

Family: *Meliaceae*

Taxon: *Sandoricum koetjape*

Synonym: *Melia koetjape* Burm. f. (basionym)
Sandoricum indicum Cav.

Common Name: Kechapi
Red santol
Santol

Questionnaire :	current 20090513	Assessor:	Chuck Chimera	Designation:	EVALUATE
Status:	Assessor Approved	Data Entry Person:	Chuck Chimera	WRA Score	1
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		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)		n
304	Environmental weed		n=0, y = 2*multiplier (see Appendix 2)		
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		y
403	Parasitic		y=1, n=0		n
404	Unpalatable to grazing animals		y=1, n=-1		n
405	Toxic to animals		y=1, n=0		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	n
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	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	n
706	Propagules bird dispersed	y=1, n=-1	
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	n
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 1

Supporting Data:

101	2011. Kubitzki, K. (ed.). The Families and Genera of Vascular Plants. Vol. X. Flowering Plants. Eudicots: Sapindales, Cucurbitales, Myrtaceae. Springer, New York	[Is the species highly domesticated? No] "The locally important fruit trees of Malesia, <i>Lansium domesticum</i> (lansat) and <i>Sandoricum koetjape</i> (sentul) exist in a number of forms, wild, cultivated and naturalized, though they are not grown on a commercial plantation scale, those reaching markets being largely those selected from local trees." [Some domestication has occurred, but no evidence that tree is highly domesticated]
102	2011. WRA Specialist. Personal Communication.	NA
103	2011. WRA Specialist. Personal Communication.	NA
201	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Species suited to tropical or subtropical climate(s)? 2-high] "S. koetjape is a semideciduous tree up to 30 m tall and 90 cm in diameter. It is found naturalized or cultivated throughout tropical Asia, particularly in Indonesia, Malaysia, the Philippines, Thailand and Vietnam."
202	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Quality of climate match data? 2-high] "S. koetjape is a semideciduous tree up to 30 m tall and 90 cm in diameter. It is found naturalized or cultivated throughout tropical Asia, particularly in Indonesia, Malaysia, the Philippines, Thailand and Vietnam."
203	1987. Morton, J.F.. Fruits of warm climates - Santol (<i>Sandoricum koetjape</i>). http://www.hort.purdue.edu/newcrop/morton/santol.html	[Broad climate suitability (environmental versatility)? No] "The santol is tropical and cannot be grown above 3,280 ft (1,000 m) in Java. It flourishes in dry as well as moist areas of the Philippine lowlands."
204	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Native or naturalized in regions with tropical or subtropical climates? Yes] "S. koetjape is a semideciduous tree up to 30 m tall and 90 cm in diameter. It is found naturalized or cultivated throughout tropical Asia, particularly in Indonesia, Malaysia, the Philippines, Thailand and Vietnam."
205	1981. Pennington, T.D./Styles, B.T./Taylor, D.A.H.. Meliaceae, with Accounts of Swietenioideae and Chemotaxonomy. Flora Neotropica. 28: 1-470.	[Does the species have a history of repeated introductions outside its natural range? Yes] " <i>Sandoricum koetjape</i> has been occasionally planted in the New World on account of its large edible fruit (up to 5-6 cm diam.). The only collections known to me are from Costa Rica."
205	1987. Morton, J.F.. Fruits of warm climates - Santol (<i>Sandoricum koetjape</i>). http://www.hort.purdue.edu/newcrop/morton/santol.html	[Does the species have a history of repeated introductions outside its natural range? Yes] "Only a few specimens are known in the western hemisphere: one in the Lancetilla Experimental Garden at Tela, Honduras, and one or more in Costa Rica. Seeds have been introduced into Florida several times since 1931. Most of the seedlings have succumbed to cold injury. At least 3 have survived to bearing age in special collections. Grafted plants from the Philippines have fruited well at Fairchild Tropical Garden, Miami."
205	2004. Kueffer, C.. Impacts of woody invasive species on tropical forests of the Seychelles. PhD Dissertation. Swiss Federal Institute Of Technology, Zurich, Switzerland	[Does the species have a history of repeated introductions outside its natural range? Yes] Seychelles
205	2004. Starr, F./Starr, K./Loope, Lloyd L.. New plant records from the Hawaiian Archipelago. Bishop Museum Occasional Papers. 79: 20-30.	[Does the species have a history of repeated introductions outside its natural range? Yes] Hawaiian Islands
301	1987. Morton, J.F.. Fruits of warm climates - Santol (<i>Sandoricum koetjape</i>). http://www.hort.purdue.edu/newcrop/morton/santol.html	[Naturalized beyond native range? Yes] "The santol is believed native to former Indochina (especially Cambodia and southern Laos) and Malaya, and to have been long ago introduced into India, the Andaman Islands, Malaysia, Indonesia, the Moluccas, Mauritius, and the Philippines where it has become naturalized. It is commonly cultivated throughout these regions and the fruits are abundant in the local markets."
301	2004. Kueffer, C.. Impacts of woody invasive species on tropical forests of the Seychelles. PhD Dissertation. Swiss Federal Institute Of Technology, Zurich, Switzerland	[Naturalized beyond native range? Yes] "The present vegetation of the Seychelles can be classified into six main vegetation types: beach fringe and coastal vegetation (including mangroves), lowland forest, mid altitude forest, palm forest, inselberg vegetation, and montane forest (adapted from Stoddart 1984, Carlstroem 1996, Fleischmann et al. 2003)...The lowland forests (at c. 50 to 300 m asl.) are mostly abandoned timber plantations, where c. 90% of all woody species are non-native, e.g. <i>Adenanthera pavonina</i> , <i>Artocarpus heterophyllus</i> , <i>Cinnamomum verum</i> , <i>Falcataria moluccana</i> or <i>Sandoricum koetjape</i> , with a few colonizing endemic palms in the understorey."

301	2004. Starr, F./Starr, K./Loope, Lloyd L.. New plant records from the Hawaiian Archipelago. Bishop Museum Occasional Papers. 79: 20-30.	[Naturalized beyond native range? Yes] "Native from India to the East Indies (St. John, 1973), <i>S. koetjape</i> (santol) is known from BISH specimens to have been first collected on O'ahu in 1933 and has recently been collected spreading from plantings on both East and West Maui...These collections represent a new naturalized record for the Hawaiian Islands. Material examined: MAUI: East Maui, Hāna Hwy, at Ulumalu Rd intersection, many young seedlings spreading in gulch from nearby planting, reported by Monroe Bryce, 550 ft [168 m], 30 Jan 2002, Starr & Martz 020130-1; West Maui, Lahaina Distr, Honokōhau Valley, spreading locally from plantings made ca. 1932, 60 ft [18 m], 1 Jul 2003, Oppenheimer & Bartlett H70302."
301	2005. Fleischmann, K./Edwards, P.J./Ramseier, D./Kollmann, J.. Stand structure, species diversity and regeneration of an endemic palm forest on the Seychelle. African Journal of Ecology. 43(4): 291-301.	[Naturalized beyond native range? Yes] "The most abundant seedlings in the permanent plots were the invasive aliens <i>Cinn. verum</i> , <i>Chrysobalanus icaco</i> and <i>Aden. pavonina</i> , and the native <i>Meme. eleagni</i> . Less common seedlings included <i>Arto. heterophyllus</i> , <i>Cant. bibracteatum</i> , <i>Hevea brasiliensis</i> , <i>Pand. hornei</i> and <i>Sandoricum koetjape</i> ."
302	2007. Randall, R.P.. Global Compendium of Weeds - <i>Sandoricum koetjape</i> [Online Database]. http://www.hear.org/gcw/species/sandoricum_koetjape/	[Garden/amenity/disturbance weed? No] No evidence
303	2007. Randall, R.P.. Global Compendium of Weeds - <i>Sandoricum koetjape</i> [Online Database]. http://www.hear.org/gcw/species/sandoricum_koetjape/	[Agricultural/forestry/horticultural weed? No] No evidence
304	2005. Dunlop, E./Hardcastle, J./Shah, N.J.. Cousin and Cousine Islands Status and Management of Alien Invasive Species. http://www.natureseychelles.org/index.php?option=com_docman&task=doc_download&gid=42&Itemid=89	[Environmental weed? Potentially] "Naturalized, Regenerating, but Slowly spreading woody plant species" [Includes <i>Sandoricum koetjape</i> . Impacts of invasion not specified]
304	2007. Schumacher, E.M.R.. Variation in growth responses among and within native and invasive juvenile trees in Seychelles. PhD Dissertation. Swiss Federal Institute of Technology, Zurich	[Environmental weed? Potentially] " <i>S. koetjape</i> is naturalized and widely planted but only slowly spreading because its large seeds are not actively dispersed." [No negative impacts specified]
305	2007. Randall, R.P.. Global Compendium of Weeds - Index [Online Database]. http://www.hear.org/gcw/	[Congeneric weed? No] No evidence
401	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestry Database: a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Produces spines, thorns or burrs? No] " <i>Sandoricum koetjape</i> is a deciduous, small to large tree, up to 45(-50) m tall. The tree bole is sometimes straight but often crooked or fluted, branchless for up to 18(-21) m and with a trunk diameter up to 100 cm. Buttresses up to 3m high. Bark surface smooth or sometimes flaky or fissured, lenticillate, greyish to pale pinkish brown, inner bark pale brown or red-brown to pink, exuding a milky latex. The tree is interesting because it branches unusually low to the ground but has a compact crown. Leaves trifoliate arranged spirally, exstipulate; leaflets entire."
402	2005. Khanh, T.D./Hong, N.H./Xuan, T.D./Chung, I.M.. Paddy weed control by medicinal and leguminous plants from Southeast Asia. Crop Protection 1. 24: 421-43.	[Allelopathic? Yes] "Several studies on the screening for the allelopathic potential of plants in ecosystems have been reported. Fujii (2001) evaluated the allelopathic potentials of 53 cover crop plants (26 leguminous, 19 graminaceous and eight others) and 239 medicinal species (Fujii et al., 2003) using the Plant Box Method. They found that some species strongly suppressed tested plants. These included: <i>Vicia villosa</i> (hairy vetch), <i>Mucuna pruriens</i> (velvet bean), <i>Avena sativa</i> (oat), <i>Secale cereale</i> (rye), <i>Triticum aestivum</i> (wheat) and <i>Hordeum vulgare</i> (barley) (Fujii, 2001). <i>Artabotrys odoratissimus</i> , <i>Annona cherimola</i> , <i>Dialium guianense</i> , <i>Embluca pectinata</i> , <i>Hevea brasiliensis</i> , <i>Eucalyptus citridora</i> , <i>Garcinia oblongifolia</i> , <i>Paeonia lactiflora</i> and <i>Sandoricum koetjape</i> showed the strongest allelopathic activities."
403	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Parasitic? No] " <i>S. koetjape</i> is a semideciduous tree up to 30 m tall and 90 cm in diameter."
404	1990. Devendra, C. (ed.). Shrubs and tree fodders for farm animals: proceedings of a workshop in Denpasar, Indonesia, 24-29 July 1989. International Development Research Centre, Ottawa, Canada	[Unpalatable to grazing animals? No] "Table 2. Shrub and tree species used for fodder in Malaysia." [Includes <i>Sandoricum koetjape</i>]

404	1992. Lowry, J.B./Petheram, R.J./Tangendjaja, B.. Plants Fed to Village Ruminants in Indonesia. Australian Centre for International Agricultural Research, Canberra, Australia	[Unpalatable to grazing animals? No] "Leaves sometimes used as feed, the extent not known."
405	1987. Morton, J.F.. Fruits of warm climates - Santol (<i>Sandoricum koetjape</i>). http://www.hort.purdue.edu/newcrop/morton/santol.html	[Toxic to animals? No] "The bitter bark, containing the slightly toxic sandoricum acid, an unnamed, toxic alkaloid, and a steroidal sapogenin, is applied on ringworm and also enters into a potion given a woman after childbirth." [No evidence that foliage or fruit are toxic to animals]
406	1987. Morton, J.F.. Fruits of warm climates - Santol (<i>Sandoricum koetjape</i>). http://www.hort.purdue.edu/newcrop/morton/santol.html	[Host for recognized pests and pathogens? Possibly] "The Caribbean fruit fly (<i>Anastrepha suspensa</i>) causes freckle-like blemishes on the surface of the fruit but cannot penetrate the rind."
406	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Host for recognized pests and pathogens? Possibly] "Pests recorded Insects: Ceratitidis capitata (mediterranean fruit fly) Eriophyes sandorici [1] Eudocima fullonia (fruit-piercing moth) Fungus diseases: Corticium salmonicolor (damping off) Phytophthora phaseoli (leaf blight: Phaseolus bean) [2] ----- Footnotes: 1. a gall-forming mite 2. can cause blight to nursery plants"
407	1987. Morton, J.F.. Fruits of warm climates - Santol (<i>Sandoricum koetjape</i>). http://www.hort.purdue.edu/newcrop/morton/santol.html	[Causes allergies or is otherwise toxic to humans? No] "The fruit is usually consumed raw without peeling. In India, it is eaten with spices. With the seeds removed, it is made into jam or jelly. Pared and quartered, it is cooked in sirup and preserved in jars. Young fruits are candied in Malaysia by paring, removing the seeds, boiling in water, then boiling a second time with sugar. In the Philippines, santols are peeled chemically by dipping in hot water for 2 minutes or more, then into a lye solution at 200° F (93.33° C) for 3 to 5 minutes. Subsequent washing in cool water removes the outer skin. Then the fruits are cut open, seeded and commercially preserved in sirup. Santol marmalade in glass jars is exported from the Philippines to Oriental food dealers in the United States and probably elsewhere. Very ripe fruits are naturally vinous and are fermented with rice to make an alcoholic drink ... Medicinal Uses: The preserved pulp is employed medicinally as an astringent, as is the quince in Europe. Crushed leaves are poulticed on itching skin"
408	2004. Kueffer, C.. Impacts of woody invasive species on tropical forests of the Seychelles. PhD Dissertation. Swiss Federal Institute Of Technology, Zurich, Switzerland	[Creates a fire hazard in natural ecosystems? No] No evidence
408	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Creates a fire hazard in natural ecosystems? No] No evidence
408	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestry Database: a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Creates a fire hazard in natural ecosystems? No] No evidence
409	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Is a shade tolerant plant at some stage of its life cycle? Yes] "- Tolerates wind; shade"
409	2007. Shono1, K. /Davies, S.J./Chua, Y.K.. Performance of 45 Native Tree Species on Degraded Lands in Singapore. Journal of Tropical Forest Science. 19(1): 25–34.	[Is a shade tolerant plant at some stage of its life cycle? Yes. But can tolerate full sunlight] "Canarium littorale and Sandoricum koetjape were hardy species capable of tolerating exposure to full sunlight and occasional droughts."
410	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Tolerates a wide range of soil conditions? Yes] "Soil descriptors - Soil texture: medium; heavy - Soil drainage: free - Soil reaction: acid; neutral - Special soil tolerances: shallow; infertile - Soil types: clay soils; mountain soils; limestone soils; volcanic soils; tropical soils"
411	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Climbing or smothering growth habit? No] "S. koetjape is a semideciduous tree up to 30 m tall and 90 cm in diameter."

412	2005. McKenzie, P./Brown, C./Jianghua, S./Jian, W. (eds.). The unwelcome guests: Proceedings of the Asia-Pacific Forest Invasive Species Conference. FAO, Bangkok, Thailand	[Forms dense thickets? No evidence yet in the Philippines] "Prehistoric introduction of trees (probably by Malayo-Polynesian settlers) were first noted and may have included common agricultural tree crops such as the katurai (* <i>Sesbania grandiflora</i>), malunggai (* <i>Moringa oleifera</i>), mango (* <i>Mangifera indica</i>), nangka (* <i>Artocarpus heterophyllus</i>), breadfruit (* <i>A. altilis</i>), santol (* <i>Sandoricum koetjape</i>), rambutan (* <i>Nephelium lappaceum</i>), karamai (* <i>Cicca (Phyllanthus) acida</i>), bignai (* <i>Antidesma bunius</i>), kamias (* <i>Averrhoa bilimbi</i>), balimbing (* <i>A. carambola</i>), duhat (* <i>Syzygium jambolana</i>) and other * <i>Syzygium</i> spp., kawayan kiling (* <i>Bambusa vulgaris</i>), kawayan tinik (* <i>B. spinosa</i>) and many others. Most of these are Indo Malayan in origin. A few escaped into the wild like the bignai, duhat and santol. However, these have not grown and established themselves as persistent gregarious stands."
412	2009. Schumacher, E./Kueffer, C./Edwards, P.J./Dietz, H.. Influence of light and nutrient conditions on seedling growth of native and invasive trees in the Seychelles. <i>Biological Invasions</i> . 11: 1941–1954.	[Forms dense thickets? Possibly in Seychelles] "Most species had seeds in the range of 2 to 10 mm diameter, but two invasive species, <i>Sandoricum koetjape</i> and <i>S. jambos</i> , had larger seeds (15–20 mm)...the fourth species, <i>S. koetjape</i> , is restricted to the understorey of plantation forests, where it forms a dense sapling layer. Its restricted distribution can probably be explained by the fact that its large fruits are not readily dispersed." [Saplings may form a dense thicket of trees in the future]
501	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Aquatic? No] Terrestrial
502	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Grass? No] Meliaceae
503	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Nitrogen fixing woody plant? No] Meliaceae
504	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "S. koetjape is a semideciduous tree up to 30 m tall and 90 cm in diameter."
601	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Evidence of substantial reproductive failure in native habitat? No] No evidence
602	2007. Schumacher, E.M.R.. Variation in growth responses among and within native and invasive juvenile trees in Seychelles. PhD Dissertation. Swiss Federal Institute of Technology, Zurich	[Produces viable seed? Yes] "S. koetjape is naturalized and widely planted but only slowly spreading because its large seeds are not actively dispersed."
603	2011. Kubitzki, K. (ed.). <i>The Families and Genera of Vascular Plants</i> . Vol. X. Flowering Plants. Eudicots: Sapindales, Cucurbitales, Myrtaceae. Springer, New York	[Hybridizes naturally? Unknown] "Five spp., all but one, <i>S. koetjape</i> (Burm.f.) Merr., restricted to W. Malesia, where the cultivated forms of <i>S. koetjape</i> (santol) may have arisen, though wild relations appear to be native as far east as New Guinea. All five are wild in Borneo, to which three are restricted." [Ability to hybridize unknown]
604	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. <i>Agroforestry Database: a tree reference and selection guide version 4.0</i> . World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Self-compatible or apomictic? Unknown] "Flowers in an axillary thyrses, bisexual, 4-5 merous; calyx truncate to shallowly lobed; petals free; staminal tube cylindrical, carrying 10 anthers; disk tubular; ovary superior, 4-5 locular with 2 ovules in each cell, stylehead lobed ... Pollination is by insects."
605	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. <i>Agroforestry Database: a tree reference and selection guide version 4.0</i> . World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Requires specialist pollinators? No] "Flowers in an axillary thyrses, bisexual, 4-5 merous; calyx truncate to shallowly lobed; petals free; staminal tube cylindrical, carrying 10 anthers; disk tubular; ovary superior, 4-5 locular with 2 ovules in each cell, stylehead lobed ... Pollination is by insects."
606	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Reproduction by vegetative fragmentation? No] "- Seed storage recalcitrant; intermediate - Vegetative propagation by grafting - Stand establishment using planting stock" [No evidence]
607	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. <i>Agroforestry Database: a tree reference and selection guide version 4.0</i> . World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Minimum generative time (years)? 4+] "Santol is a hermaphroditic tree flowering after 5-7 years (clonally propagated trees may flower after 3-4 years)."
701	2009. Schumacher, E./Kueffer, C./Edwards, P.J./Dietz, H.. Influence of light and nutrient conditions on seedling growth of native and invasive trees in the Seychelles. <i>Biological Invasions</i> . 11: 1941–1954.	[Propagules likely to be dispersed unintentionally? No] "Most species had seeds in the range of 2 to 10 mm diameter, but two invasive species, <i>Sandoricum koetjape</i> and <i>S. jambos</i> , had larger seeds (15–20 mm)...the fourth species, <i>S. koetjape</i> , is restricted to the understorey of plantation forests, where it forms a dense sapling layer. Its restricted distribution can probably be explained by the fact that its large fruits are not readily dispersed." [No evidence, and unlikely given large fruit and seed size with no means of external attachment]

702	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Propagules dispersed intentionally by people? Yes] "It is a popular fruit tree; the fruits are usually eaten fresh, or processed into preserves, chutneys, or candy. Both the rind and pulp are edible. Yield of a 30-year-old tree in the Philippines can be between 18,000 and 24,000 fruits each year. The tree is an excellent shade tree with ornamental value. The wood is used for carpentry and construction purposes, and to make household utensils and implements. Various parts of the plant have a range of medicinal uses, including the bark, fresh foliage, and roots."
703	2009. Schumacher, E./Kueffer, C./Edwards, P.J./Dietz, H.. Influence of light and nutrient conditions on seedling growth of native and invasive trees in the Seychelles. Biological Invasions. 11: 1941–1954.	[Propagules likely to disperse as a produce contaminant? No] "Most species had seeds in the range of 2 to 10 mm diameter, but two invasive species, Sandoricum koetjape and S. jambos, had larger seeds (15–20 mm)...the fourth species, S. koetjape, is restricted to the understorey of plantation forests, where it forms a dense sapling layer. Its restricted distribution can probably be explained by the fact that its large fruits are not readily dispersed." [No evidence, and unlikely given large fruit and seed size]
704	2009. Schumacher, E./Kueffer, C./Edwards, P.J./Dietz, H.. Influence of light and nutrient conditions on seedling growth of native and invasive trees in the Seychelles. Biological Invasions. 11: 1941–1954.	[Propagules adapted to wind dispersal? No] "Most species had seeds in the range of 2 to 10 mm diameter, but two invasive species, Sandoricum koetjape and S. jambos, had larger seeds (15–20 mm)...the fourth species, S. koetjape, is restricted to the understorey of plantation forests, where it forms a dense sapling layer. Its restricted distribution can probably be explained by the fact that its large fruits are not readily dispersed."
705	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestry Database: a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Propagules water dispersed? No] "Bats disperse the seeds." [No evidence in literature that seeds are dispersed by birds]
706	2009. Kanwatanakid, C./Poonswad, P./Savini, T.. An assessment of food overlap between gibbons and hornbills. The Raffles Bulletin of Zoology. 57(1): 189-198.	[Propagules bird dispersed? Not by hornbills] "White-handed gibbons are also generalized frugivores, consuming various morphological types of fruits because of the advantage of hands for manipulation and long digestive tracts that allow consumption of fruit species with hard covers and flesh attached to seeds (e.g. Choerospondias axillaris, Sandoricum koetjape and Garcinia xanthochymus) (Kanwatanakid, 2000). Conversely, hornbills do not consume these fruit species because their feeding adaptations are restricted by their bill morphology, which significantly reduces their capability to manipulate and extract food."
706	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestry Database: a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Propagules bird dispersed? Possibly No] "Bats disperse the seeds."
706	2011. WRA Specialist. Personal Communication.	[Propagules bird dispersed? Potentially yes] Fleshy-fruited, and adapted for vertebrate dispersal, but suite of avian frugivores in Hawaiian Islands may not be able to disperse large seeds
707	2004. Kueffer, C./Vos, P.. Case Studies on the Status of invasive Woody Plant Species in the Western Indian Ocean: 5. Seychelles. Forest Health & Biosecurity Working Papers FBS/4-5E. FAO Forestry Dept., Rome, Italy	[Propagules dispersed by other animals (externally)? Potentially] "Pteropus seychellensis subsp. seychellensis is well adapted to exotic vegetation. It roosts in tall trees such as Paraserianthes falcataria and Casuarina equisetifolia, and feeds on, or at least pollinates, exotic species such as Anacardium occidentale, Pentadesma butyracea, Sandoricum koetjape, Mangifera indica, Carica papaya, Artocarpus heterophyllus, Syzygium jambos and Psidium cattleianum, but also native species such as Northea hornei and Calophyllum inophyllum (Racey and Nicoll 1984). Fruit bats are probably important dispersers of invasive plants. Pteropus aldabrensis on Aldabra pollinates the highly invasive Agave sisalana (Racey and Nicoll 1984)." [Possibly carried by bats externally. Could potentially be transported by introduced rodents in island ecosystems lacking bats]
708	2002. Kitamura, S./Yumoto, T./Poonswad, P./Chuailua, P./Plongmai, K./Maruhashi, T./Noma, N.. Interactions between fleshy fruits and frugivores in a tropical seasonal forest in Thailand. Oecologia. 133: 559–572.	[Propagules survive passage through the gut? Yes] "Appendix...Fruit consumers: Bu bulbuls, Pi pigeons, Ho hornbills, Sq squirrels, Ci civets, Gi gibbons, Ma macaques, Be bears, De deer, El elephants. Effects on seeds: d disperser, n neutral consumer, p predator, x unknown" [Squirrels listed as predators; Gibbons, macaques and elephants listed as dispersers; Civets and deer listed as unknown]
708	2011. WRA Specialist. Personal Communication.	[Propagules survive passage through the gut? Yes] Feral pigs could presumably disperse seeds

802	1998. Hong, T.D./Ellis, R.H.. Contrasting seed storage behaviour among different species of Meliaceae. <i>Seed Science and Technology</i> . 26(1): 77-95.	[Evidence that a persistent propagule bank is formed (>1 yr)? No] "Seeds of six species of Meliaceae were tested for germination following desiccation and subsequent hermetic storage for up to 26 months in different environments. Seeds of both <i>Aglaia clarkii</i> and <i>Sandoricum koetjape</i> were very sensitive to desiccation; no seeds survived desiccation to 20% moisture content or below...We conclude that <i>Aglaia clarkii</i> and <i>Sandoricum koetjape</i> show recalcitrant seed storage behaviour, while <i>Melia azedarach</i> shows orthodox seed storage behaviour, but that <i>Azadirachta indica</i> , <i>Khaya senegalensis</i> and <i>Swietenia macrophylla</i> show intermediate seed storage behaviour. We illustrate how combining information on four criteria (seed weight, shape, moisture content at maturity, and plant ecology) may provide a guide to likely seed storage behaviour in Meliaceae."
803	2011. WRA Specialist. Personal Communication.	[Well controlled by herbicides? Unknown] No information on herbicide efficacy or chemical control of this species
804	2011. WRA Specialist. Personal Communication.	[Tolerates, or benefits from, mutilation, cultivation, or fire? Unknown]
805	2011. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown]
