Key Words: Evaluate; Tree; Naturalized; Edible Fruit; Zoochorous; Tropical

Family: ***Oxalidaceae***

Taxon: ***Averrhoa bilimbi***

Synonym: *NA*

Common Name: Bilimbi
Cucumber tree
Tree sorrel
Zibeline

Questionaire : 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)**	
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**	**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**	**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**	
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**	**y**
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**	**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	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Is the species highly domesticated? Yes] "Bilimbis are all much the same wherever they are grown, but P.J. Wester reported that a form with sweet fruits had been discovered in the Philippines."
102	2012. WRA Specialist. Personal Communication.	NA
103	2012. WRA Specialist. Personal Communication.	NA
201	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Species suited to tropical or subtropical climate(s) 2-High] "Perhaps a native of the Moluccas, the bilimbi is cultivated throughout Indonesia; is cultivated and semi-wild everywhere in the Philippines; is much grown in Ceylon and Burma. It is very common in Thailand, Malaya and Singapore; frequent in gardens across the plains of India, and has run wild in all the warmest areas of that country. It is much planted in Zanzibar. Introduced into Queensland about 1896, it was readily adopted and commercially distributed to growers."
202	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Quality of climate match data 2-High] "Perhaps a native of the Moluccas, the bilimbi is cultivated throughout Indonesia; is cultivated and semi-wild everywhere in the Philippines; is much grown in Ceylon and Burma. It is very common in Thailand, Malaya and Singapore; frequent in gardens across the plains of India, and has run wild in all the warmest areas of that country. It is much planted in Zanzibar. Introduced into Queensland about 1896, it was readily adopted and commercially distributed to growers." [Exact region of origin unknown, but well-suited to tropical climates]
203	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Broad climate suitability (environmental versatility)? No] "The bilimbi is a tropical species, more sensitive to cold than the carambola, especially when very young. In Florida, it needs protection from cold and wind. Ideally, rainfall should be rather evenly distributed throughout most of the year but there should be a 2- to 3-month dry season. The bilimbi is not found in the wettest zones of Malaya. The tree makes slow growth in shady or semi shady situations. It should be in full sun."
204	1980. Woodson, Jr.; R.E./Schery, R.W./Lourteig, A.. Flora of Panama. Part IV. Family 84. Oxalidaceae. Annals of the Missouri Botanical Garden. 67(4): 823-850.	[Native or naturalized in regions with tropical or subtropical climates? Yes] "Averrhoa bilimbi is a widespread tree in tropical regions. Frequent in the Orient, in America it is known only in botanical gardens and experiment stations."
204	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Native or naturalized in regions with tropical or subtropical climates? Yes] "Perhaps a native of the Moluccas, the bilimbi is cultivated throughout Indonesia; is cultivated and semi-wild everywhere in the Philippines; is much grown in Ceylon and Burma. It is very common in Thailand, Malaya and Singapore; frequent in gardens across the plains of India, and has run wild in all the warmest areas of that country. It is much planted in Zanzibar. Introduced into Queensland about 1896, it was readily adopted and commercially distributed to growers."
205	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Does the species have a history of repeated introductions outside its natural range? Yes] "In 1793, the bilimbi was carried from the island of Timor to Jamaica and, after some years, was planted in Cuba and Puerto Rico, Trinidad, the lowlands of Central America, Venezuela, Colombia, Ecuador, Surinam, Guyana and Brazil, and even in northern Argentina, and it is very popular among the Asiatic residents of those countries as it must be in Hawaii. Still it is grown only as an occasional curiosity in southern Florida."
205	1999. Jensen, M.. Trees Commonly Cultivated in Southeast Asia: An Illustrated Field Guide. 2nd Edition. FAO Regional Office for Asia and the Pacific, Bangkok, Thailand	[Does the species have a history of repeated introductions outside its natural range? Yes] "Distribution: Origin S.E. Asia, now grown all over the humid tropics."
301	. Blench, R.. A history of fruits on the Southeast Asian mainland. Occasional Paper 4. Linguistics, Archaeology and the Human Past. Indus Project: Research Institute for Humanity & Nature, Kyoto, Japan	[Naturalized beyond native range? Escapes from cultivation] "The origin of the bilimbi is probably the Moluccas, but today it is cultivated throughout the region. It easily escapes from cultivation and is found semiwild in much of South Asia."
301	1988. TOPP, J.M.W.. An Annotated Check List of the Flora of Diego Garcia, British Ocean Territory. Atoll Research Bulletin. 313: 1-21.	[Naturalized beyond native range? Possibly Diego Garcia] "Frequent and scattered throughout the island but concentrated near former habitation sites and more common on the eastern side of the island."

301	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	[Naturalized beyond native range? Yes] "Other exotic species do occur on the islands that have proven invasive elsewhere (eg: Eucalyptus sp, Coffea sp, Citrus sp., Averrhoa bilimbi). Currently these species are naturalised but their populations do not appear to be regenerating nor expanding. Therefore at present they do not present a concern for the managers of the islands. Despite their non-invasive status, these populations should be monitored and in the event of expansion, appropriate measures be taken to confine or remove the population."
301	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	[Naturalized beyond native range? Yes] "Widely cultivated and freely escaping along rivers and in secondary vegetations. Guangdong, Guangxi, Taiwan [native to tropical SE Asia]"
301	2009. Chong, K.Y./Tan, H.T.W./Corlett, R.T.. A Checklist of the Total Vascular Plant Flora of Singapore: Native, Naturalized and Cultivated Species. Raffles Museum of Biodiversity Research, National University of Singapore, Singapore	[Naturalized beyond native range? Potentially in Singapore, although may be within natural range] "Averrhoa bilimbi L.; Oxalidaceae; casual"
302	2007. Randall, R.P.. Global Compendium of Weeds - Averrhoa bilimbi [Online Database]. http://www.hear.org/gcw/species/averrhoa_bilimbi/	[Garden/amenity/disturbance weed? Possibly] Averrhoa bilimbi listed as a weed of unspecified impacts
303	2007. Randall, R.P.. Global Compendium of Weeds - Averrhoa bilimbi [Online Database]. http://www.hear.org/gcw/species/averrhoa_bilimbi/	[Agricultural/forestry/horticultural weed? No] No evidence
304	2007. Randall, R.P.. Global Compendium of Weeds - Averrhoa bilimbi [Online Database]. http://www.hear.org/gcw/species/averrhoa_bilimbi/	[Environmental weed? No] No evidence
305	2007. Randall, R.P.. Global Compendium of Weeds - Averrhoa carambola [Online Database]. http://www.hear.org/gcw/species/averrhoa_carambola/	[Congeneric weed? No] Averrhoa carambola listed as naturalized and as a weed, but evidence of negative impacts was not found
401	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Produces spines, thorns or burrs? No] "The tree is attractive, long-lived, reaches 16 to 33 ft (5-10 m) in height; has a short trunk soon dividing into a number of upright branches. The leaves, very similar to those of the Otaheite gooseberry and mainly clustered at the branch tips, are alternate, imparipirmate; 12 to 24 in (30-60 cm) long, with 11 to 37 alternate or subopposite leaflets, ovate or oblong, with rounded base and pointed tip; downy; medium-green on the upper surface, pale on the underside; 3/4 to 4 in (2-10 cm) long, 1/2 to 1 1/8 in (1.2-1.25 cm) wide."
402	2012. WRA Specialist. Personal Communication.	[Allelopathic? Unknown]
403	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Parasitic? No] "The tree is attractive, long-lived, reaches 16 to 33 ft (5-10 m) in height; has a short trunk soon dividing into a number of upright branches." [Oxalidaceae]
404	1990. Devendra, C. (ed.). Shrubs and tree fodders for farm animalsanimals: proceedings of a workshop in Denpasar, Indonesia, 24-29 July 1989. International Development Research Centre, Ottawa, Canada	[Unpalatable to grazing animals? Presumably No] "Table 2. Shrub and tree species used for fodder in Malaysia." [Includes A. bilimbi]
405	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Toxic to animals? No] No evidence
405	2008. Wagstaff, D.J.. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	[Toxic to animals? No] No evidence
406	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Host for recognized pests and pathogens? No] "No pests or diseases have been reported specifically for the bilimbi."
406	2012. Bioversity International. Species Compendium Database - Averrhoa bilimbi L.. http://www.bioversityinternational.org/databases/species_compendium_database/detail.html?tx_wfqbe_pi1[species_id]=24915	[Host for recognized pests and pathogens? Potentially] "Pests and diseases: Leaf spot (Cercospora averrhoa), pink disease (Corticium spp.), rots (Ceratocystis spp., Colletotrichum spp. And Dothoriella spp.), caterpillars, fruit fly maggots (Samson, 1991)"

407	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Causes allergies or is otherwise toxic to humans? No] "The bilimbi is generally regarded as too acid for eating raw, but in Costa Rica, the green, uncooked fruits are prepared as a relish which is served with rice and beans." … " Very acid bilimbis are employed to clean the blade of a kris (dagger), and they serve as mordants in the preparation of an orange dye for silk fabrics. Bilimbi juice, because of its oxalic acid content, is useful for bleaching stains from the hands and rust from white cloth, and also tarnish from brass." [No evidence, despite multiple uses, including for human consumption]
407	1999. Jensen, M.. Trees Commonly Cultivated in Southeast Asia: An Illustrated Field Guide. 2nd Edition. FAO Regional Office for Asia and the Pacific, Bangkok, Thailand	[Causes allergies or is otherwise toxic to humans? No] "Use: Fruit used for pickles, curries, chutney and preserves in syrup and can also be used to clean metal and remove stains. Also used in traditional medicines."
407	2008. Wagstaff, D.J.. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	[Causes allergies or is otherwise toxic to humans? No] No evidence
408	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Creates a fire hazard in natural ecosystems? No] No evidence
408	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree 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	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Is a shade tolerant plant at some stage of its life cycle? Yes] "The tree makes slow growth in shady or semi shady situations. It should be in full sun." [Can tolerate shade, but prefers full sun]
410	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Tolerates a wide range of soil conditions? Yes] "While the bilimbi does best in rich, moist, but well-drained soil, it grows and fruits quite well on sand or limestone."
411	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Climbing or smothering growth habit? No] "The tree is attractive, long-lived, reaches 16 to 33 ft (5-10 m) in height; has a short trunk soon dividing into a number of upright branches."
412	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	[Forms dense thickets? No] "Widely cultivated and freely escaping along rivers and in secondary vegetations. Guangdong, Guangxi, Taiwan" [No evidence]
412	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Forms dense thickets? No] "A. bilimbi is a tropical tree, more sensitive to cold than A. carambola, especially when very young. Ideally, it prefers seasonally humid climates, rainfall should be rather evenly distributed throughout most of the year but there should be a 2-3 month dry season. The tree makes slow growth in shady or semi-shady situations. It should be in full sun." [No evidence]
501	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Aquatic? No] "The tree is attractive, long-lived, reaches 16 to 33 ft (5-10 m) in height…" [Terrestrial]
502	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Grass? No] Oxalidaceae
503	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Nitrogen fixing woody plant? No] Oxalidaceae
504	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "The tree is attractive, long-lived, reaches 16 to 33 ft (5-10 m) in height; has a short trunk soon dividing into a number of upright branches."

601	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Evidence of substantial reproductive failure in native habitat? No] "Perhaps a native of the Moluccas, the bilimbi is cultivated throughout Indonesia; is cultivated and semi-wild everywhere in the Philippines; is much grown in Ceylon and Burma. It is very common in Thailand, Malaya and Singapore; frequent in gardens across the plains of India, and has run wild in all the warmest areas of that country. It is much planted in Zanzibar. Introduced into Queensland about 1896, it was readily adopted and commercially distributed to growers." [Native range not well known, but no evidence of substantial reproductive failure]
602	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Produces viable seed? Yes] "Most efforts at grafting and budding have not been rewarding, though Wester had success in shield-budding, utilizing non-petioled, ripe, brown budwood cut 1 1/2 to 2 in (3.8-5 cm) long. Air-layering has been practiced in Indonesia for many years. However, the tree is more widely grown from seed."
603	2012. WRA Specialist. Personal Communication.	[Hybridizes naturally? Unknown]
604	2012. Bioversity International. Species Compendium Database - Averrhoa bilimbi L.. http://www.bioversityinternational.org/databases/species_compendium_database/detail.html?tx_wfqbe_pi1[species_id]=24915	[Self-compatible or apomictic? Possibly] "Breeding system: Inbreeding, outbreeding, heterostylous (Samson, 1991)"
605	1980. Woodson, Jr.; R.E./Schery, R.W./Lourteig, A.. Flora of Panama. Part IV. Family 84. Oxalidaceae. Annals of the Missouri Botanical Garden. 67(4): 823-850.	[Requires specialist pollinators? No] "Inflorescences axillary or often cauliflorous on aborted branches, sometimes even on the lower part of the trunk, of cymes forming racemes or panicles, 15-20 flowered, or of solitary flowers, pubescent and glandular; bracts ca. 4 mm long, bracteoles 1.5-2 mm long, both subulate, densely tomentose; pedicels 4-20 mm long, articulate near the middle. Flowers with the sepals 5-2.5 mm long, 1.5-3 mm wide, ovate to elliptical, asymmetrical, acute, mucronate, one internal sepal oblong and obtuse, pubescence appressed and glandular inside and out, green yellow to purplish; petals purplish, free or sometimes connate near the middle, linear spathulate, 10-20 mm long, 2.5-4 mm wide, clawed, caducous, apically with a short caducous cilium and minute glandular hairs; stamens 10, nearly free, glabrous, the longer 10 mm and the shorter 4 mm long, the anthers suborbicular, the connective conspicuous; pistils mostly mesostylous, 7.5-12 mm long, the ovary cylindrical, 5-lobate, 4-7.5 mm long, acute, lengthened-into the styles, the styles cylindrical, ca. 2 mm long, 2-lobed or truncate, densely appressed pilose, the hairs yellow, straight, ascending, the stigma inconspicuous, liguliform or subulate, the carpels with (1-3-)4-7 ovules."
605	2005. Karunaratne, W.A.I.P./Edirisinghe, J.P./Gunatilleke,C.V.S.. Ceylon Journal of Science. 34: 27-45.	[Requires specialist pollinators? No] "This study represents the very first attempt to record the floral relations of bees of Sri Lanka. Floral hosts of 117 bee species in 35 genera were recorded based on floral visits, pollen carriage and special behaviour at flowers."
605	2012. Bioversity International. Species Compendium Database - Averrhoa bilimbi L.. http://www.bioversityinternational.org/databases/species_compendium_database/detail.html?tx_wfqbe_pi1[species_id]=24915	[Requires specialist pollinators? No] "Pollination: Entomophilous (Samson, 1991)"
606	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Reproduction by vegetative fragmentation? No] "Most efforts at grafting and budding have not been rewarding, though Wester had success in shield-budding, utilizing non-petioled, ripe, brown budwood cut 1 1/2 to 2 in (3.8-5 cm) long. Air-layering has been practiced in Indonesia for many years. However, the tree is more widely grown from seed."
607	2012. Bioversity International. Species Compendium Database - Averrhoa bilimbi L.. http://www.bioversityinternational.org/databases/species_compendium_database/detail.html?tx_wfqbe_pi1[species_id]=24915	[Minimum generative time (years)? 5+] "Time horizon: Seedling to fruit bearing 5-6 years (Samson, 1991)"
701	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? No] "Fruit ellipsoid, obovoid or nearly cylindrical, faintly 5-sided, 4-10 cm long; capped by a thin, star-shaped calyx at the stem-end and tipped with 5 hairlike floral remnants at the apex. Crispy when unripe, the fruit turns from bright green to yellowish-green, ivory or nearly white when ripe and falls to the ground. The outer skin is glossy, very thin, soft and tender, and the flesh green, jelly-like, juicy and extremely acid. There may be a few (6-7) flattened, disc-like seeds, 6 mm wide, smooth, brown." [Unlikely. Fruits & seeds large and lack a means of external attachment]

702	1957. Ledin, R.B.. Tropical and Subtropical Fruits in Florida (Other than Citrus). Economic Botany. 11(4): 349-376.	[Propagules dispersed intentionally by people? Yes] "Averrhoa bilimbi L., the bilimbi or pickle fruit, is occasionally found in Florida gardens where it is grown as an oddity. The fruit, to 4 inches long, is cylindrical and pickle-shaped and borne on the trunk and main branches. The fruit has a thin skin and firm flesh which is juicy but very acid and is used principally for relishes, pickles, syrup, etc."
702	2001. Galvao de Lima, V.L.A./Emelo, N.D.A./Lima, L.D.S.. Physicochemical Characteristics of Bilimbi (Averrhoa bilimbi L.). Revista Brasileira de Fruticultura. 23(2): 421-423.	[Propagules dispersed intentionally by people? Yes] "Averrhoa bilimbi L., commonly known as bilimbi, belongs to the family of the Oxalidaceae. It is widely cultivated in the tropics and its origins are not yet clear. Nevertheless, Corrêa (1926) reported that it is native of India, from where it was brought to Brazil centuries ago. In Brazil, this tree is cultivated in the states of Rio de Janeiro, Amazonas, Pará and Santa Catarina, but the distribution of its fruits is limited. In these places, it is locally known as "bilimbi", "bilimbino", "biri-biri", "caramboleira amarela" or "limão de caiena"."
702	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	[Propagules dispersed intentionally by people? Yes] "Averrhoa bilimbi is especially popular with Filipinos in Hawaii, who use the fruit in cooking as a source of acidic tartness, much as limes, lemons, or tamarinds are used in other cuisines."
702	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Propagules dispersed intentionally by people? Yes] "Ornamental: Bilimbi is also grown in home gardens due to its attractive small purplish red flowers borne in clusters along the trunk and branches. Bilimbi is attractive to bees, butterflies and/or birds."
703	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Propagules likely to disperse as a produce contaminant? No] "Fruit ellipsoid, obovoid or nearly cylindrical, faintly 5-sided, 4-10 cm long; capped by a thin, star-shaped calyx at the stem-end and tipped with 5 hairlike floral remnants at the apex. Crispy when unripe, the fruit turns from bright green to yellowish-green, ivory or nearly white when ripe and falls to the ground. The outer skin is glossy, very thin, soft and tender, and the flesh green, jelly-like, juicy and extremely acid. There may be a few (6-7) flattened, disc-like seeds, 6 mm wide, smooth, brown." [Unlikely. Fruits & seeds large]
704	1987. Morton, J.F.. Fruits of warm climates - Bilimbi (Averrhoa bilimbi). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/bilimbi.html	[Propagules adapted to wind dispersal? No] "The bilimbi is ellipsoid, obovoid or nearly cylindrical, faintly 5-sided, 1 1/2 to 4 in (4 10 cm) long; capped by a thin, star-shaped calyx at the stem-end and tipped with 5 hair like floral remnants at the apex. The fruit is crisp when unripe, turns from bright-green to yellowish-green, ivory or nearly white when ripe and falls to the ground. The outer skin is glossy, very thin, soft and tender, and the flesh green, jelly-like, juicy and extremely acid. There may be a few (perhaps 6 or 7) flattened, disc-like seeds about 1/4 in (6 mm) wide, smooth and brown."
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? Probably Yes] "Widely cultivated and freely escaping along rivers and in secondary vegetations. Guangdong, Guangxi, Taiwan"
706	1980. Woodson, Jr.; R.E./Schery, R.W./Lourteig, A.. Flora of Panama. Part IV. Family 84. Oxalidaceae. Annals of the Missouri Botanical Garden. 67(4): 823-850.	[Propagules bird dispersed? Potentially Yes] "Berry oblong, to 7.5 cm long, 3.5 cm in diam., 5-lobate or smooth, in transverse section subcircular or pentagonal, the base roundish, the apex lobulate; seeds 4- 7 per carpel." [Fleshy-fruited]
706	2011. Saad, M.-N. et al.. The Distribution of Avifauna Community at the UiTM-Perhilitan Research Station, Kuala Heniam, Taman Negara Pahang, Malaysia. Pp 281-286 in Rehabilitation of Tropical Rainforest Ecosystems.. Univ. Putra Malaysia - Mitsubishi Corp.	[Propagules bird dispersed? Yes] "Kuala Keniam is also important for the frugivores as shown by the presence of high abundance of frugivores and mixed frugivores. The fruit trees at Kuala Keniam [Ficus glandulifera (Ara), Durio zibethinus (Durian), Maggifera foetida (Bachang), Lansium domesticum (Langsat), Nephelium lappaceum (Rambutan), Syzygium jambos (Jambu), Microcos tomentosa (Cenderai), Baccaurea motleyana (Rambai), Averrhoa bilimbi (Belimbing buluh), Melastoma malabathricum (Senduduk)] are important source of food (Dorst, 1971; Yap, 2005) for frugivores. The association between vegetation and the bird types and their abundance (Cody, 1985) is thus apparent at Kuala Keniam."
707	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Propagules dispersed by other animals (externally)? No] "Fruit ellipsoid, obovoid or nearly cylindrical, faintly 5-sided, 4-10 cm long; capped by a thin, star-shaped calyx at the stem-end and tipped with 5 hairlike floral remnants at the apex. Crispy when unripe, the fruit turns from bright green to yellowish-green, ivory or nearly white when ripe and falls to the ground. The outer skin is glossy, very thin, soft and tender, and the flesh green, jelly-like, juicy and extremely acid. There may be a few (6-7) flattened, disc-like seeds, 6 mm wide, smooth, brown." [Unlikely. Fruits & seeds large & lack any means of external attachment]

708	1980. Woodson, Jr.; R.E./Schery, R.W./Lourteig, A.. Flora of Panama. Part IV. Family 84. Oxalidaceae. Annals of the Missouri Botanical Garden. 67(4): 823-850.	[Propagules survive passage through the gut? Yes["Berry oblong, to 7.5 cm long, 3.5 cm in diam., 5-lobate or smooth, in transverse section subcircular or pentagonal, the base roundish, the apex lobulate; seeds 4- 7 per carpel." [Fleshy-fruited]
801	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Prolific seed production (>1000/m2)? Unlikely given large fruits and seeds] "Averrhoa bilimbi is an attractive, long lived tree, reaching 5-10 m in height; has a short trunk soon dividing into a number of upright branches. Leaves mainly clustered at the branch tips, are alternate, imparipinnate; 30-60 cm long, with 11-37 alternate or subopposite leaflets, ovate or oblong, with rounded base and pointed tip; downy; medium-green on the upper surface, pale on the underside; 2-10 cm long, 1.2-1.25 cm wide. Flowers small, fragrant, auxiliary or cauliflorous, 5-petalled, yellowishgreen or purplish marked with dark-purple, 10 22 mm long, borne in small, hairy panicles emerging directly from the trunk and oldest, thickest branches and some twigs, as do the clusters of curious fruits. Fruit ellipsoid, obovoid or nearly cylindrical, faintly 5-sided, 4-10 cm long; capped by a thin, star-shaped calyx at the stem-end and tipped with 5 hairlike floral remnants at the apex. Crispy when unripe, the fruit turns from bright green to yellowish-green, ivory or nearly white when ripe and falls to the ground. The outer skin is glossy, very thin, soft and tender, and the flesh green, jelly-like, juicy and extremely acid."
802	2012. Bioversity International. Species Compendium Database - Averrhoa bilimbi L.. http://www.bioversityinternational.org/databases/species_compendium_database/detail.html?tx_wfqbe_pi1[species_id]=24915	[Evidence that a persistent propagule bank is formed (>1 yr)? No] "Storage behaviour: Viability maintained for 6 months with partially dried seeds at 5°C (Riley, 1981)" [Seed viability in field conditions not likely to persist longer than laboratory storage conditions]
803	2012. WRA Specialist. Personal Communication.	[Well controlled by herbicides? Unknown] No information on herbicide efficacy or chemical control of this species
804	2012. WRA Specialist. Personal Communication.	[Tolerates, or benefits from, mutilation, cultivation, or fire? Unknown]
805	2012. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown]