. Randall, R.P.. Global Compendium of Weeds [Online Database]. http://www.hear.org/gcw/	Several Maytenus species listed as naturalized and/or weeds, but no Gymnosporia species
401	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Diagnostic characters of Gymnoporia include the presence of brachyblasts and spines...Shrub or small tree up to 6 m high; bark pale brown, smooth, cracked; branches terete, with pale lenticels; spines axillary or terminating short lateral shoots"
401	2008. Mehta, V.K./Sullivan, P.J./Walter, M.T./Krishnaswamy, J./DeGloria, S.D.. Ecosystem impacts of disturbance in a dry tropical forest in southern India. Ecohydrology. 1: 149–160.	"The increasing dominance and diversity of small woody species, along with shrubaceous species that bear thorny structures (e.g. G. emarginata, Z. oenoplia) has been reported in other dry tropical forests in India (Pandey and Singh, 1991; Shankar et al., 1998b; Kumar and Shahabuddin, 2005; Madhusudan, 2005)."

402	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	No evidence of allelopathy
402	2008. Mehta, V.K./Sullivan, P.J./Walter, M.T./Krishnaswamy, J./DeGloria, S.D.. Ecosystem impacts of disturbance in a dry tropical forest in southern India. Ecohydrology. 1: 149–160.	No evidence
403	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Shrub or small tree up to 6 m high" [no evidence of parasitism]
404	2008. Asouti, E./Fuller, D.Q.. Trees and woodlands of south India: archaeological perspectives. Left Coast Press, Walnut Creek, CA	"leaves are used as fodder and its branches as roofing material." [presumably palatable]
404	2009. Tuttle, R. (ed.). The functional and evolutionary biology of primates. (Third Paperback printing). Transaction Publishers, Piscataway, New Jersey	"Table 16-1. Common deeding trees of langurs (present study)…Gymnosporia emarginata - Part Utilized - Leaves"
405	1992. Brara, R.. Are Grazing Lands 'Wastelands'? Some Evidence from Rajasthan. Economic and Political Weekly. 27(8): 411-418.	"Table 1: Uses of Principal Plant Types on Common Lands (Villages Khedi and Banai)" [Maytenus/Gymnospora emarginata used for Fuel, Fodder, Timber. No evidence of toxicity]
406	2011. WRA Specialist. Personal Communication.	Unknown
407	2010. Patel, Y.S./Joshi, E.P./Joshi, P.N.. Ethnobotanical Study of Tapkeshwari Hill, Bhuj, Kachchh, India. Life sciences Leaflets. 2: 22 – 31.	"Usage in Ethnomedicine: Bark powder used with cow milk against weakness, leaves used against on bile control and to cure jaundice, young branches used as toothbrush"
407	2010. Reddy, K.N./Trimurthulu, G./Sudhakar Reddy, C.. Medicinal plants used by ethnic people of Medak district, Andhra Pradesh. Indian Journal of Traditional Knowledge. 9(1): 184-190.	"Uses: During mouth ulcer, tender shoots are chewed and the sap is swallowed. For treating boils and wounds, leaves crushed with those of Ximenia americana (Adavi nakkera) are used externally. During diarrhoea, tender tips crushed with those of Diospyros chloroxylon (Ullintha), mixed in with curd is administered; during burning micturition, stem bark powder mixed with Phoenix sylvestris toddy (Sendhi) is administered and in epilepsy, paste prepared from root bark crushed with those of Bauhinia racemosa and earthworms is administered daily." [medicinal uses, but no evidence of unintentional poisonings or allergenic properties]
408	2008. Mehta, V.K./Sullivan, P.J./Walter, M.T./Krishnaswamy, J./DeGloria, S.D.. Ecosystem impacts of disturbance in a dry tropical forest in southern India. Ecohydrology. 1: 149–160.	"Vegetation is prone to annual, low-intensity fires at the end of the dry season (Devidas and Puyravaud, 1995)." [native to fire prone areas. Could potentially contribute to increased fire risk in natural ecosystems]
409	2006. Giesen, W./Wulffraat, S./Zieren, M./Scholten, L.. Mangrove Guidebook for Southeast Asia. Food and Agriculture Organization of the United Nations, Bangkok, Thailand	"Occurs in dry thickets at low altitudes, in coastal areas directly behind beaches, or on the landward side of mangroves." [habitat suggests high light environments, but shade tolerance unknown]
410	1988. Singh, N.P.. Flora of eastern Karnataka, Volume 1. Mittal Publications, Delhi, India	"Common in the scrub forests, frequent elsewhere. 2-3 m tall shrubs on poor, rocky soils." [soil tolerances unknown]
411	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Shrub or small tree up to 6 m high; bark pale brown, smooth, cracked; branches terete, with pale lenticels; spines axillary or terminating short lateral shoots." [not climbing or smothering]
412	1986. Pascal, J.P.. Explanatory Booklet on the Forest Map of South India. Institut Français, Pondichéry, India	"2.3.2 Low discontinuous thicket to scattered undershrubs. The arborescent species are represented only by rare stunted individuals. The thicket is mainly composed of Maytenus emarginata, Lantana camara,…" [grows in thickets with other plants, but ability to form monotypic thickets unknown]
412	2008. Mehta, V.K./Sullivan, P.J./Walter, M.T./Krishnaswamy, J./DeGloria, S.D.. Ecosystem impacts of disturbance in a dry tropical forest in southern India. Ecohydrology. 1: 149–160.	"The widespread tree species listed in Table I occur at low densities (MD1),

501	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	Terrestrial
502	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	Celastraceae
503	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	Celastraceae [not a Nitrogen fixing woody plant]
504	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Shrub or small tree up to 6 m high" [not a geophyte]
601	1988. Singh, N.P.. Flora of eastern Karnataka, Volume 1. Mittal Publications, Delhi, India	No evidence of substantial reproductive failure in native range
602	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Seed ovoid or ellipsoid, red and shining, 2.5–3.5 × 2.0–2.5 mm; aril white, fleshy, a basal rim."
603	2011. WRA Specialist. Personal Communication.	Ability to hybridize unknown
604	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Diagnostic characters of Gymnoporia include the presence of brachyblasts and spines, leaves which are in fascicles or alternate, the inflorescence which is a dichasium, the flowers which are mostly functionally unisexual, the fruit which is a dehiscent capsule and the seeds which have an aril." [flowers functionally unisexual, but unknown if plant itself is self-compatible]
604	2006. Consortium of Micropropagation Researchers and Technology Development. Protocol - Forest trees - Maytenus emarginata. DBT, Government of India, http://dbtmicropropagation.nic.in/protocols/maytenus.htm	"M. emarginata is an out breeding tree therefore it shows great variability . The seed raised plants show enormous variability and if selected plants are to be propagated they has to be vegetatively propagated or cloned through tissue culture methods." [suggests possible self-incompatibility]
605	1994. Zomlefer, W.B.. Guide to Flowering Plant Families. The University of North Carolina Press, Chapel Hill & London	"The inconspicuous, greenish-white (occasionally purplish) flowers are pollinated by various small insects (bees, flies, ants, beetles) attracted to the easily accessible nectar secreted by the disc surrounded by spreading to recurved petals." [family description]
605	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Flowers pale greenish-yellow or white, sweet scented, ± 4 mm in diam. Sepals deltoid, ± 1 mm long, apex obtuse, margin ciliate. Petals obovate-oblong or oblong, 2–3 × 1.0–1.5 mm, twice as long as sepals, apex subacute, often reflexed, margin entire or uneven. Disc very broad, fleshy, sinuate-lobed. Male flowers: stamens slightly shorter than petals, inserted slightly beneath the disc margin; anthers broadly ovoid; pistillode globose, small, style unbranched. Female flowers: staminodes shorter than stamens in male flowers; ovary semi-immersed in disc, 3 locular; style cylindrical, 3-branched, spreading."
605	2006. Selwyn, M. A./Parthasarathy, N.. Reproductive traits and phenology of plants in tropical dry evergreen forest on the Coromandel coast of India. Biodiversity and Conservation. 15: 3207–3234.	"Appendix A … Pollinator syndrome…Bees … DS … (Dispersal syndrome): Z - zoochory"
606	2011. WRA Specialist. Personal Communication.	Unknown
607	2011. WRA Specialist. Personal Communication.	Unknown
701	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Seed ovoid or ellipsoid, red and shining, 2.5–3.5 × 2.0–2.5 mm; aril white, fleshy, a basal rim." [no evidence, and no means of external attachment]

702	2006. Consortium of Micropropagation Researchers and Technology Development. Protocol - Forest trees - Maytenus emarginata. DBT, Government of India, http://dbtmicropropagation.nic.in/protocols/maytenus.htm	"The plant provides fodder, timber and fuel wood. It has medicinal value. The plant is economically and ecologically valuable."
703	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Seed ovoid or ellipsoid, red and shining, 2.5–3.5 × 2.0–2.5 mm; aril white, fleshy, a basal rim. (Fig. 5). Distribution and habitat: S India and Sri Lanka. Growing in scrub, on coastal plains, up to 500 m." [no evidence, and unlikely to be grown with produce of any kind]
704	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Capsule obconic-trigonous, inflated, flat topped, apiculate, 3-valved, 3–5 × 6–12 mm, red or dull purple. Seed ovoid or ellipsoid, red and shining, 2.5–3.5 × 2.0–2.5 mm; aril white, fleshy, a basal rim" [no adaptations to wind dispersal]
705	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Distribution and habitat: S India and Sri Lanka. Growing in scrub, on coastal plains, up to 500 m." [coastal distribution suggests possible water dispersal
705	2008. Jin-shuang Ma/Zhixiang Zhang/Liu Quanru/Hua Peng/Funston, A.M.. Flora of China. Vol. 11. - Celastraceae. Science Press Beijing, and Missouri Botanical Garden Press, St. Louis.,	"Thickets along seashores, open areas. Taiwan [Sri Lanka; Australia]." [distribution suggests possible water dispersal]
706	1994. Zomlefer, W.B.. Guide to Flowering Plant Families. The University of North Carolina Press, Chapel Hill & London	"The attractive drupes and arillate seeds of capsular fruits are dispersed by birds." [family description]
706	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Capsule obconic-trigonous, inflated, flat-topped, apiculate, 3-valved, 3–5 × 6–12 mm, red or dull purple. Seed ovoid or ellipsoid, red and shining, 2.5–3.5 × 2.0–2.5 mm; aril white, fleshy, a basal rim" [fleshy aril an adaptation to bird dispersal]
706	2006. Selwyn, M. A./Parthasarathy, N.. Reproductive traits and phenology of plants in tropical dry evergreen forest on the Coromandel coast of India. Biodiversity and Conservation. 15: 3207–3234.	"Appendix A … Pollinator syndrome…Bees … DS … (Dispersal syndrome): Z - zoochory"
707	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Seed ovoid or ellipsoid, red and shining, 2.5–3.5 × 2.0–2.5 mm; aril white, fleshy, a basal rim." [possible that vertebrate or invertebrate dispersers attracted to aril may transport seeds externally]
708	2003. Jordaan, M./van Wyk, A.E.. Reinstatement of Gymnosporia (Celastraceae): implications for the Flora Malesiana region. Telopea. 10(1): 155-167.	"Seed ovoid or ellipsoid, red and shining, 2.5–3.5 × 2.0–2.5 mm; aril white, fleshy, a basal rim" [bird-dispersed, and presumably survive passage through guts of birds]
801	2011. WRA Specialist. Personal Communication.	Unknown
802	2011. WRA Specialist. Personal Communication.	Seed bank longevity unknown
803	2011. WRA Specialist. Personal Communication.	Unknown [no information on control of this species with herbicide]
804	2011. WRA Specialist. Personal Communication.	Unknown
805	2011. WRA Specialist. Personal Communication.	Unknown