Taxon: Annona montana Macfad.

Family: Annonaceae

Common Name(s): guanábana cimarrona
mountain soursop
wild custard apple
wild soursop

Synonym(s): Annona marcgravii Mart.
Annona pisonis Mart.
Annona sphaerocarpa Splitg.

Assessor: Chuck Chimera **Status:** Approved **End Date:** 25 Feb 2025

WRA Score: 1.0 **Designation:** EVALUATE **Rating:** Evaluate

Keywords: Tropical Tree, Edible Fruit, Dichogamous, Beetle Pollinated, Animal Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y = -3, n = 0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
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		
302	Garden/amenity/disturbance weed	y = 1*multiplier (see Appendix 2), n = 0	n
303	Agricultural/forestry/horticultural weed	y = 2*multiplier (see Appendix 2), n = 0	n
304	Environmental weed	y = 2*multiplier (see Appendix 2), n = 0	n
305	Congeneric weed	y = 1*multiplier (see Appendix 2), n = 0	y
401	Produces spines, thorns or burrs	y = 1, n = 0	n
402	Allelopathic		
403	Parasitic	y = 1, n = 0	n
404	Unpalatable to grazing animals		
405	Toxic to animals	y = 1, n = 0	n
406	Host for recognized pests and pathogens		
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		

Qsn #	Question	Answer Option	Answer
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		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y = -1, n = 0	y
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	2
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		
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut	y = 1, n = -1	y
801	Prolific seed production (>1000/m2)		
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		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Smith, N. (2023). Annonaceae: Alligator Pears and Their Like. In: Amazon Fruits: An Ethnobotanical Journey. Ethnobiology. Springer, Cham	[Cultivated but no domesticated] "Known as mountain soursop or wild custard apple in English, Annona montana is a relative of the better-known soursop Annona muricata but is not nearly as common as the latter, probably because the fruit's flavor is less appealing. The fruits of mountain soursop, which remain green when ripe, have smaller prickles than soursop. Also, the seeds are brown instead of black. The round to oblong fruits, which can reach 26 cm long (Lorenzi et al. 2006a, b:47), are used to make juice. The white pulp surrounding the seeds is removed by hand and mixed with water and drunk. Neither the fruits nor the juice find their way to markets. The medium-sized tree, which can reach up 18 m in height, fruits in the rainy season and is occasionally planted in home gardens."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2025). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2025). Personal Communication	NA

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	High
	Source(s)	Notes
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	"This species is indigenous to South America, Central America and West Indies - Bolivia, Brazil, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Guadeloupe, Jamaica, Panama, Paraguay, Peru, Puerto Rico, Suriname and Venezuela."

202	Quality of climate match data	High
	Source(s)	Notes
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	"This species is indigenous to South America, Central America and West Indies - Bolivia, Brazil, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Guadeloupe, Jamaica, Panama, Paraguay, Peru, Puerto Rico, Suriname and Venezuela."

203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	FAO. (1986). Food and fruit-bearing forest species 3: Examples from Latin America. FAO Forestry Paper, 44(3). Food & Agriculture Organization of the United Nations, Rome	"Annona monta.na occurs in the lowland humid tropics in secondary forest, abandoned as well as cultivated farmland and in some city backyards. It is capable of growing on relatively poor clay oxisols provided there is good drainage; its climatic requirements are an annual rainfall of 2400 mm and an annual temperature of 26°c."

Qsn #	Question	Answer
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	"The climatic requirement for this species is tropical - dry tropical to the wet tropical forest zones but it also grows in the dry to moist subtropics. It is found from near sea level to 650 m altitude in its native areas. Optimum mean annual temperature range is from 21°C to 26°C and annual precipitation from 60 to 400 mm. It is drought tolerant and will grow well in dry conditions but cannot withstand prolonged water-logging."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	**Notes**
	Gallaher, T.J., Brock, K., Kennedy, B.H., Imada, C.T., Imada, K., & Walvoord, N. (2025). Plants of Hawai'i. http://www.plantsofhawaii.org. [Accessed 21 Feb 2025]	"Only found in cultivation"
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	"This species is indigenous to South America, Central America and West Indies - Bolivia, Brazil, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Guadeloupe, Jamaica, Panama, Paraguay, Peru, Puerto Rico, Suriname and Venezuela."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	**Notes**
	Gallaher, T.J., Brock, K., Kennedy, B.H., Imada, C.T., Imada, K., & Walvoord, N. (2025). Plants of Hawai'i. http://www.plantsofhawaii.org. [Accessed 24 Feb 2025]	"Only found in cultivation"
	GBIF Secretariat (2025). Annona montana Macfad. GBIF Backbone Taxonomy. Checklist dataset. https://www.gbif.org/species/5407165. [Accessed 24 Feb 2025]	Reported from India, Indonesia, China, Taiwan and Florida

301	Naturalized beyond native range	
	Source(s)	**Notes**
	Morton, J.F. (1976). Pestiferous spread of many ornamental and fruit species in South Florida. Proceedings of the Florida State Horticultural Society 89: 348-353	"Annona montana Macfad. MOUNTAIN SOURSOP. Tropical America; West Indies. Occasionally escapes locally."
	Hanelt, P. (ed.). (2001). Mansfeld's Encyclopedia of Agricultural and Horticultural Crops (except Ornamentals), Volume 1. Springer-Verlag, Berlin, Heidelberg, New York	"Northern South America, Antilles, Central America, partly naturalized."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Cited as naturalized in Bolivia. Other sources include Bolivia as part of the species native range] "Annona montana Macfad. Annonaceae Synonym/s (n° of refs): Annona marcgravii Mart. (1) Total N° of Refs: 6 Habit: Tree Preferred Climate/s: Tropical Major Pathway/s: Crop, Ornamental Dispersed by: Humans, Animals, Escapee References: Global-N-1059, United States of America-C-1329, Global-CD-1611, Bolivia-N-1753, Bolivia-W-1977."
	WRA Specialist. (2025). Personal Communication	Reports of naturalization outside its native range are ambiguous

302	Garden/amenity/disturbance weed	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"References: Global-N-1059, United States of America-C-1329, Global-CD-1611, Bolivia-N-1753, Bolivia-W-1977."
	WRA Specialist. (2025). Personal Communication	Not known to be invasive or weedy. Citation of weediness in the Global Compendium of Weeds was not corroborated.

303	Agricultural/forestry/horticultural weed	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

304	Environmental weed	n
	Source(s)	**Notes**
	WRA Specialist. (2025). Personal Communication	No evidence

305	Congeneric weed	y
	Source(s)	**Notes**
	Weber, E. (2017). Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Annona glabra] "Annona glabra is considered as one of the worst invasive plants in Australia. Dense thickets form quickly after establishment, reducing light levels and shading out native species. Species richness is strongly reduced in such stands and regeneration of native trees and shrubs is prevented. As a result, pond apple replaces the former vegetation and transforms intact rainforest and mangrove vegetation into species-poor stands. The plant also competes with ferns, grasses and herbs in the understorey; allelopathy may play a role (Matsumoto et al., 2010). Once pond apple has become dominant, wildlife is affected because their food plants, breeding and shelter sites have disappeared (State of Queensland, 2014; Weeds of Australia, 2014)."

401	Produces spines, thorns or burrs	n
	Source(s)	**Notes**
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	[No evidence] "A small deciduous tree to 10 m high with a spreading crown and dark, grey or brown bark. Leaves are alternate, distichous, short petiolate, oblong or elliptic 7–18 cm long by 2.5–8 cm wide, with tapering apex and rounded base, leathery, dark green above and pale green beneath, glabrous and glossy (Plate 1). Flowers are solitary or in pairs in older twigs, with stout peduncle. Sepals three, broad and pubescent; petals 6 in two whorls, inner three rounded; stamens numerous and crowded in rounded mass. Fruit is a syncarp, formed by the fusion of numerous carpels. It is subglobose to oval, up to 15 cm long by 7–13 cm across, green turning yellow when ripe and covered with soft, 4 mm long spines (Plates 1 and 2). The pulp is yellow and subacid, containing numerous light brown, oblong seeds, 18 mm long."

Qsn #	Question	Answer
402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. (2025). Personal Communication	Unknown. No evidence found

403	Parasitic	n
	Source(s)	Notes
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	"A small deciduous tree to 10 m high with a spreading crown and dark, grey or brown bark." [Annonaceae. No evidence]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	WRA Specialist. (2025). Personal Communication	Unknown. In its native range, certain insects or specialized herbivores may feed on the leaves, but there is no widely documented evidence of large mammals or livestock grazing on Annona montana foliage.

405	Toxic to animals	n
	Source(s)	Notes
	Tropical Plants Database, Ken Fern. (2025). Annona montana. https://tropical.theferns.info/viewtropical.php?id=Annona+montana. [Accessed 24 Feb 2025]	"Known Hazards : None known"
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	FAO. (1986). Food and fruit-bearing forest species 3: Examples from Latin America. FAO Forestry Paper, 44(3). Food & Agriculture Organization of the United Nations, Rome	"A. montana has been used as a rootstock for A. muricata. Planted in the field growth is-vigorous and continues strongly for at least b years. Fruiting starts after 2 years in the field and is quite good (35 fruit) by the fifth year. The trunk borer of the genus Cratasomu.s attacks the trees, but the tree's vigour appears to be reduced only slightly, if at all. The fruit are also attacked by various borers (Diptera, Lepidoptera and Coleoptera) although to a lesser extent than the soursop (A. muricata)."

Qsn #	Question	Answer
	Hendrival, H., Aryani, D. S., & Saputri, N. (2020). Diversity and Host Range of Fruit Flies (Diptera: Tephritidae) in Horticultural Commodities in Lembah Seulawah District, Aceh Besar Regency, Aceh Province, Indonesia. Journal of Tropical Horticulture, 3(1), 6-11	"Accurate information on the species and host spectrum is an important aspect of fruit flies management. The study was conducted in August to November 2018 to evaluate the host range and species diversity of fruit flies in Lembah Seulawah District, Aceh Besar Regency, Aceh Province, Indonesia. Fruit flies were collected from 3 villages in Kemukiman Saree: Suka Damai, Suka Mulia, and Saree Aceh. The insects were collected using the trapping method. The modified Lynfield trap baited with methyl eugenol (ME) was used in the research. This modified Lynfield trap was applied using used mineral bottles. Shannon-Wiener diversity index, evenness index, and dominance were applied to determine the diversity of fruit flies. The results revealed that there were six species of fruit flies that acted as pests in 21 species of host plants belonged to 12 families. They were Bactrocera carambolae, Bactrocera latifrons, Bactrocera limbifera, Bactrocera papayae, Bactrocera umbrosa, and Bactrocera verbascifoliae. B. carambolae was found to be dominant insect pest even though the results indicated that diversity and evenness index of fruit flies species in this district were low." ... "According to the research of Aketarawong, et al. (2015), the host plants of B. carambolae were varied in Southeast Asia, such as mountain soursop (Annona montana Macf.), soursop (Annona muricata L.), avocado (Persea americana Mill.), jackfruit (Artocarpus heterophyllus L.), bilimbi (Averrhoa bilimbi L.), pomegranate (Punica granatum L.), chili (Capsicum annuum L.) and tomato (Lycopersicon esculentum Mill.)."
	Hara, A. H., & Beardsley, J. W. (1979). The biology of the black twig borer, Xylosandrus compactus (Eichhoff), in Hawaii. Proceedings, Hawaiian Entomological Society 13 (1): 55-70	"The list of hosts attacked in Hawaii has increased to 108 species of shrubs and trees in 44 families (Table 1)." [Includes Annona montana. Impacts unspecified]

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	**Notes**
	FAO. (1986). Food and fruit-bearing forest species 3: Examples from Latin America. FAO Forestry Paper, 44(3). Food & Agriculture Organization of the United Nations, Rome	[No evidence] "The abundant fleshy pulp surrounding the seeds is eaten. Al though the strong aroma is relatively agreeable, in most cases ·the flavour is poor, being slightly sweet and acid. Occasional trees produce better fruit with a more agreeable flavour. They are normally consumed with a fair to heavy measure of sugar as a juice or fresh fruit after the extraction of the seed, which are bitter."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	**Notes**
	FAO. (1986). Food and fruit-bearing forest species 3: Examples from Latin America. FAO Forestry Paper, 44(3). Food & Agriculture Organization of the United Nations, Rome	"Annona montana occurs in the lowland humid tropics in secondary forest, abandoned as well as cultivated farmland and in some city backyards." [In its native range and typical growing conditions, Annona montana is not considered a significant contributor to fire hazards.]

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	**Notes**
	Angulo, H. R., Acevedo, M., Ataroff, M., & Lezama, A. T. (2009). Crecimiento diamétrico de especies arbóreas en un bosque estacional de los llanos occidentales de Venezuela. Ecotrópicos, 22(2), 46-63	"Continuación Anexo 1. Clasificación de las especies en grupos funcionales en el área de estudio." [Tolerancia a la sombra (Shade tolerance) = Tolerantes (Tolerant). Annona montana is included in the list of shade tolerant species]
	Tropilab Inc. (2025). Annona montana - Wild Custard Apple. https://tropilab.com/annonamontana.html. [Accessed 25 Feb 2025]	"Full sun / light shade"

Qsn #	Question	Answer
	Tropical Plants Database, Ken Fern. (2025). Annona montana. https://tropical.theferns.info/viewtropical.php?id=Annona+montana. [Accessed 25 Feb 2025]	"Grows best in a sunny position"
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	"It thrives in full sun on many soil types in the pH range of 5.8-8 but optimum range is from pH 6 to 6.5."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	**Notes**
	FAO. (1986). Food and fruit-bearing forest species 3: Examples from Latin America. FAO Forestry Paper, 44(3). Food & Agriculture Organization of the United Nations, Rome	"It is capable of growing on relatively poor clay oxisols provided there is good drainage"
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	"It thrives in full sun on many soil types in the pH range of 5.8-8 but optimum range is from pH 6 to 6.5."
	Tropical Plants Database, Ken Fern. (2025). Annona montana. https://tropical.theferns.info/viewtropical.php?id=Annona+montana. [Accessed 25 Feb 2025]	"Tolerant of a wide range of well-drained, fertile soils[418], but prefers a moist, sandy loam with a pH in the range 5.5 - 6.5[200, 303]. Prefers a pH in the range 5.5 - 7, tolerating 5 - 8.7[418]."

411	Climbing or smothering growth habit	n
	Source(s)	**Notes**
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	"A small deciduous tree to 10 m high with a spreading crown and dark, grey or brown bark."

412	Forms dense thickets	n
	Source(s)	**Notes**
	Smith, N. (2023). Annonaceae: Alligator Pears and Their Like. In: Amazon Fruits: An Ethnobotanical Journey. Ethnobiology. Springer, Cham	[No evidence] "In the Brazilian Amazon, araticum is found mostly in cultivation in home gardens and in successionary vegetation associated usually with human settlements or activities, such as mining (Baar et al. 2004; Brienza Júnior 1999:26; Coelho et al. 2003; Ducke 1946; Gualberto et al. 2014; Machado 2016:27; Oliveira and Jardim 1998; Rodrigues et al. 2004; Santana et al. 2004; Souza 2010:23). This tree is also planted by the Yuracaré and Trinitario in the Bolivian Amazon (Thomas and Van Damme 2010). However, it is also found in upland forest, such as in the Tapajós National Forest in western Pará (Gonçalves and Santos 2008; Sandel and Carvalho 2000), along the middle Xingu (Lemos et al. 2015), in the southern fringe of the Amazon Basin in Mato Grosso (Malheiros et al. 2009), the eastern fringe of the basin in Maranhão (Muniz et al. 1994) and in western Amazonia including the Colombian Amazon near Leticia (Rudas and Prieto 1998) and the Andean foothills in Peru (Cartagena 2014:69). This fruit tree also occurs in scrub savanna and gallery forest in the southern part of the Amazon Basin such as along the middle Tocantins River (Haidar et al. 2013; Medeiros et al. 2012), and in tidal forest on Combu Island at the mouth of the Guamá River near Belém (Amaral et al. 2009; Cattanio et al. 2002). It also grows in floodplain forest along the clear water Jari River in eastern Amazonia (Carim 2016:86). In the Colombian Amazon, this fruit tree is found in both upland and floodplain forests (Rudas and Prieto 1998)."
	WRA Specialist. (2025). Personal Communication	Annona montana is not reported to form dense stands or thickets. It grows as individual trees or in small groups, both in its native range and in cultivation. Its growth habit and ecological behavior do not support the formation of dense, monotypic stands.

501	Aquatic	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	Smith, N. (2023). Annonaceae: Alligator Pears and Their Like. In: Amazon Fruits: An Ethnobotanical Journey. Ethnobiology. Springer, Cham	[Terrestrial] "In the Brazilian Amazon, araticum is found mostly in cultivation in home gardens and in successionary vegetation associated usually with human settlements or activities, such as mining (Baar et al. 2004; Brienza Júnior 1999:26; Coelho et al. 2003; Ducke 1946; Gualberto et al. 2014; Machado 2016:27; Oliveira and Jardim 1998; Rodrigues et al. 2004; Santana et al. 2004; Souza 2010:23). This tree is also planted by the Yuracaré and Trinitario in the Bolivian Amazon (Thomas and Van Damme 2010). However, it is also found in upland forest, such as in the Tapajós National Forest in western Pará (Gonçalves and Santos 2008; Sandel and Carvalho 2000), along the middle Xingu (Lemos et al. 2015), in the southern fringe of the Amazon Basin in Mato Grosso (Malheiros et al. 2009), the eastern fringe of the basin in Maranhão (Muniz et al. 1994) and in western Amazonia including the Colombian Amazon near Leticia (Rudas and Prieto 1998) and the Andean foothills in Peru (Cartagena 2014:69). This fruit tree also occurs in scrub savanna and gallery forest in the southern part of the Amazon Basin such as along the middle Tocantins River (Haidar et al. 2013; Medeiros et al. 2012), and in tidal forest on Combu Island at the mouth of the Guamá River near Belém (Amaral et al. 2009; Cattanio et al. 2002). It also grows in floodplain forest along the clear water Jari River in eastern Amazonia (Carim 2016:86). In the Colombian Amazon, this fruit tree is found in both upland and floodplain forests (Rudas and Prieto 1998)."

502	Grass	n
	Source(s)	**Notes**
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	Annonaceae

503	Nitrogen fixing woody plant	n
	Source(s)	**Notes**
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	Annonaceae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	**Notes**
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	"A small deciduous tree to 10 m high with a spreading crown and dark, grey or brown bark."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	**Notes**
	Verspagen, N. & Erkens, R.H.J. (2020). Annona montana. The IUCN Red List of Threatened Species 2020: e.T142423951A142423971. https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T142423951A142423971.en. [Accessed 24 Feb 2025]	"Annona montana commonly known as mountain soursop is a widespread tree species of central and South America and the Caribbean. It is sometimes cultivated for its edible fruit and used medicinally. The EOO was too large to be classified as threatened (17,722,338 km2), and while the AOO would classify as threatened (1,980 km2) and the species occurs in areas where forest cover loss has been reported over the past years (Hansen et al. 2013), there were more than 10 locations and thus the species is assessed as Least Concern."

Qsn #	Question	Answer
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	"This species is indigenous to South America, Central America and West Indies - Bolivia, Brazil, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Guadeloupe, Jamaica, Panama, Paraguay, Peru, Puerto Rico, Suriname and Venezuela." [No evidence]

602	Produces viable seed	y
	Source(s)	**Notes**
	FAO. (1986). Food and fruit-bearing forest species 3: Examples from Latin America. FAO Forestry Paper, 44(3). Food & Agriculture Organization of the United Nations, Rome	"Germination of fresh seed is rapid (3 to 6 weeks) and relatively good (60 to 80%) when sown in sand beds. Initial growth in the nursery is vigorous, With the young plants attaining graftable size in 4 to 6 months."

603	Hybridizes naturally	
	Source(s)	**Notes**
	Leal, F., & Paull, R. E. (2023). The genus Annona: Botanical characteristics, horticultural requirements and uses. Crop Science, 63(3), 1030-1049	"Hybridization studies using selected Annona spp. (A. muricata, A. squamosa, A. glabra, A. montana, A. reticulata, and A. mucosa) have been conducted in Malaysia (Khalid, 2002) where all of the species were crossed, complete with their reciprocals. In some of these crosses, fruit were produced but the seeds were not viable except for fruits from two of the crosses: A. muricata × A. montana and A. mucosa × A. muricata. The F1 hybrids of A. muricata × A. montana produced plants that flowered but were without fruit, whereas the F1 hybrids of A. mucosa × A. muricata had fruit similar to those of A. mucosa (formerly Rollinia mucosa)."
	Mohd Khalid, M.Z. (2002). Hybridizations Between Selected Annonaceae Species. Acta Horticulturae 575, 367-369	"The studies conducted in Serdang , Selangor, Malaysia, involved six selected species of Annonaceae, namely: Annona muricata, A. squamosa, A. glabra, A. montana, A. rollinia, and A. reticulata. Hybridizations were attempted between all species and also their reciprocal crosses. Although fruit was formed between some species, seeds were not viable except for those produced in two hybridizations: Annona muricata (female) x Annona montana (male) and Rollinia mucosa (female) x Annona muricata (male). The former F1 hybrids produced plants that flowered but set no fruit. The latter F1 hybrids produced fruit similar to Rollinia."
	WRA Specialist. (2025). Personal Communication	Artificial hybrids are possible, but no viable seeds were produced.

604	Self-compatible or apomictic	
	Source(s)	**Notes**
	FAO. (1986). Food and fruit-bearing forest species 3: Examples from Latin America. FAO Forestry Paper, 44(3). Food & Agriculture Organization of the United Nations, Rome	"Flowers solitary, on the younger parts of the branches, bisexual. Calyx small, green, lobes 3, triangular, 5-6 cm long; petals 6, in 2 whorls of three, fleshy, outer 4.5-5.5 cm long, 3.5 cm wide, strongly thickened to c. 5 mm at the apex, inner petals up to 4.5 cm long, 2.5 cm wide, concave and more or less closed when in flower and regulating the entry of pollinating beetles; stamens numerous, up to 6 mm long, forming a compact ring around the gynoecium, the pollen in tetrads held together by a viscous substance; carpels numerous, each with 1 ovule and a contracted style. Fruit a syncarp, composed of, many united carpels, spherical to ovoid, up to 26 cm long,"
	Silberbauer-Gottsberger, I., Gottsberger, G., & Webber, A. C. (2003). Morphological and functional flower characteristics of New and Old World Annonaceae with respect to their mode of pollination. Taxon, 52(4), 701-718	"The Annonaceae show a broader flower biological radiation than originally thought, with flowers being pollinated not only by beetles, but also by thrips, flies and even bees. The majority of species have hermaphroditic protogynous flowers."

Qsn #	Question	Answer
	WRA Specialist. (2025). Personal Communication	Self-fertilization under natural conditions is unlikely. Annona montana exhibits protogyny, a form of dichogamy where the female reproductive organs (stigmas) mature before the male reproductive organs (anthers) within the same flower. This temporal separation reduces the likelihood of self-pollination and promotes cross-pollination.

605	Requires specialist pollinators	y
	Source(s)	**Notes**
	Silberbauer-Gottsberger, I., Gottsberger, G., & Webber, A. C. (2003). Morphological and functional flower characteristics of New and Old World Annonaceae with respect to their mode of pollination. Taxon, 52(4), 701-718	"Large beetle-pollinated species: Pollination by large scarabs (Dynastinae) is considered a specialized, derived, form of beetle pollination and one that has developed in several angiosperm families (Schatz & Young, 1985; Schatz, 1987b; Gottsberger, 1990; Silberbauer-Gottsberger & al., 2001). Within Annonaceae, many Annona spp. [e.g., A. coriacea Mart., A. crassiflora Mart., A. dioica A. St.-Hil., A. montana Macfad. (Gottsberger, 1989), A. malmeana R.E. Fries (Silberbauer- Gottsberger & al., 1997)], some Cymbopetalum spp. (Schatz, 1987c, 1990; Webber & Gottsberger, 1993; Webber, 1996)], and certain Duguetia species [i.e., Duguetia riparia Huber, and D. ulei (Diels) R. E. Fries (Webber, 1996)] are pollinated by Cyclocephala species." ... "Members of Annonaceae that are pollinated by specialized dynastid scarabs have structures on the adaxial surface of the inner petals, or on their margins (e.g., in Cymbopetalum euneurum) which are eaten by the flower-visiting beetles. The food bodies of the inner petals of the Amazon species Annona montana, Malmea manausensis, Cymbopetalum euneurum, Duguetia ulei and D. riparia (Fig. 1K, L), investigated by Gottsberger & al. (1998), are made up of cells rich in starch, lipids, tannins and mucilage; however, not all of these substances are necessarily present at the same time in any one species. The specialized tissue apparently is the only food available to the beetles in the initial, female flowering, stage; only in the later staminate phase is pollen made available to the beetles."

606	Reproduction by vegetative fragmentation	n
	Source(s)	**Notes**
	FAO. (1986). Food and fruit-bearing forest species 3: Examples from Latin America. FAO Forestry Paper, 44(3). Food & Agriculture Organization of the United Nations, Rome	[No evidence] "Germination of fresh seed is rapid (3 to 6 weeks) and relatively good (60 to 80%) when sown in sand beds. Initial growth in the nursery is vigorous, With the young plants attaining graftable size in 4 to 6 months. A. montana has been used as a rootstock for A. muricata. Planted in the field growth is-vigorous and continues strongly for at least b years. Fruiting starts after 2 years in the field and is quite good (35 fruit) by the fifth year." [Annona montana primarily spreads through seed dispersal, facilitated by animals that consume its fruit. It does not naturally spread vegetatively, although vegetative propagation can be achieved artificially in cultivation.]

Qsn #	Question	Answer
607	**Minimum generative time (years)**	2
	Source(s)	**Notes**
	FAO. (1986). Food and fruit-bearing forest species 3: Examples from Latin America. FAO Forestry Paper, 44(3). Food & Agriculture Organization of the United Nations, Rome	"Germination of fresh seed is rapid (3 to 6 weeks) and relatively good (60 to 80%) when sown in sand beds. Initial growth in the nursery is vigorous, With the young plants attaining graftable size in 4 to 6 months. A. montana has been used as a rootstock for A. muricata. Planted in the field growth is-vigorous and continues strongly for at least 6 years. Fruiting starts after 2 years in the field and is quite good (35 fruit) by the fifth year."

701	**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)**	n
	Source(s)	**Notes**
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	"Fruit is a syncarp, formed by the fusion of numerous carpels. It is subglobose to oval, up to 15 cm long by 7-13 cm across, green turning yellow when ripe and covered with soft, 4 mm long spines (Plates 1 and 2). The pulp is yellow and subacid, containing numerous light brown, oblong seeds, 18 mm long." [Fruits and seeds are large and unlikely to be accidentally dispersed by external attachment]

702	**Propagules dispersed intentionally by people**	y
	Source(s)	**Notes**
	Tropical Plants Database, Ken Fern. (2025). Annona montana. https://tropical.theferns.info/viewtropical.php?id=Annona+montana. [Accessed 25 Feb 2025]	"Annona montana is a widespread species found in multiple locations and also sometimes cultivated."

703	**Propagules likely to disperse as a produce contaminant**	n
	Source(s)	**Notes**
	FAO. (1986). Food and fruit-bearing forest species 3: Examples from Latin America. FAO Forestry Paper, 44(3). Food & Agriculture Organization of the United Nations, Rome	"seeds 1.5 cm long, 0.7 cm wide, yellow-brown." [No evidence. Seeds large, recalcitrant, and unlikely to be accidentally dispersed]

704	**Propagules adapted to wind dispersal**	n
	Source(s)	**Notes**
	FAO. (1986). Food and fruit-bearing forest species 3: Examples from Latin America. FAO Forestry Paper, 44(3). Food & Agriculture Organization of the United Nations, Rome	"Fruit a syncarp, composed of, many united carpels, spherical to ovoid, up to 26 cm long, 15 cm in diameter, weighing up to 4 kg; epidermis dark to yellow-green, with many short, fleshy spines lying over the carpels; pulp white to yellow, with a soft, fibrous and mucilaginous texture and strong aroma; seeds 1.5 cm long, 0.7 cm wide, yellow-brown." [The seeds of Annona montana are not adapted for wind dispersal due to their size, weight, and lack of specialized structures. Instead, they are dispersed primarily by animals that consume the fruit and excrete the seeds in new locations.]

705	**Propagules water dispersed**	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Smith, N. (2023). Annonaceae: Alligator Pears and Their Like. In: Amazon Fruits: An Ethnobotanical Journey. Ethnobiology. Springer, Cham	"This fruit tree also occurs in scrub savanna and gallery forest in the southern part of the Amazon Basin such as along the middle Tocantins River (Haidar et al. 2013; Medeiros et al. 2012), and in tidal forest on Combu Island at the mouth of the Guamá River near Belém (Amaral et al. 2009; Cattanio et al. 2002). It also grows in floodplain forest along the clear water Jari River in eastern Amazonia (Carim 2016:86). In the Colombian Amazon, this fruit tree is found in both upland and floodplain forests (Rudas and Prieto 1998)." ... "The seeds of A. montana are surrounded by a layer of air containing tissue to help them float (Waldhoff et al. 1996) so the tree's original habitat was likely in wetlands. Mountain soursop is also found in the Caribbean where it may also be indigenous (Popenoe 1920:192), or populations there could have arisen from seeds carried from Central or northern South America."

706	Propagules bird dispersed	
	Source(s)	**Notes**
	FAO. (1986). Food and fruit-bearing forest species 3: Examples from Latin America. FAO Forestry Paper, 44(3). Food & Agriculture Organization of the United Nations, Rome	"Fruit a syncarp, composed of, many united carpels, spherical to ovoid, up to 26 cm long, 15 cm in diameter, weighing up to 4 kg; epidermis dark to yellow-green, with many short, fleshy spines lying over the carpels; pulp white to yellow, with a soft, fibrous and mucilaginous texture and strong aroma; seeds 1.5 cm long, 0.7 cm wide, yellow-brown."
	WRA Specialist. (2025). Personal Communication	Presumably capable of being dispersed by birds, although the relatively large seed size may limit the ability of most birds in the Hawaiian Islands to swallow and effectively disperse the seeds

707	Propagules dispersed by other animals (externally)	
	Source(s)	**Notes**
	Pereira, A. S. (2017). Frugivoria por morcegos (Chiroptera: Phyllostomidae) na Mata atlântica do Nordeste e padrões germinativos de sementes após passagem pelo sistema digestivo. Universidade Federal de Sergipe, São Cristóvão - State of Sergipe, Brazil	"As espécies sinzoocóricas encontradas; Aegiphila vitelliniflora (0,03%; n=108), Annona montana (0,003%; n=10), Chomelia obtusa (0,001%; n=3) e Syagrus coronata (0,008%; n=27), representaram uma baixa parcela da amostra geral de sementes identificadas, sendo também pouco frequentes ao longo do ano, com ocorrência em 25%, 8%, 8% e 25% dos meses, respectivamente (Tab. 1)." [The synzoochoric species found; Aegiphila vitelliniflora (0.03%; n=108), Annona montana (0.003%; n=10), Chomelia obtusa (0.001%; n=3) and Syagrus coronata (0.008%; n=27), represented a low portion of the general sample of identified seeds, and are also infrequent throughout the year, with occurrence in 25%, 8%, 8% and 25% of months, respectively (Table 1).]
	WRA Specialist. (2025). Personal Communication	Reported to be dispersed via synzoochory, or the deliberate carrying of diaspores by animals. In Brazil, this species may be dispersed by fruit-eating bats, which are absent in the Hawaiian Islands. Animals that include fruit in their diets, including mongoose, feral pigs, other feral ungulates, gamebirds, and rodents could carry fruit away from the parent plant, thereby externally dispersing the seeds.

Qsn #	Question	Answer
708	**Propagules survive passage through the gut**	**y**
	Source(s)	**Notes**
	Smith, N. (2023). Annonaceae: Alligator Pears and Their Like. In: Amazon Fruits: An Ethnobotanical Journey. Ethnobiology. Springer, Cham	"Tapirs Tapirus terrestris eat this fruit in the Upper Orinoco Basin in eastern Colombia and probably disperse some of the seeds (Alviz and Pérez-Albarracín 2015:41)."
	WRA Specialist. (2025). Personal Communication	Feral pigs could act as surrogates of tapirs in the Hawaiian Islands, and potentially disperse seeds

801	**Prolific seed production (>1000/m2)**	
	Source(s)	**Notes**
	FAO. (1986). Food and fruit-bearing forest species 3: Examples from Latin America. FAO Forestry Paper, 44(3). Food & Agriculture Organization of the United Nations, Rome	"Fruit a syncarp, composed of, many united carpels, spherical to ovoid, up to 26 cm long, 15 cm in diameter, weighing up to 4 kg; epidermis dark to yellow-green, with many short, fleshy spines lying over the carpels; pulp white to yellow, with a soft, fibrous and mucilaginous texture and strong aroma; seeds 1.5 cm long, 0.7 cm wide, yellow-brown."
	WRA Specialist. (2025). Personal Communication	Under natural conditions, it is unlikely for Annona montana to produce seed densities greater than 1,000 seeds/m² due to the scattered nature of seed dispersal by animals. However, in localized areas with concentrated seed deposition (e.g., near parent trees, animal roosting sites, or human-disturbed areas), such high densities could occur. In cultivated or managed settings, seed densities might also be higher due to intentional or unintentional accumulation of seeds.

802	**Evidence that a persistent propagule bank is formed (>1 yr)**	**n**
	Source(s)	**Notes**
	Leal, F., & Paull, R. E. (2023). The genus Annona: Botanical characteristics, horticultural requirements and uses. Crop Science, 63(3), 1030-1049	"Annona seeds normally remain viable for a few weeks to many months and some species are regarded as being recalcitrant. The recommendation is to sow seeds as soon as possible after extraction from the fruit. Germination takes around 30 d, but gibberellic acid (GA) applications (10,000 ul L−1) can increase germination rate and accelerate seedling growth (Nakasone & Paull, 1998; Pinto, 1975)."
	Tropilab Inc. (2025). Annona montana - Wild Custard Apple. https://tropilab.com/annonamontana.html. [Accessed 25 Feb 2025]	"Due to recalcitrant nature of the seeds, they have a short viable life, can not be dried well and can not withstand low temperatures."
	FAO. (1986). Food and fruit-bearing forest species 3: Examples from Latin America. FAO Forestry Paper, 44(3). Food & Agriculture Organization of the United Nations, Rome	"Germination of fresh seed is rapid (3 to 6 weeks) and relatively good (60 to 80%) when sown in sand beds."

803	**Well controlled by herbicides**	**y**
	Source(s)	**Notes**
	CRC Weed Management. (2003). Weed Management Guide - Pond apple (Annona glabra). http://www.weeds.gov.au/publications/guidelines/wons/pubs/a-glabra.pdf. [Accessed 25 Feb 2025]	"Herbicides available for woody weeds are effective in controlling pond apple." [Herbicides used to control Annona glabra would likely be effective at controlling A. montana, although it has not been documented as invasive, or targeted for control anywhere in the world]

Qsn #	Question	Answer
804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	
	Source(s)	**Notes**
	WRA Specialist. (2025). Personal Communication	Unclear. Annona montana can tolerate some degree of mutilation, such as pruning or cutting, especially if the damage is not severe.

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	Hara, A. H., & Beardsley, J. W. (1979). The biology of the black twig borer, Xylosandrus compactus (Eichhoff), in Hawaii. Proceedings, Hawaiian Entomological Society 13 (1): 55-70	"Table 1. Host plants of Xylosandrus compactus (Eichhojf) in Hawaii" [Includes Annona montana. Impacts unspecified]

Summary of Risk Traits:

Annona montana is a tree species native to tropical regions of Central and South America. It can grow up to twelve meters in height and has a dense, rounded canopy. Its leaves are large, leathery, and dark green with an oblong shape. The flowers are small, yellow-green, and have a distinct fragrance. The tree produces large, spiny fruits that resemble those of Annona muricata, commonly known as soursop. The fruit is edible, with a soft, fibrous pulp that has a mildly sweet flavor, though it is not as widely consumed as other Annona species. Annona montana is valued for its potential medicinal properties, particularly in traditional herbal medicine, where various parts of the tree are used for their purported anti-inflammatory and antimicrobial benefits.
While it is not as well-known as some of its relatives, it has been introduced to other tropical regions and can be found growing in cultivation or possibly naturalized in certain areas. It is currently reported to be cultivated, but not naturalized or invasive in the Hawaiian Islands.

High Risk / Undesirable Traits
• Grows and can spread in regions with tropical climates
• Ambiguous reports of naturalization
• Other Annona species are invasive
• Tolerates many soil types (not limited by substrate)
• Reproduces by seed
• Can flower after two years
• Seeds dispersed by animals, water and through intentional cultivation

Low Risk Traits
• No reports of invasive or negative impacts where cultivated
• Unarmed (no spines, thorns, or burrs)
• Not reported to be toxic
• Grows best in high light environments (dense shade may inhibit spread)
• Relatively large seeds unlikely to be accidentally spread
• Although dispersed by birds and bats, the Hawaiian Islands may lack dispersers capable of consuming or transporting the large seeds
• Recalcitrant seeds lose viability quickly and will not form a persistent seed bank
• Herbicides provide effective control of related invasive Annona species, and would likely be similarly effective if needed to control Annona montana

Second Screening Results for Tree / tree-like shrub
A) Shade tolerant OR known to form dense stands? Tolerant of light shade. Not known to form dense stands.
B) Bird- OR clearly wind-dispersed? Possibly bird-dispersed, although the Hawaiian Islands may not have large dispersers capable of effectively transporting the seeds.
C) Life cycle ,4 years? Yes
Outcome = Evaluate (Moderate Risk)