Keywords: Evaluate, Agroforestry, Ornamental, Tree, Non-toxic, Bird Dispersal, Coppices

Family: ***Burseraceae***

Taxon: ***Canarium album (Lour.) Raeusch.***

Synonym: *Pimela alba Lour. (basionym)*

Common Name: Chines white-olive
Chinese olive

Questionaire : current 20090513
Status: Assessor Approved

Assessor: Patti Clifford
Data Entry Person: Patti Clifford

Designation: EVALUATE
WRA Score 3

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**	**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**	**y=1, n=0**	
403	**Parasitic**	**y=1, n=0**	**n**
404	**Unpalatable to grazing animals**	**y=1, n=-1**	
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**	**n**
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**	**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**	**n**
605	**Requires specialist pollinators**	**y=-1, n=0**	
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**	
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**	**n**
708	**Propagules survive passage through the gut**	**y=1, n=-1**	**y**
801	**Prolific seed production (>1000/m2)**	**y=1, n=-1**	**n**
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**	**y**
805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	**y=-1, n=1**	

Designation: EVALUATE **WRA Score** **3**

Supporting Data:

101	2012. WRA Specialist. Personal Communication.	[Is the species highly domesticated? No] No evidence of domestication that reduces invasive traits.
102	2012. WRA Specialist. Personal Communication.	[Has the species become naturalized where grown? NA]
103	2012. WRA Specialist. Personal Communication.	[Does the species have weedy races? NA]
201	2012. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN). 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"? 2 - high] Native range: China -Fujian, Guangdong, Guangxi, Yunnan; Hong Kong; Vietnam.
202	2012. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN). http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Quality of climate match data? 2 - high] Native range: China -Fujian, Guangdong, Guangxi, Yunnan; Hong Kong; Vietnam.
203	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Broad climate suitability (environmental versatility)? Yes] Climatic amplitude (estimates): - Altitude range: 180 - 1800 m - Mean annual rainfall: 1200 - 2000 mm - Rainfall regime: summer; uniform - Dry season duration: 2 - 5 months - Mean annual temperature: 20 - 22ºC - Mean maximum temperature of hottest month: 27 - 33ºC - Mean minimum temperature of coldest month: 11 - 13ºC - Absolute minimum temperature: > -3ºC
203	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Broad climate suitability (environmental versatility)?] Forests on slopes, valleys, also cultivated; 100-1300 m.
203	2012. Tam, P.D./Dong, T.L./Duong, N.S.. Research results on forest planting with Canarium album Roeusch. Unpublished, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CB8QFjAA&url=http%3A%2F%2Fwww.mekonginfo.org%2Fassets%2Fmidocs%2F000	[Broad climate suitability (environmental versatility)?] C.album is a species of wide distribution in North, Central and South Vietnam and is frequently met in secondary forest with intact forest soil, at elevation from 10m .a.s.l (Ba Ria Vung Tau), (Tan phu – Dong Nai) to 1,000 a.s.l (Tua Chua – Lai Chau).
204	2012. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN). http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Native or naturalized in regions with tropical or subtropical climates? Yes] Native range: China -Fujian, Guangdong, Guangxi, Yunnan; Hong Kong; Vietnam.
205	2012. Tam, P.D./Dong, T.L./Duong, N.S.. Research results on forest planting with Canarium album Roeusch. Unpublished, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CB8QFjAA&url=http%3A%2F%2Fwww.mekonginfo.org%2Fassets%2Fmidocs%2F000	[Does the species have a history of repeated introductions outside its natural range? No] No evidence.
301	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Naturalized beyond native range? No] No evidence.
302	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Garden/amenity/disturbance weed? No] No evidence.
303	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Agricultural/forestry/horticultural weed? No] No evidence.
304	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Environmental weed? No] No evidence.
305	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Congeneric weed? No] No evidence.

401	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Produces spines, thorns or burrs? No] "Trees, 7-25(-35) m tall. Branchlets 5-6 mm in diam., tomentose with yellowish brown hairs when young, glabrescent. Leaves stipulate; leaflets 3-6 pairs; blades lanceolate, elliptic, or ovate, 6-14 × 2-5.5 cm, glabrous or abaxially sparsely setose on veins, base rounded or obliquely cuneate, margin entire, apex acuminate with acumen up to ca. 2 cm; lateral veins 12-16 pairs. Inflorescences axillary, minutely tomentose or glabrescent."
402	2012. WRA Specialist. Personal Communication.	[Allelopathic? Unknown]
403	2010. Nickrent, D.. The parasitic plant connection. Department of Plant Biology, Southern Illinois University, Carbondale http://www.parasiticplants.siu.edu/index.html	[Parasitic? No] Burseraceae.
404	2012. WRA Specialist. Personal Communication.	[Unpalatable to grazing animals? Unknown]
405	2012. National Center for Biotechnology Information. PubMed. http://www.ncbi.nlm.nih.gov/sites/entrez	[Toxic to animals? No] No evidence.
405	2012. 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	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[[Host for recognized pests and pathogens?] Pests recorded Insects: Acanthoecia laminati Anomala cupripes (large green chafer beetle) Chineura alba Cricula trifenestrata (tea flush worm) Cunaxa africanus Metanastria hyrtaca Pseudophacopteron canarium Stromatium longicorne Fungus diseases: Meliola canarii-albi
406	2012. WRA Specialist. Personal Communication.	[Host for recognized pests and pathogens? Unknown]
407	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Causes allergies or is otherwise toxic to humans? No] "C. album also yields resin, essential oil and medicinal compounds. In Chinese medicine, fruits and roots of C. album are used to treat poisoning, diarrhoea and dermatitis. The fruits contain chemicals that can act as an important component of anti-febrile and detoxifying drugs, particularly for curing laryngitis, promoting the production of bodily fluids and curing epilepsy."
407	2012. National Center for Biotechnology Information. PubMed. http://www.ncbi.nlm.nih.gov/sites/entrez	[Causes allergies or is otherwise toxic to humans? No] No evidence.
407	2012. 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	2012. WRA Specialist. Personal Communication.	[Creates a fire hazard in natural ecosystems? No] No evidence.
409	2012. Tam, P.D./Dong, T.L./Duong, N.S.. Research results on forest planting with Canarium album Roeusch. Unpublished, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CB8QFjAA&url=http%3A%2F%2Fwww.mekonginfo.org%2Fassets%2Fmidocs%2F000	[Is a shade tolerant plant at some stage of its life cycle? Yes] Level of shading affects growth of seedlings at nursery stage (1 - 2 year old). Shading degree of 25 – 50% is best for the growth of seedlings.
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)? No] Soil descriptors - Soil texture: medium - Soil drainage: free - Soil reaction: acid

410	2012. Tam, P.D./Dong, T.L./Duong, N.S.. Research results on forest planting with Canarium album Roeusch. Unpublished, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CB8QFjAA&url=http%3A%2F%2Fwww.mekonginfo.org%2Fassets%2Fmidocs%2F000	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? No] "The soil in the distribution range of C.album is almost of thick layer, >0.5m, pHkcl varies from 3 to 7, P2O5 < 5mg/ 100g soil, humus varies from 2 to 4.7%. This means that C.album is tolerant to acidic to slightly acidic soil, rather poor in P but humus content must be rather high and soil layer must be deep."
411	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Climbing or smothering growth habit? No] Tree.
412	2012. WRA Specialist. Personal Communication.	[Forms dense thickets? No] No evidence.
501	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Aquatic? No] Tree; terrestrial.
502	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Grass? No] Burseraceae.
503	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Nitrogen fixing woody plant? No] Burseraceae.
503	2010. Winrock International. Nitrogen fixing trees and shrubs. Winrock International, http://www.winrock.org/	[Nitrogen fixing woody plant? No] Not a nitrogen fixer.
503	2010. www.nationmaster.com. Encyclopedia Nitrogen fixation. Nationmaster.com, http://www.nationmaster.com/encyclopedia/Nitrogen-fixation	[Nitrogen fixing woody plant? No] Not a nitrogen fixer.
504	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] Tree; woody.
601	2012. WRA Specialist. Personal Communication.	[Evidence of substantial reproductive failure in native habitat? No] No evidence.
602	2012. Tam, P.D./Dong, T.L./Duong, N.S.. Research results on forest planting with Canarium album Roeusch. Unpublished, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CB8QFjAA&url=http%3A%2F%2Fwww.mekonginfo.org%2Fassets%2Fmidocs%2F000	[Produces viable seed? Yes] Canarium album is capable of strong natural regeneration from both seed and coppice.
603	2012. WRA Specialist. Personal Communication.	[Hybridizes naturally? Unknown]
604	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Self-compatible or apomictic? No] Dioecious.
605	2012. WRA Specialist. Personal Communication.	[Requires specialist pollinators? Unknown]
606	2012. Tam, P.D./Dong, T.L./Duong, N.S.. Research results on forest planting with Canarium album Roeusch. Unpublished, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CB8QFjAA&url=http%3A%2F%2Fwww.mekonginfo.org%2Fassets%2Fmidocs%2F000	[Reproduction by vegetative fragmentation? Yes] Canarium album is capable of strong natural regeneration from both seed and coppice.
607	2012. WRA Specialist. Personal Communication.	[Minimum generative time (years)? Unknown]
701	2012. WRA Specialist. Personal Communication.	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? No] No evidence of dispersal in heavily trafficked areas.

702	2012. Biodiversity informatics and co-operation in taxonomy for interactive shared knowledge base (BIOTIK). Canarium ablum (Loureiro) Raeuschel [accessed 30 Sugust 2012]. http://www.biotik.org/	[Propagules dispersed intentionally by people? Yes] The raw fruit is sold on markets and is edible: it is believed to help indigestion and combat drunkenness. The aromatic resin tapped from the trunk is used in incense making.
703	2012. WRA Specialist. Personal Communication.	[Propagules likely to disperse as a produce contaminant? No] No evidence.
704	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Propagules adapted to wind dispersal? No] Drupe ovoid or spindle-shaped, 25-35 mm, yellow-green, glabrous; exocarp thick, wrinkled when dry; pyrene acuminate.
705	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Propagules water dispersed? Unknown] Drupe ovoid or spindle-shaped, 25-35 mm, yellow-green, glabrous; exocarp thick, wrinkled when dry; pyrene acuminate.
706	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Propagules bird dispersed? Yes] Drupe ovoid or spindle-shaped, 25-35 mm, yellow-green, glabrous; exocarp thick, wrinkled when dry; pyrene acuminate.
707	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Propagules dispersed by other animals (externally)? No] Drupe ovoid or spindle-shaped, 25-35 mm, yellow-green, glabrous; exocarp thick, wrinkled when dry; pyrene acuminate.
708	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Propagules survive passage through the gut? Yes] Drupe ovoid or spindle-shaped, 25-35 mm, yellow-green, glabrous; exocarp thick, wrinkled when dry; pyrene acuminate.
801	2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Prolific seed production (>1000/m2)? No] Infructescences 1.5-15 cm, with 1-6 fruits; persistent calyx flat, ca. 5 mm in diam., with recurved lobes. Drupe ovoid or spindle-shaped, 25-35 mm, yellow-green, glabrous; exocarp thick, wrinkled when dry; pyrene acuminate. Fl. Apr-May, fr. Oct-Dec.
802	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Evidence that a persistent propagule bank is formed (>1 yr)?] Seed orthodox.
803	2012. WRA Specialist. Personal Communication.	[Well controlled by herbicides? Unknown]
804	2012. Tam, P.D./Dong, T.L./Duong, N.S.. Research results on forest planting with Canarium album Roeusch. Unpublished, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CB8QFjAA&url=http%3A%2F%2Fwww.mekonginfo.org%2Fassets%2Fmidocs%2F000	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] Canarium album is capable of strong natural regeneration from both seed and coppice.
805	2012. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown]

Summary of Risk Traits

High Risk

- Native to tropical regions
- Broad environmental tolerance
- Shade tolerant
- Viable seed
- Coppices readily
- Bird dispersal

Low Risk

- Not naturalized
- Not a weed elsewhere
- Unarmed
- Non-toxic to animals and people
- Limited soil type tolerance
- Not a prolific seed producer