

Family: *Sapindaceae*

Taxon: *Melicoccus bijugatus*

Synonym: *Melicocca bijuga* L.

Common Name: Genip
Honeyberry
Spanish lime

Questionnaire :	current 20090513	Assessor:	Chuck Chimera	Designation:	EVALUATE
Status:	Assessor Approved	Data Entry Person:	Chuck Chimera	WRA Score	4
101	Is the species highly domesticated?		y=-3, n=0		n
102	Has the species become naturalized where grown?		y=1, n=-1		
103	Does the species have weedy races?		y=1, n=-1		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"		(0-low; 1-intermediate; 2-high) (See Appendix 2)		High
202	Quality of climate match data		(0-low; 1-intermediate; 2-high) (See Appendix 2)		High
203	Broad climate suitability (environmental versatility)		y=1, n=0		y
204	Native or naturalized in regions with tropical or subtropical climates		y=1, n=0		y
205	Does the species have a history of repeated introductions outside its natural range?		y=-2, ?=-1, n=0		y
301	Naturalized beyond native range		y = 1*multiplier (see Appendix 2), n= question 205		y
302	Garden/amenity/disturbance weed		n=0, y = 1*multiplier (see Appendix 2)		y
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		
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		n
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		n
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	
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	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	n
803	Well controlled by herbicides	y=-1, n=1	y
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 4

Supporting Data:

101	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	[Is the species highly domesticated? No] "Little selection has been done within the species to improve fruit quality or yield." [No evidence]
102	2012. WRA Specialist. Personal Communication.	NA
103	2012. WRA Specialist. Personal Communication.	NA
201	2003. Acevedo-Rodríguez, P.. Melicocceae (Sapindaceae): Melicoccus and Talisia. Flora Neotropica. 87: 1-178.	[Species suited to tropical or subtropical climate(s) 2-High] "Native to nor them South America, perhaps from dry forest. Commonly planted and naturalized along roads and in secondary dry forest throughout northern South America, Central America, the West Indies, Cameroon, Gabon (Fouilloy & Halle, 1973a, 1973b), and the Pacific Islands. In secondary forest on Thomas and St. John (US Virgin Islands) is sometimes the dominant species."
202	2003. Acevedo-Rodríguez, P.. Melicocceae (Sapindaceae): Melicoccus and Talisia. Flora Neotropica. 87: 1-178.	[Quality of climate match data? 2-High] "Native to nor them South America, perhaps from dry forest. Commonly planted and naturalized along roads and in secondary dry forest throughout northern South America, Central America, the West Indies, Cameroon, Gabon (Fouilloy & Halle, 1973a, 1973b), and the Pacific Islands. In secondary forest on Thomas and St. John (US Virgin Islands) is sometimes the dominant species."
203	1987. Morton, J.F.. Fruits of warm climates - Mamoncillo (Melicoccus bijugatus). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/mamoncillo.html	[Broad climate suitability (environmental versatility)? Yes] "The mamoncillo is not strictly tropical, for it ascends up to 3,300 ft (1,000 m) above sea level in South America. It can stand several degrees of frost in Florida. Nevertheless, it is too tender to fruit in California though it has been planted there on various occasions. It is well adapted to areas of low rainfall. That of Key West ranges from 30 to 50 in (75-125 cm) annually. The tree can tolerate long periods of drought." [Exhibits some environmental versatility]
204	2003. Acevedo-Rodríguez, P.. Melicocceae (Sapindaceae): Melicoccus and Talisia. Flora Neotropica. 87: 1-178.	[Native or naturalized in regions with tropical or subtropical climates? Yes] "Native to nor them South America, perhaps from dry forest. Commonly planted and naturalized along roads and in secondary dry forest throughout northern South America, Central America, the West Indies, Cameroon, Gabon (Fouilloy & Halle, 1973a, 1973b), and the Pacific Islands. In secondary forest on Thomas and St. John (US Virgin Islands) is sometimes the dominant species."
205	1987. Morton, J.F.. Fruits of warm climates - Mamoncillo (Melicoccus bijugatus). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/mamoncillo.html	[Does the species have a history of repeated introductions outside its natural range? Yes] "The mamoncillo is native to Colombia, Venezuela, and the island of Margarita, also French Guiana, Guyana and Surinam. It is commonly cultivated and spontaneous in those countries, also in coastal Ecuador, the lowlands of Central America, the West Indies and in the Bahamas. In Florida, it is occasionally grown as far north as Ft. Myers on the West Coast and Palm Beach on the east; is much more plentiful in Key West, especially as a street tree. There are some specimens in California and in botanical gardens in the Philippines, Zanzibar, Hawaii and elsewhere. According to Britton, there was a tree about 30 ft (9 m) tall in Bermuda in 1914 but it had never bloomed."
205	2003. Acevedo-Rodríguez, P.. Melicocceae (Sapindaceae): Melicoccus and Talisia. Flora Neotropica. 87: 1-178.	[Does the species have a history of repeated introductions outside its natural range? Yes] Melicoccus bijugatus and M. oliviformis are distributed throughout the tropics through cultivation, while the other two species are largely restricted to their natural ranges."
205	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	[Does the species have a history of repeated introductions outside its natural range? Yes] "Native to northern South America and widely cultivated in the Caribbean for its edible fruit, Spanish-lime has been widely introduced to other tropical places. It is occasionally found on Oahu as a street tree or grown as a fruit tree in private gardens. The fruit, though esteemed in Latin America, has never become popular here."
301	1976. Morton, J.F.. Pestiferous spread of many ornamental and fruit species in South Florida. Proceedings of the Florida State Horticultural Society. 89: 348-353.	[Naturalized beyond native range? Yes] "Melicoccus bijugatus Jacq. SPANISH LIME; MAMONCILLO. Tropical America. Naturalized on shell mounds and Indian middens in Florida Keys."
301	1991. Francis, J.K./Liogier, H.A.. Naturalized Exotic Tree Species in Puerto Rico. General Technical Report SO-82. United States Department of Agriculture Forest Service, New Orleans, LA	[Naturalized beyond native range? Yes. Puerto Rico] "Table 3-Exotic tree species that have been able to regenerate and compete in forest stands and are likely to become common or abundant within the next century" [Includes Melicoccus bijugatus]

301	2003. Acevedo-Rodríguez, P.. Melicocceae (Sapindaceae): Melicoccus and Talisia. Flora Neotropica. 87: 1-178.	[Naturalized beyond native range? Yes] "Native to northern South America, perhaps from dry forest. Commonly planted and naturalized along roads and in secondary dry forest throughout northern South America, Central America, the West Indies, Cameroon, Gabon (Fouilloy & Halle, 1973a, 1973b), and the Pacific Islands. In secondary forest on Thomas and St. John (US Virgin Islands) is sometimes the dominant species."
301	2003. Clark, D.. Weeds are still "weeds" in paradise. Wildland Weeds. Winter: 16-17.	[Naturalized beyond native range? Yes] "A cursory examination of the distribution and abundance of invasive exotic plants in the U.S. Virgin Island natural areas is a part of the work underway. Another facet of the work involves applied research in the Virgin Islands National Park to look at the effects of several invasive exotic plants on the native flora. After introduction to the islands, species such as <i>Triphasia trifolia</i> (Rutaceae) and <i>Melicoccus bijugatus</i> (Sapindaceae) have become naturalized and have drastically expanded their range over several hundred years."
301	2005. Wagner, W.L./Herbst, D.R./Lorence, D.H.. Flora of the Hawaiian Islands website. Smithsonian Inst., Washington, D.C. http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/index.htm	[Naturalized beyond native range? No evidence in Hawaiian Islands]
301	2010. Nelson, G.. The Trees of Florida. 2nd Edition. Pineapple Press Inc, Sarasota, FL	[Naturalized beyond native range? Yes] "Disturbed sites; naturalized in southern Florida from about Palm Beach County southward, including the Keys."
301	2011. Jaramillo Díaz, P./Guézou, A./Mauchamp, A./Tye, A.. CDF Checklist of Galapagos Flowering Plants. In: Bungartz, F. et al. (eds.). Charles Darwin Foundation Galapagos Species Checklist. Charles Darwin Foundation, Puerto Ayora, Galapagos http://www.dar	[Naturalized beyond native range? Yes] "Origin: Introduced, Escaped. Galapagos Distribution: Isabela."
302	1990. Reilly, A.E./Earhart, J.E./Prance, G.T.. Three sub-tropical secondary forests in the U.S. Virgin Islands: a comparative quantitative ecological inventory. Advances in Economic Botany. 8: 189-198.	[Garden/amenity/disturbance weed? Yes] "Three permanent plots were established on the island of St. John in 1986 in secondary forest representative of ecological zones on the island, including upland moist forest (1.0 ha plot, 100 yr old stand), gallery moist forest (0.5 ha, 80 yr) and dry evergreen woodland (0.5 ha, 50 yr). All stems \geq 5 cm d.b.h. were tagged, mapped and measured. The floristic composition, and species and family importance values are given for each stand. One exotic species (<i>Melicoccus bijugatus</i>) comprised a significant percentage of the importance value (15.5%) in the youngest, most disturbed stand, while native species dominated older stands."
302	2003. Ray, G.. Vascular Plant Inventory and Mapping of Buck Island Buck Island Reef National Monument St. Croix, U.S. Virgin Islands. University of the Virgin Islands & The National Park Service, St. Croix	[Garden/amenity/disturbance weed? Yes] "It is widely accepted by biogeographers that <i>Genip</i> (<i>Melicoccus bijugatus</i>) was introduced to the Virgin Islands prior to European contact by aboriginal settlers from South America. It is dispersed short distances by bats and pigeons. The Buck Island population is small and concentrated in the vicinity of the west beach picnic area (cells 2 & 3), and is likely therefore to have been established by island visitors or previous residents. Eradication should not present a problem."
302	2008. Clark, D.W. et al. "Rats & Weeds & Lizards—Oh My!" Eradication of <i>Rattus rattus</i> & Control of Invasive Exotic Plants on Buck Island, U.S. Virgin Islands. Pp 106-111 in Weber & Harmon (eds). Proc. of the 2007 George Wright Society.	[Garden/amenity/disturbance weed? Yes. Potential environmental weed] "Nineteen out of the 228 plant species are not native to Buck Island Reef NM (Woodbury and Little 1976; Ray 2002). Six invasive non native species (<i>Urochloa maxima</i> , <i>Leucaena leucocephala</i> , <i>Tecoma stans</i> , <i>Bromelia penguin</i> , <i>Boerhavia erecta</i> , and <i>Aloe vera</i>) on Buck Island were of immediate concern, and three additional invasive exotic plant species (<i>Melicoccus bijugatus</i> , <i>Thespesia populnea</i> , and <i>Morinda citrifolia</i>) on Buck Island are known to exhibit invasive characteristics in the region." ... "In the spring of 2003, Buck Island Reef National Monument's Division of Resource Management attained funding to begin an invasive non-native plant control and management program on Buck Island." ... "Woody vegetation (<i>Leucaena leucocephala</i> , <i>Tecoma stans</i> , <i>Melicoccus bijugatus</i> , <i>Thespesia populnea</i> , <i>Tamarindus indica</i> and <i>Morinda citrifolia</i>): Basally apply Triclopyr (in vegetable oil carrier) to entire stem(s) circumference above ground (between where the foliage starts and ground) at a concentration of 30% (using compression or backpack sprayer)." ... "Since 2004, annual contractor visits to treat invasive exotic plant species on Buck Island have reduced the coverage of six of the targeted species (<i>Melicoccus bijugatus</i> , <i>Thespesia populnea</i> , <i>Morinda citrifolia</i> , <i>Aloe vera</i> , <i>Tamarindus indica</i> and <i>Bromelia penguin</i>) to fewer than 10 individual plants detected per species, per visit, island-wide." [A target species on Buck Island, U.S. Virgin Islands. Potential environmental weed]
303	2007. Randall, R.P.. Global Compendium of Weeds - <i>Melicoccus bijugatus</i> [Online Database]. http://www.hear.org/gcw/species/melicoccus_bijugatus/	[Agricultural/forestry/horticultural weed? No] No evidence

304	2007. Randall, R.P.. Global Compendium of Weeds - <i>Melicoccus bijugatus</i> [Online Database]. http://www.hear.org/gcw/species/melicoccus_bijugatus/	[Environmental weed? Potentially] "cultivation escape, environmental weed, naturalised, weed"
304	2008. Clark, D.W. et al.. "Rats & Weeds & Lizards—Oh My!" Eradication of <i>Rattus rattus</i> & Control of Invasive Exotic Plants on Buck Island, U.S. Virgin Islands. Pp 106-111 in Weber & Harmon (eds). Proc. of the 2007 George Wright Society.	[Environmental weed? Potentially] "Nineteen out of the 228 plant species are not native to Buck Island Reef NM (Woodbury and Little 1976; Ray 2002). Six invasive non native species (<i>Urochloa maxima</i> , <i>Leucaena leucocephala</i> , <i>Tecoma stans</i> , <i>Bromelia penguin</i> , <i>Boerhavia erecta</i> , and <i>Aloe vera</i>) on Buck Island were of immediate concern, and three additional invasive exotic plant species (<i>Melicoccus bijugatus</i> , <i>Thespesia populnea</i> , and <i>Morinda citrifolia</i>) on Buck Island are known to exhibit invasive characteristics in the region." ... "In the spring of 2003, Buck Island Reef National Monument's Division of Resource Management attained funding to begin an invasive non-native plant control and management program on Buck Island." ... "Woody vegetation (<i>Leucaena leucocephala</i> , <i>Tecoma stans</i> , <i>Melicoccus bijugatus</i> , <i>Thespesia populnea</i> , <i>Tamarindus indica</i> and <i>Morinda citrifolia</i>): Basally apply Triclopyr (in vegetable oil carrier) to entire stem(s) circumference above ground (between where the foliage starts and ground) at a concentration of 30% (using compression or backpack sprayer)." ... "Since 2004, annual contractor visits to treat invasive exotic plant species on Buck Island have reduced the coverage of six of the targeted species (<i>Melicoccus bijugatus</i> , <i>Thespesia populnea</i> , <i>Morinda citrifolia</i> , <i>Aloe vera</i> , <i>Tamarindus indica</i> and <i>Bromelia penguin</i>) to fewer than 10 individual plants detected per species, per visit, island-wide." [A target species on Buck Island, U.S. Virgin Islands. Potential environmental weed]
304	2009. Sanon, K./Stanford, A.. ISSR-Protocol Established for Local Plant Killer. P. 38 In: Fall Research Symposium 2009. University of the Virgin Islands, St. Thomas, USVI	[Environmental weed? Potentially] "A well known plant introduced to the United States Virgin Islands (USVI) is killing local plants. In the USVI, <i>Melicoccus bijugatus</i> better known as "Genip" is a naturalized plant that is very invasive. As a result, <i>M. bijugatus</i> is presently changing the structure of the USVI's forests and is endangering local plants."
305	2007. Randall, R.P.. Global Compendium of Weeds - Index [Online Database]. http://www.hear.org/gcw/	[Congeneric weed? No] No evidence
401	1976. Woodson, Jr., R.E./Schery, R.W./Croat, T.B.. Flora of Panama. Part VI. Family 108. Sapindaceae. Annals of the Missouri Botanical Garden. 63(3): 419-540.	[Produces spines, thorns or burrs? No] "Polygamous, deciduous, slow-growing trees, 6-20 m tall; trunk to 60 cm d.b.h., slightly angled and fluted, the bark gray, smooth, the inner bark orange brown, granular; stems grayish, glabrous. Leaves paripinnate, to 26 cm long; petioles 1.5-7 cm long, sometimes winged near the apex; rachis winged or not; leaflets 2-4, elliptic to ovate-elliptic, acute to acuminate, acute and inequilateral at the base, nearly sessile, 7-14 cm long, 2.5-6 cm wide."
402	2012. WRA Specialist. Personal Communication.	[Allelopathic? Unknown]
403	1976. Woodson, Jr., R.E./Schery, R.W./Croat, T.B.. Flora of Panama. Part VI. Family 108. Sapindaceae. Annals of the Missouri Botanical Garden. 63(3): 419-540.	[Parasitic? No] "Polygamous, deciduous, slow-growing trees, 6-20 m tall..." [Sapindaceae]
404	1992. Francis, J.K.. <i>Melicoccus bijugatus</i> Jacq. Quenepa - Sapindaceae - Soapberry family. SO-ITF-SM48. USDA Forest Service, International Institute of Tropical Forestry, Rfo Piedras, Puerto Rico	[Unpalatable to grazing animals? Apparently No] "Naturally regenerated trees are common at the fringes of farmsteads and along fencerows and roadsides in places where livestock were excluded during the establishment period."
405	1992. Francis, J.K.. <i>Melicoccus bijugatus</i> Jacq. Quenepa - Sapindaceae - Soapberry family. SO-ITF-SM48. USDA Forest Service, International Institute of Tropical Forestry, Rfo Piedras, Puerto Rico	[Toxic to animals? No] "Naturally regenerated trees are common at the fringes of farmsteads and along fencerows and roadsides in places where livestock were excluded during the establishment period." [No evidence]
406	1987. Morton, J.F.. Fruits of warm climates - Mamoncillo (<i>Melicoccus bijugatus</i>). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/mamoncillo.html	[Host for recognized pests and pathogens? No] "The tree is a host of the Citrus black fly, <i>Aleurocanthus woglumi</i> . There are several parasites (<i>Prospaltella</i> spp., <i>Eretmocerus serius</i> , and <i>Amitus hesperidium</i>) which provide effective control of this pest. In Florida, <i>Armillariella</i> (<i>Clitocybe</i>) <i>tabescens</i> causes mushroom root rot; <i>Fusarium</i> and <i>Phyllosticta</i> cause leaf spot; and <i>Cephaleuros virescens</i> , algal leaf spot and green scurf." [Nothing significant]

407	1987. Morton, J.F.. Fruits of warm climates - Mamoncillo (<i>Melicoccus bijugatus</i>). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/mamoncillo.html	[Causes allergies or is otherwise toxic to humans? No] "For eating out-of-hand, the rind is merely torn open at the stem end and the pulp-coated seed is squeezed into the mouth, the juice being sucked from the pulp until there is nothing left of it but the fiber. With fruits that have non adherent pulp, the latter may be scraped from the seed and utilized to make pie-filling, jam, marmalade or jelly, but this entails much work for the small amount of edible material realized. More commonly, the peeled fruits are boiled and the resulting juice is prized for cold drinks. In Colombia, the juice is canned commercially. The seeds are eaten after roasting. Indians of the Orinoco consume the cooked seeds as a substitute for cassava." ... "It has been said that the pulp fibers coat the lining of the stomach, adversely affecting the health, but this has been denied by the Government Chemist of the Department of Science and Agriculture in Jamaica who declares that fatalities in children are the result of choking on the seed. When coated with pulp, it is very slippery, is accidentally swallowed and, because of its size, lodges in the throat, causing suffocation or strangulation." [No evidence despite widespread human consumption]
407	1992. Francis, J.K.. <i>Melicoccus bijugatus</i> Jacq. Quenepa - Sapindaceae - Soapberry family. SO-ITF-SM48. USDA Forest Service, International Institute of Tropical Forestry, Rfo Piedras, Puerto Rico	[Causes allergies or is otherwise toxic to humans? No, but seeds may lead to choking] "Quenepa fruits are harvested and sold in clusters; the demand usually exceeds the supply in Puerto Rico. People eat them by biting off the exocarp and sucking the pulp away from the seed. There is danger in letting small children eat them; the seeds are said to cause occasional choking deaths."
408	1987. Morton, J.F.. Fruits of warm climates - Mamoncillo (<i>Melicoccus bijugatus</i>). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/mamoncillo.html	[Creates a fire hazard in natural ecosystems? No] No evidence
408	1992. Francis, J.K.. <i>Melicoccus bijugatus</i> Jacq. Quenepa - Sapindaceae - Soapberry family. SO-ITF-SM48. USDA Forest Service, International Institute of Tropical Forestry, Rfo Piedras, Puerto Rico	[Creates a fire hazard in natural ecosystems? No] "The two forest types-tropical dry transition to moist and tropical moist, according to Holdridge (7) in Venezuela where quenepa reportedly grows naturally receive 900 to 2600 mm of precipitation and have 3 to 5 rainless months annually (25J. The mean annual temperature in the native range varies from about 25 to 27 C, depending on elevation: there is little variation in month-to-month averages (61. Mean annual temperatures throughout the naturalized range may be somewhat lower and have a wider summer to winter variation." [No evidence]
409	1992. Francis, J.K.. <i>Melicoccus bijugatus</i> Jacq. Quenepa - Sapindaceae - Soapberry family. SO-ITF-SM48. USDA Forest Service, International Institute of Tropical Forestry, Rfo Piedras, Puerto Rico	[Is a shade tolerant plant at some stage of its life cycle? Potentially] "Reaction to Competition. - Quenepa is intolerant of shade (15). Seedlings can survive under light shade but must have full or nearly full overhead sun to progress to a dominant position."
410	1987. Morton, J.F.. Fruits of warm climates - Mamoncillo (<i>Melicoccus bijugatus</i>). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/mamoncillo.html	[Tolerates a wide range of soil conditions? Yes] "In Cuba, the tree is said to flourish in nearly all types of terrain but particularly in deep, rich soil of calcareous origin. It seems perfectly at home in the oolitic-limestone of southern Florida and the Florida Keys. In Colombia, it has been observed to grow on such poor soils that it has been adopted for planting in soil reclamation efforts. It is spontaneous especially in dry, coastal districts."
410	1992. Francis, J.K.. <i>Melicoccus bijugatus</i> Jacq. Quenepa - Sapindaceae - Soapberry family. SO-ITF-SM48. USDA Forest Service, International Institute of Tropical Forestry, Rfo Piedras, Puerto Rico	[Tolerates a wide range of soil conditions? Yes] "Quenepa is not very demanding of soil quality, although it grows best on moist, fertile sites. Soils having a pH as high as 8.0 and as low as about 5.5 are acceptable. Quenepa trees grow in clays, loams, sands, and soft, porous limestone, provided the soils are well drained (15). One of the reasons that the species is popular as an urban ornamental is that it will grow reasonably well in partially compacted fill dirt."
411	1976. Woodson, Jr., R.E./Schery, R.W./Croat, T.B.. Flora of Panama. Part VI. Family 108. Sapindaceae. Annals of the Missouri Botanical Garden. 63(3): 419-540.	[Climbing or smothering growth habit? No] "Polygamous, deciduous, slow-growing trees, 6-20 m tall..." [Sapindaceae]
412	2004. Gladfelter, W.B./Gladfelter, E.H.. Terrestrial Habitats of the Southgate Coastal Reserve: Dominant Plant Species and Other Habitat Characteristics. Coast & Harbor SCR Technical Report # 6. St. Croix Environmental Association, St. Croix, USVI	[Forms dense thickets? Potentially] "Large trees in W end and W TA dense stands of saplings in TA" [W: Littoral Woodland/Scrub; T: Transition zone (3 subzones, TA, TB, TC from west to east) ... Unknown if dense stands of saplings exclude other vegetation]

412	2010. Chakroff, M.. U. S. Virgin Islands Forest Resources Assessment and Strategies. Forestry Division, VI Department of Agriculture, Kingshill, VI	[Forms dense thickets? Potentially] "Genip (<i>Melicoccus bijugatus</i>), a favorite fruit of local island inhabitants during the months of June-August, was second on the list of relative dominance at 11.33%. Although not a native tree species, genip fruit is eaten for the tart flesh surrounding the seed and the wood is used for charcoal production by many locals because it grows quickly." [Figure 14: Genip Dominated Forest - Image shows a thicket of <i>M. bijugatus</i> trees, but unknown if it excludes other vegetation]
501	1976. Woodson, Jr., R.E./Schery, R.W./Croat, T.B.. Flora of Panama. Part VI. Family 108. Sapindaceae. Annals of the Missouri Botanical Garden. 63(3): 419-540.	[Aquatic? No] "Polygamous, deciduous, slow-growing trees, 6-20 m tall..." [Terrestrial]
502	2003. Acevedo-Rodríguez, P.. Melicocceae (Sapindaceae): <i>Melicoccus</i> and <i>Talisia</i> . Flora Neotropica. 87: 1-178.	[Grass? No] Sapindaceae
503	2003. Acevedo-Rodríguez, P.. Melicocceae (Sapindaceae): <i>Melicoccus</i> and <i>Talisia</i> . Flora Neotropica. 87: 1-178.	[Nitrogen fixing woody plant? No] Sapindaceae
504	1976. Woodson, Jr., R.E./Schery, R.W./Croat, T.B.. Flora of Panama. Part VI. Family 108. Sapindaceae. Annals of the Missouri Botanical Garden. 63(3): 419-540.	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "Polygamous, deciduous, slow-growing trees, 6-20 m tall; trunk to 60 cm d.b.h., slightly angled and fluted, the bark gray, smooth, the inner bark orange brown, granular; stems grayish, glabrous."
601	2003. Acevedo-Rodríguez, P.. Melicocceae (Sapindaceae): <i>Melicoccus</i> and <i>Talisia</i> . Flora Neotropica. 87: 1-178.	[Evidence of substantial reproductive failure in native habitat? No] No evidence
602	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	[Produces viable seed? Yes] "Propagation is from seed, although desirable selections are usually air layered."
603	1992. Francis, J.K.. <i>Melicoccus bijugatus</i> Jacq. Queneba - Sapindaceae - Soapberry family. SO-ITF-SM48. USDA Forest Service, International Institute of Tropical Forestry, Rfo Piedras, Puerto Rico	[Hybridizes naturally? Unknown] "The only other member of the genus is <i>Melicoccus lepidopetanus</i> Radlk., a similar tree with edible fruit that grows in Bolivia, Paraguay, and northern Argentina (8, 12)."
604	1987. Morton, J.F.. Fruits of warm climates - Mamoncillo (<i>Melicoccus bijugatus</i>). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/mamoncillo.html	[Self-compatible or apomictic? Possibly] "Generally, the presence of a male tree is necessary to pollinate the flowers that are predominantly female (or hermaphrodite functioning as female). However, in Cuba, some trees have sufficient numbers of flowers of both sexes to yield regularly large crops without interplanting."
604	2003. Acevedo-Rodríguez, P.. Melicocceae (Sapindaceae): <i>Melicoccus</i> and <i>Talisia</i> . Flora Neotropica. 87: 1-178.	[Self-compatible or apomictic? Potentially] "Dioecious or monoecious tree 10-25 m tall; bark light grey, smooth, with horizontal markings..."
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? Potentially, but generally no] "Most trees produce flowers of only one sex (thus requiring that a male tree be located near a female to promote cross-pollination), but exceptional trees produce both staminate and pistillate flowers and are capable of producing a crop of fruit."
605	1987. Morton, J.F.. Fruits of warm climates - Mamoncillo (<i>Melicoccus bijugatus</i>). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/mamoncillo.html	[Requires specialist pollinators? No] "The flowers, in slender racemes 2 1/3 to 4 in (6-10 cm) long, often clustered in terminal panicles, are fragrant, white, 1/5 to 1/3 in (5-8 mm) wide, with 4 petals and 8 stamens." ... "Flowers: The flowers are rich in nectar and highly appealing to hummingbirds and honeybees. The honey is somewhat dark in color but of agreeable flavor. The tree is esteemed by Jamaican beekeepers though the flowering season (March/April) is short."
606	1987. Morton, J.F.. Fruits of warm climates - Mamoncillo (<i>Melicoccus bijugatus</i>). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/mamoncillo.html	[Reproduction by vegetative fragmentation? No] "The mamoncillo is usually grown from seed but superior types should be vegetatively reproduced. Air-layering of fairly large branches, at least 2 in (5 cm) in diameter, is successful in the summer and there will be adequate root development in 5 to 6 weeks. Approach-grafting is feasible provided the rootstocks are raised in a lightweight medium, in plastic bags to facilitate attachment to the selected tree. Attempts to veneer-graft or chip bud have generally failed."
606	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	[Reproduction by vegetative fragmentation? No] "Propagation is from seed, although desirable selections are usually air layered." [No evidence]

607	1987. Morton, J.F.. Fruits of warm climates - Mamoncillo (<i>Melicoccus bijugatus</i>). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/mamoncillo.html	[Minimum generative time (years)? 4+] "The mamoncillo tree is slow-growing, erect, stately, attractive; to 85 ft (25 m) high, with trunk to 5 1/2 ft (1.7 m) thick; smooth, gray bark, and spreading branches. Young branchlets are reddish." ... "There are a few trees in Israel but none has flowered before 10 years of age." [Slow growing tree assumed to take 4 or more years to reach maturity]
607	1992. Francis, J.K.. <i>Melicoccus bijugatus</i> Jacq. Quenepa - Sapindaceae - Soapberry family. SO-ITF-SM48. USDA Forest Service, International Institute of Tropical Forestry, Rfo Piedras, Puerto Rico	[Minimum generative time (years)? 7+] "Fruit and seed production begins in 7 to 10 years from seed and in 4 to 5 years in vegetatively propagated stock" ... "Although quenepa grows well in moist forest areas, its relative growth rate is too slow to compete with the faster growing mesic species."
607	2008. Lemke, C.. Cal's plant of the month - <i>Melicoccus bijugatus</i> - Mamoncillo. University of Oklahoma Department of Botany & Microbiology, http://www.plantoftheweek.org/week480.shtml	[Minimum generative time (years)? >3] "Blooming: Our trees are 2 years old and will probably not flower for another 3-5 years."
701	1976. Woodson, Jr., R.E./Schery, R.W./Croat, T.B.. Flora of Panama. Part VI. Family 108. Sapindaceae. Annals of the Missouri Botanical Garden. 63(3): 419-540.	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? Possibly] "Most seeds fall under the parent tree. Distribution of naturalized trees (along roads, trails, and near old farmsteads), suggests that humans are the major long-distance dispersers in Puerto Rico (author, personal observation)." [Suggests dispersal is intentional]
702	1992. Francis, J.K.. <i>Melicoccus bijugatus</i> Jacq. Quenepa - Sapindaceae - Soapberry family. SO-ITF-SM48. USDA Forest Service, International Institute of Tropical Forestry, Rfo Piedras, Puerto Rico	[Propagules dispersed intentionally by people? Yes] "Quenepa, an evergreen with a clean, pleasing form, is popular as a shade and ornamental tree in tropical America. It tolerates poor soils, requires little maintenance, and, under the right conditions, yields significant amounts of fruit. Naturally occurring trees along fencerows are regularly used as living fenceposts."
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] "Native to northern South America and widely cultivated in the Caribbean for its edible fruit, Spanish-lime has been widely introduced to other tropical places. It is occasionally found on Oahu as a street tree or grown as a fruit tree in private gardens. The fruit, though esteemed in Latin America, has never become popular here."
703	1976. Woodson, Jr., R.E./Schery, R.W./Croat, T.B.. Flora of Panama. Part VI. Family 108. Sapindaceae. Annals of the Missouri Botanical Garden. 63(3): 419-540.	[Propagules likely to disperse as a produce contaminant? No] "Drupes green to pale yellow, globose, 2-3 cm diam., the pericarp ca. 2 mm thick, smooth, the mesocarp yellowish, translucent, sweet and juicy; seeds globose, 1.5-2 cm diam." [No evidence. Unlikely that relatively large fruit or seeds would become an inadvertent produce contaminant]
704	2003. Acevedo-Rodríguez, P.. Melicocceae (Sapindaceae): <i>Melicoccus</i> and <i>Talisia</i> . Flora Neotropica. 87: 1-178.	[Propagules adapted to wind dispersal? No] "Fruits baccate, indehiscent, ellipsoid, ovoid, or globose, with leathery mesocarp. Seed 1(-2), with a fleshy, edible testa." ... "Fruit subglobose or ellipsoid, green, 2-3.5 cm long, the pericarp coriaceous, ca. 1 mm thick. Seeds 1(2), 1.5-2.5 cm long, with a tan, fleshy testa. Embryo with erect, similar-sized cotyledons."
705	1992. Francis, J.K.. <i>Melicoccus bijugatus</i> Jacq. Quenepa - Sapindaceae - Soapberry family. SO-ITF-SM48. USDA Forest Service, International Institute of Tropical Forestry, Rfo Piedras, Puerto Rico	[Propagules water dispersed? No] "Most seeds fall under the parent tree. Distribution of naturalized trees (along roads, trails, and near old farmsteads), suggests that humans are the major long-distance dispersers in Puerto Rico (author, personal observation). Dispersal by birds and bats is suggested for Trinidad and Tobago (15)."
706	1992. Francis, J.K.. <i>Melicoccus bijugatus</i> Jacq. Quenepa - Sapindaceae - Soapberry family. SO-ITF-SM48. USDA Forest Service, International Institute of Tropical Forestry, Rfo Piedras, Puerto Rico	[Propagules bird dispersed? Yes] "Dispersal by birds and bats is suggested for Trinidad and Tobago (15)."
706	2003. Acevedo-Rodríguez, P.. Melicocceae (Sapindaceae): <i>Melicoccus</i> and <i>Talisia</i> . Flora Neotropica. 87: 1-178.	[Propagules bird dispersed? Yes] "Fruits baccate, indehiscent, ellipsoid, ovoid, or globose, with leathery mesocarp. Seed 1(-2), with a fleshy, edible testa." ... "Fruit subglobose or ellipsoid, green, 2-3.5 cm long, the pericarp coriaceous, ca. 1 mm thick. Seeds 1(2), 1.5-2.5 cm long, with a tan, fleshy testa. Embryo with erect, similar-sized cotyledons."
706	2003. Ray, G.. Vascular Plant Inventory and Mapping of Buck Island Buck Island Reef National Monument St. Croix, U.S. Virgin Islands. University of the Virgin Islands & The National Park Service, St. Croix	[Propagules bird dispersed? Yes] "It is widely accepted by biogeographers that Genip (<i>Melicoccus bijugatus</i>) was introduced to the Virgin Islands prior to European contact by aboriginal settlers from South America. It is dispersed short distances by bats and pigeons."
707	1997. Norconk, M.A./Wertis, C./Kinzey, W.G.. Seed Predation by Monkeys and Macaws III Eastern Venezuela: Preliminary Findings. Primates. 38(2): 177 -184.	[Propagules dispersed by other animals (externally)? Potentially] "Table I. Identity and characteristics of fruit and seeds ingested by <i>Ara chloroptera</i> and <i>Chiropotes satanas</i> ." ... "Item ingested = Mesocarp" [Bearded saki monkey (<i>Chiropotes satanas</i>) consume the mesocarp of fruit. May transport fruit externally to consume pulp and discard seed without ingesting]

707	2011. Kunz, T.H./Braun de Torrez, E./Bauer, D./Lobova, T./Fleming, T.H.. Ecosystem services provided by bats. <i>Annals of the New York Academy of Sciences</i> . 1223: 1-38.	[Propagules dispersed by other animals (externally)? Potentially] "Table 4. Examples of economically and ecologically important plants that are either pollinated (P) or dispersed (D) by bats" [Melicoccus bijugatus = Dispersed. Seed probably carried away and discarded without ingestion]
708	2004. González-Martínez, J. The Introduced Free-ranging Rhesus and Patas Monkey Populations of Southwestern Puerto Rico. <i>PRHSJ</i> . 23(1): 39-46.	[Propagules survive passage through the gut? Presumably Yes] "Rhesus (<i>Macaca mulatta</i>) and patas (<i>Erythrocebus patas</i>) monkeys escaped to the mainland of southwestern Puerto Rico (SWPR) from research colonies on small offshore islands during the 1960s and through 1982." ... "The monkeys appear to coordinate their movements primarily in relation to the appearance of ripe fruits and pods of <i>Tamarindus indica</i> , <i>Melicoccus bijugatus</i> ,..." [Consumed by exotic rhesus monkeys]
708	2007. Lopez, L./Terborgh, J.. Seed predation and seedling herbivory as factors in tree recruitment failure on predator-free forested islands. <i>Journal of Tropical Ecology</i> . 23: 129-137.	[Propagules survive passage through the gut? Presumably Yes] "Table 2. Species of seeds used in the experiments, their dimensions and presumed dispersers, ranked by fresh seed mass. [Melicoccus bijugatus: Dispersal Mode = AM (arboreal mammal)]
801	1992. Francis, J.K.. <i>Melicoccus bijugatus</i> Jacq. Quenepa - Sapindaceae - Soapberry family. SO-ITF-SM48. USDA Forest Service, International Institute of Tropical Forestry, Rfo Piedras, Puerto Rico	[Prolific seed production (>1000/m ²)? Unlikely] "A sample of 60 air-dried, cleaned seeds from Puerto Rico averaged 2.64 ± 0.07 g per seed or 379 seeds per kilogram (author, personal observation). The fruiting of quenepa is apparently more regular in dry zones along streams or in moist coves than on exposed hillsides or in higher rainfall zones (author, personal observation)." [Fruits & seeds relatively large, and unlikely to reach such high densities]
802	2008. Royal Botanic Gardens Kew. Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/	[Evidence that a persistent propagule bank is formed (>1 yr)? No] "Seeds are sensitive to desiccation, 100% germination following 10 weeks storage at 15°C and 75% r.h., but no seeds remain viable after 17 weeks, whereas 100% germination following 17 weeks storage at 15°C with seeds imbibed with 0.0001M ABA (Goldbach, 1979b); viability can be maintained for 3 months at 5°C (Riley, 1981)"
802	2012. Tropilab Inc.. <i>Melicoccus bijugatus</i> - Knippa. http://www.tropilab.com/knippla.html	[Evidence that a persistent propagule bank is formed (>1 yr)? No] "Due to recalcitrant nature of the seeds, they have a short viable life, can not be dried well and can not withstand low temperatures."
803	2008. Clark, D.W. et al.. "Rats & Weeds & Lizards—Oh My!" Eradication of <i>Rattus rattus</i> & Control of Invasive Exotic Plants on Buck Island, U.S. Virgin Islands. Pp 106-111 in Weber & Harmon (eds). <i>Proc. of the 2007 George Wright Society</i> .	[Well controlled by herbicides? Presumably Yes] "Woody vegetation (<i>Leucaena leucocephala</i> , <i>Tecoma stans</i> , <i>Melicoccus bijugatus</i> , <i>Thespesia populnea</i> , <i>Tamarindus indica</i> and <i>Morinda citrifolia</i>): Basally apply Triclopyr (in vegetable oil carrier) to entire stem(s) circumference above ground (between where the foliage starts and ground) at a concentration of 30% (using compression or backpack sprayer)."
804	1992. Francis, J.K.. <i>Melicoccus bijugatus</i> Jacq. Quenepa - Sapindaceae - Soapberry family. SO-ITF-SM48. USDA Forest Service, International Institute of Tropical Forestry, Rfo Piedras, Puerto Rico	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "Vegetative Reproduction.-Young trees coppice when cut."
805	2012. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown]