Taxon: Myrmecodia tuberosa Jack **Family:** Rubiaceae

Common Name(s): ant plant
Hua roi ru nam

Synonym(s): Lasiostoma tuberosum (Jack) Spreng.

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 16 Apr 2023

WRA Score: 3.0 **Designation:** L **Rating:** Low Risk

Keywords: Tuberous Epiphyte, Spiny, Self-Fertile, Ant-Dispersed, Bird-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	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	n
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	n
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	n
401	Produces spines, thorns or burrs	y=1, n=0	y
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	n
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)	y=1, n=-1	y
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		
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**
	Puff, C., Chayamarit, K., Chamchumroon, V. & Esser, H.-J. (2021). e-Flora of Thailand 15(1): 1-235. https://botany.dnp.go.th/eflora/. [Accessed 14 Apr 2023]	"Notes: Throughout its entire distribution range the species shows considerable, continuous variation. Thai material agrees with the informal Myrmecodia tuberosa 'armata' variant of Huxley & Jebb, Blumea 37: 277. 1993, which occurs from Peninsular Malaysia to Java and Borneo." [No evidence of domestication]

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. (2023). 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**
	Puff, C., Chayamarit, K., Chamchumroon, V. & Esser, H.-J. (2021). e-Flora of Thailand 15(1): 1-235. https://botany.dnp.go.th/eflora/. [Accessed 14 Apr 2023]	"Thailand : PENINSULAR: Narathiwat (Hala Bala). Distribution : Throughout Malesia from the Malay Peninsula to Australia and the Solomon Islands (type from Sumatra); also in Vietnam (Annam). Ecology : Growing below 500 m alt."

202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	Puff, C., Chayamarit, K., Chamchumroon, V. & Esser, H.-J. (2021). e-Flora of Thailand 15(1): 1-235. https://botany.dnp.go.th/eflora/. [Accessed 14 Apr 2023]	

Qsn #	Question	Answer
203	**Broad climate suitability (environmental versatility)**	**y**
	Source(s)	**Notes**
	Lemmens, R.H.M.J. & Bunyapraphatsara, N. (Eds.). (2003). Plant Resources of South-East Asia. No 12(3). Medicinal and Poisonous Plants 3. Backhuys Publishers, Leiden, The Netherlands	[Broad elevation range in tropical latitudes] "M. tuberosa is distributed in widely divergent habitats. It can be found in mangrove trees along the coast, but also at high altitudes, up to 2500 m. It occurs in lowland rain forest (secondary as well as primary), swamp or riverine rain forest, disturbed forest, montane and mossy forest, Acacia-Melaleuca woodland, Casuarina - Melaleuca and Eucalyptus - Melaleuca savanna, and sometimes in plantations. It is epiphytic on a wide range of trees. "

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	**Notes**
	Puff, C., Chayamarit, K., Chamchumroon, V. & Esser, H.-J. (2021). e-Flora of Thailand 15(1): 1-235. https://botany.dnp.go.th/eflora/. [Accessed 14 Apr 2023]	"Thailand : PENINSULAR: Narathiwat (Hala Bala). Distribution : Throughout Malesia from the Malay Peninsula to Australia and the Solomon Islands (type from Sumatra); also in Vietnam (Annam). Ecology : Growing below 500 m alt."
	Gallaher, T.J., Brock, K., Kennedy, B.H., Imada, C.T., Imada, K., & Walvoord, N. (2020). Plants of Hawai'i. http://www.plantsofhawaii.org.. [Accessed 14 Apr 2023]	No evidence
	Wagner, W.L., Herbst, D.R.& Lorence, D.H. (2023). Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. https://naturalhistory2.si.edu/botany/hawaiianflora/. [Accessed 14 Apr 2023]	No evidence to date

205	Does the species have a history of repeated introductions outside its natural range?	n
	Source(s)	**Notes**
	LLIFLE. (2022). Myrmecodia tuberosa. http://www.llifle.com/Encyclopedia/SUCCULENTS/Family/Rubiaceae/20538/Myrmecodia_tuberosa. [Accessed 14 Apr 2023]	"Cultivation and Propagation: Rarely cultivated by amateur growers these plants can be tricky to grow well and are quick to shed their leaves if they are allowed to dry out or become too cold."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence
	GBIF Secretariat (2023). Myrmecodia tuberosa Jack. GBIF Backbone Taxonomy. Checklist dataset. https://www.gbif.org/species/2902953. [Accessed 14 Apr 2023]	No evidence

301	Naturalized beyond native range	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

Qsn #	Question	Answer
	Gallaher, T.J., Brock, K., Kennedy, B.H., Imada, C.T., Imada, K., & Walvoord, N. (2020). Plants of Hawai'i. http://www.plantsofhawaii.org.. [Accessed 14 Apr 2023]	No evidence
	GBIF Secretariat (2023). Myrmecodia tuberosa Jack. GBIF Backbone Taxonomy. Checklist dataset. https://www.gbif.org/species/2902953. [Accessed 14 Apr 2023]	No evidence

302	Garden/amenity/disturbance weed	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

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**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

305	Congeneric weed	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence
	CABI. (2023). Invasive Species Compendium. Wallingford, UK: CAB International. https://www.cabidigitallibrary.org/product/qi. [Accessed 14 Apr 2023]	No evidence

Qsn #	Question	Answer
401	**Produces spines, thorns or burrs**	**y**
	Source(s)	**Notes**
	Lemmens, R.H.M.J. & Bunyapraphatsara, N. (Eds.). (2003). Plant Resources of South-East Asia. No 12(3). Medicinal and Poisonous Plants 3. Backhuys Publishers, Leiden, The Netherlands	"An epiphytic subshrub, with solitary or few thick stems arising from a variously shaped tuber-like swollen base up to 40 cm long, inside usually with a labyrinth of honeycombed pores, outside with entrance holes often in arcs, with or without spines on tubers and stems."
	Puff, C., Chayamarit, K., Chamchumroon, V. & Esser, H.-J. (2021). e-Flora of Thailand 15(1): 1-235. https://botany.dnp.go.th/eflora/. [Accessed 14 Apr 2023]	"Description: Ant-inhabited tuberous epiphyte; tubers irregularly globose to oblong, to 40 by 15 cm, usually ridged, with entrance holes arranged in irregular arcs and with simple thorns mostly on ridges; apically with thick, solitary, unbranched erect or upward-curving stem to ca 30 cm long."

402	Allelopathic	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	Unknown. No evidence found

403	Parasitic	n
	Source(s)	**Notes**
	Lemmens, R.H.M.J. & Bunyapraphatsara, N. (Eds.). (2003). Plant Resources of South-East Asia. No 12(3). Medicinal and Poisonous Plants 3. Backhuys Publishers, Leiden, The Netherlands	"An epiphytic subshrub" [Rubiaceae]

404	Unpalatable to grazing animals	
	Source(s)	**Notes**
	Whitten, A. J. (1982). Diet and feeding behaviour of Kloss gibbons on Siberut Island, Indonesia. Folia Primatologica, 37(3-4), 177-208	[Consumed by gibbons. May be palatable to browsing animals if they can access the fruit and foliage] "Leaves The only vegetable matter other than fruit which was seen to be eaten by Kloss gibbons were leaf petioles of orchids and Myrmecodia tuberosa"

405	Toxic to animals	n
	Source(s)	**Notes**
	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
	Wagstaff, D.J. (2008). International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	**Notes**

Qsn #	Question	Answer
	LLIFLE. (2022). Myrmecodia tuberosa. http://www.llifle.com/Encyclopedia/SUCCULENTS/Family/Rubiaceae/20538/Myrmecodia_tuberosa. [Accessed 14 Apr 2023]	"Pest and disease: Ant-plants are susceptible to scale and mealybugs, or occasionally red-spiders."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	**Notes**
	A Fascinating Green World. (2014). Myrmecodia tuberosa (Ant Plant). March 11. https://austinbotany.wordpress.com/2015/03/11/myrmecodia-tuberosa-ant-plant/. [Accessed 16 Apr 2023]	"Poisonous: (presumably) no"
	Lemmens, R.H.M.J. & Bunyapraphatsara, N. (Eds.). (2003). Plant Resources of South-East Asia. No 12(3). Medicinal and Poisonous Plants 3. Backhuys Publishers, Leiden, The Netherlands	[No evidence] "In Indonesia, the pounded tuber has been applied as a poultice to treat swellings and headache. "
	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
	Wagstaff, D.J. (2008). International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	**Notes**
	Lemmens, R.H.M.J. & Bunyapraphatsara, N. (Eds.). (2003). Plant Resources of South-East Asia. No 12(3). Medicinal and Poisonous Plants 3. Backhuys Publishers, Leiden, The Netherlands	[No evidence. Unlikely to contribute much to fuel load] "M. tuberosa is distributed in widely divergent habitats. It can be found in mangrove trees along the coast, but also at high altitudes, up to 2500 m. It occurs in lowland rain forest (secondary as well as primary), swamp or riverine rain forest, disturbed forest, montane and mossy forest, Acacia-Melaleuca woodland, Casuarina - Melaleuca and Eucalyptus - Melaleuca savanna, and sometimes in plantations. It is epiphytic on a wide range of trees."

Qsn #	Question	Answer
409	**Is a shade tolerant plant at some stage of its life cycle**	
	Source(s)	**Notes**
	Flora Fauna Web. (2023). Myrmecodia tuberosa. https://www.nparks.gov.sg/florafaunaweb/flora/2/2/2255. [Accessed 14 Apr 2023]	"Light Preference: Semi-Shade, Full Sun"
	A Fascinating Green World. (2014). Myrmecodia tuberosa (Ant Plant). March 11. https://austinbotany.wordpress.com/2015/03/11/myrmecodia-tuberosa-ant-plant/. [Accessed 16 Apr 2023]	"Sun requirement: full sun (partial shade for smaller specimens)"
	LLIFLE. (2022). Myrmecodia tuberosa. http://www.llifle.com/Encyclopedia/SUCCULENTS/Family/Rubiaceae/20538/Myrmecodia_tuberosa. [Accessed 14 Apr 2023]	"They needs warm temperatures all year round with high humidity and bright light, though some protection from mid-day sun may be warranted."

410	**Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)**	**n**
	Source(s)	**Notes**
	LLIFLE. (2022). Myrmecodia tuberosa. http://www.llifle.com/Encyclopedia/SUCCULENTS/Family/Rubiaceae/20538/Myrmecodia_tuberosa. [Accessed 14 Apr 2023]	"It is possible to grow them in a mix of peat and perlite, but an open orchids substrate (sphagnum moss, chopped fir bark, and perlite) seems the best combination. The plant is an epiphyte, needs lots of water, watered when the mix is just barely moist. If humidity is high, plants can be mounted on cork bark plaques for a more natural appearance. Mounted plants will, of course, require more frequent watering."
	A Fascinating Green World. (2014). Myrmecodia tuberosa (Ant Plant). March 11. https://austinbotany.wordpress.com/2015/03/11/myrmecodia-tuberosa-ant-plant/. [Accessed 16 Apr 2023]	"Soil requirements: none, naturally epiphytic"

411	**Climbing or smothering growth habit**	**n**
	Source(s)	**Notes**
	Lemmens, R.H.M.J. & Bunyapraphatsara, N. (Eds.). (2003). Plant Resources of South-East Asia. No 12(3). Medicinal and Poisonous Plants 3. Backhuys Publishers, Leiden, The Netherlands	[Epiphytic, but not climbing or smothering] "An epiphytic subshrub, with solitary or few thick stems arising from a variously shaped tuber-like swollen base up to 40 cm long, inside usually with a labyrinth of honeycombed pores, outside with entrance holes often in arcs, with or without spines on tubers and stems."

412	**Forms dense thickets**	**n**
	Source(s)	**Notes**

Qsn #	Question	Answer
	Madison, M. (1979). Distribution of epiphytes in a rubber plantation in Sarawak. Selbyana, 5(2), 207-213	"Three of the four fleshy-fruited epiphytes show a random distribution in the plot as would be expected for bird-dispersed species over these distances. Myrmecodia tuberosa shows a highly clumped distribution. Janzen (1974) observed that seeds of this species are often dispersed by ants, and Docters van Leeuwen (1929) observed in Java that seeds of M. echinata are at least occasionally dispersed by ants, though birds are considered the primary vectors. The occurrence of Myrmecodia tuberosa in four adjacent trees, together with ant-inhabited Dischidia species in all four trees, suggests that in this case ant-dispersal may be a factor."
	Puff, C., Chayamarit, K., Chamchumroon, V. & Esser, H.-J. (2021). e-Flora of Thailand 15(1): 1-235. https://botany.dnp.go.th/eflora/. [Accessed 14 Apr 2023]	[No evidence] "Distribution : Throughout Malesia from the Malay Peninsula to Australia and the Solomon Islands (type from Sumatra); also in Vietnam (Annam). Ecology : Growing below 500 m alt."
	Lemmens, R.H.M.J. & Bunyapraphatsara, N. (Eds.). (2003). Plant Resources of South-East Asia. No 12(3). Medicinal and Poisonous Plants 3. Backhuys Publishers, Leiden, The Netherlands	[No evidence] "M. tuberosa is distributed in widely divergent habitats. It can be found in mangrove trees along the coast, but also at high altitudes, up to 2500 m. It occurs in lowland rain forest (secondary as well as primary), swamp or riverine rain forest, disturbed forest, montane and mossy forest, Acacia-Melaleuca woodland, Casuarina - Melaleuca and Eucalyptus - Melaleuca savanna, and sometimes in plantations. It is epiphytic on a wide range of trees."

501	Aquatic	n
	Source(s)	**Notes**
	Lemmens, R.H.M.J. & Bunyapraphatsara, N. (Eds.). (2003). Plant Resources of South-East Asia. No 12(3). Medicinal and Poisonous Plants 3. Backhuys Publishers, Leiden, The Netherlands	[Epiphytic] "M. tuberosa is distributed in widely divergent habitats. It can be found in mangrove trees along the coast, but also at high altitudes, up to 2500 m. It occurs in lowland rain forest (secondary as well as primary), swamp or riverine rain forest, disturbed forest, montane and mossy forest, Acacia-Melaleuca woodland, Casuarina - Melaleuca and Eucalyptus - Melaleuca savanna, and sometimes in plantations. It is epiphytic on a wide range of trees."

502	Grass	n
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2023). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 14 Apr 2023]	"Family: Rubiaceae Subfamily: Rubioideae Tribe: Psychotrieae"

503	Nitrogen fixing woody plant	n
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2023). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 14 Apr 2023]	"Family: Rubiaceae Subfamily: Rubioideae Tribe: Psychotrieae"

Qsn #	Question	Answer
504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	**n**
	Source(s)	**Notes**
	Lemmens, R.H.M.J. & Bunyapraphatsara, N. (Eds.). (2003). Plant Resources of South-East Asia. No 12(3). Medicinal and Poisonous Plants 3. Backhuys Publishers, Leiden, The Netherlands	[Tuberous epiphyte] "An epiphytic subshrub, with solitary or few thick stems arising from a variously shaped tuber-like swollen base up to 40 cm long, inside usually with a labyrinth of honeycombed pores, outside with entrance holes often in arcs, with or without spines on tubers and stems. "

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Lemmens, R.H.M.J. & Bunyapraphatsara, N. (Eds.). (2003). Plant Resources of South-East Asia. No 12(3). Medicinal and Poisonous Plants 3. Backhuys Publishers, Leiden, The Netherlands	[No evidence] "M. tuberosa is extremely widely spread and, at least locally, common. Moreover, it occurs in many different habitats. There is no reason to consider it to be liable to genetic erosion. The enormous variability in morphology, partly related with habitat preference and geography, is remarkable. "

602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	Sari, Y. P., Kusumawati, E., Saleh, C., Kustiawan, W., & Sukartingsih, S. (2018). Effect of sucrose and plant growth regulators on callogenesis and preliminary secondary metabolic of different explant Myrmecodia tuberosa. Nusantara Bioscience, 10(3), 183-192	"Besides internal factors, seed germination is also affected by external factors, such as plant growth regulators, light, and medium composition. The successful seed germination of the ant nest plant in a brief time is influenced by the MS medium composition, which contains several amino acids that might boost seed germination."
	LLIFLE. (2022). Myrmecodia tuberosa. http://www.llifle.com/Encyclopedia/SUCCULENTS/Family/Rubiaceae/20538/Myrmecodia_tuberosa. [Accessed 14 Apr 2023]	"Propagation: They are very very easy to grow from seed. The flowers are self-pollinating and produce easily fruits and seeds, but the seeds remain viable for a very short time and must be sown immediately after harvesting."

603	**Hybridizes naturally**	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	Unknown. No evidence found

604	**Self-compatible or apomictic**	**y**
	Source(s)	**Notes**
	Lemmens, R.H.M.J. & Bunyapraphatsara, N. (Eds.). (2003). Plant Resources of South-East Asia. No 12(3). Medicinal and Poisonous Plants 3. Backhuys Publishers, Leiden, The Netherlands	"The flowers are self-fertilizing; the corolla lobes usually do not spread and the corolla remains closed."
	LLIFLE. (2022). Myrmecodia tuberosa. http://www.llifle.com/Encyclopedia/SUCCULENTS/Family/Rubiaceae/20538/Myrmecodia_tuberosa. [Accessed 14 Apr 2023]	"The flowers are self-pollinating and produce easily fruits and seeds, but the seeds remain viable for a very short time and must be sown immediately after harvesting."

Qsn #	Question	Answer
605	**Requires specialist pollinators**	**n**
	Source(s)	**Notes**
	Lok, A. F. S. L., & Tan, H. T. W. (2009). Tuberous, epiphytic, rubiaceous myrmecophytes of Singapore. Nature in Singapore, 2, 231-236	"However because of their ant associations, both Hydnophytum and Myrmecodia species are self pollinated, and the fruits are formed without pollinator visits, because these plants are fiercely guarded by their ant tenants (Benzing, 1990)."
	Lemmens, R.H.M.J. & Bunyapraphatsara, N. (Eds.). (2003). Plant Resources of South-East Asia. No 12(3). Medicinal and Poisonous Plants 3. Backhuys Publishers, Leiden, The Netherlands	"The flowers are self-fertilizing; the corolla lobes usually do not spread and the corolla remains closed."

606	**Reproduction by vegetative fragmentation**	**n**
	Source(s)	**Notes**
	Flora Fauna Web. (2023). Myrmecodia tuberosa. https://www.nparks.gov.sg/florafaunaweb/flora/2/2/2255. [Accessed 16 Apr 2023]	"Cultivation: It can be propagated by seed."
	LLIFLE. (2022). Myrmecodia tuberosa. http://www.llifle.com/Encyclopedia/SUCCULENTS/Family/Rubiaceae/20538/Myrmecodia_tuberosa. [Accessed 14 Apr 2023]	"Propagation: They are very very easy to grow from seed. The flowers are self-pollinating and produce easily fruits and seeds, but the seeds remains viable for a very short time and must be sown immediately after harvesting. The seeds germinate equally well in light and darkness, lay them on the surface of the sowing mix, do not bury them. Fresh seed germinates quickly within a week and often the day after they were sown, ie, within twenty-four hours, and the initial swelling of the tuber is visible almost immediately. Seedlings grow rapidly if kept constantly moist. They can also be reproduced by cuttings, stems will root and grow but do not produce a tuber."

607	**Minimum generative time (years)**	
	Source(s)	**Notes**
	A Fascinating Green World. (2014). Myrmecodia tuberosa (Ant Plant). March 11. https://austinbotany.wordpress.com/2015/03/11/myrmecodia-tuberosa-ant-plant/. [Accessed 16 Apr 2023]	"Growth Rate: slow" [Probably >1 years to maturity]

701	**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)**	**n**
	Source(s)	**Notes**
	Madison, M. (1979). Distribution of epiphytes in a rubber plantation in Sarawak. Selbyana, 5(2), 207-213	[An epiphytic plant dispersed by ants, and possibly birds] "Myrmecodia tuberosa shows a highly clumped distribution. Janzen (1974) observed that seeds of this species are often dispersed by ants, and Docters van Leeuwen (1929) observed in Java that seeds of M. echinata are at least occasionally dispersed by ants, though birds are considered the primary vectors. The occurrence of Myrmecodia tuberosa in four adjacent trees, together with ant-inhabited Dischidia species in all four trees, suggests that in this case ant-dispersal may be a factor."

Qsn #	Question	Answer
702	**Propagules dispersed intentionally by people**	**y**
	Source(s)	**Notes**
	LLIFLE. (2022). Myrmecodia tuberosa. http://www.llifle.com/Encyclopedia/SUCCULENTS/Family/Rubiaceae/20538/Myrmecodia_tuberosa. [Accessed 14 Apr 2023]	"Cultivation and Propagation: Rarely cultivated by amateur growers these plants can be tricky to grow well and are quick to shed their leaves if they are allowed to dry out or become too cold."

703	**Propagules likely to disperse as a produce contaminant**	**n**
	Source(s)	**Notes**
	Madison, M. (1979). Distribution of epiphytes in a rubber plantation in Sarawak. Selbyana, 5(2), 207-213	[An epiphytic plant dispersed by ants, and possibly birds] "Myrmecodia tuberosa shows a highly clumped distribution. Janzen (1974) observed that seeds of this species are often dispersed by ants, and Docters van Leeuwen (1929) observed in Java that seeds of M. echinata are at least occasionally dispersed by ants, though birds are considered the primary vectors. The occurrence of Myrmecodia tuberosa in four adjacent trees, together with ant-inhabited Dischidia species in all four trees, suggests that in this case ant-dispersal may be a factor."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

704	**Propagules adapted to wind dispersal**	**n**
	Source(s)	**Notes**
	Lemmens, R.H.M.J. & Bunyapraphatsara, N. (Eds.). (2003). Plant Resources of South-East Asia. No 12(3). Medicinal and Poisonous Plants 3. Backhuys Publishers, Leiden, The Netherlands	"Fruit a fleshy drupe c. 7 mm long, developing within cavities in the stem, extruded when mature, yellow, orange-red to pink when ripe, with 4-6 pyrenes. " [Fleshy-fruited, & presumably ant-dispersed]
	Madison, M. (1979). Distribution of epiphytes in a rubber plantation in Sarawak. Selbyana, 5(2), 207-213	"Myrmecodia tuberosa shows a highly clumped distribution. Janzen (1974) observed that seeds of this species are often dispersed by ants"

705	**Propagules water dispersed**	**n**
	Source(s)	**Notes**
	Lemmens, R.H.M.J. & Bunyapraphatsara, N. (Eds.). (2003). Plant Resources of South-East Asia. No 12(3). Medicinal and Poisonous Plants 3. Backhuys Publishers, Leiden, The Netherlands	"It is epiphytic on a wide range of trees." [No evidence. A fleshy-fruited, ant, and possibly bird-dispersed epiphyte]

706	**Propagules bird dispersed**	**y**
	Source(s)	**Notes**

Qsn #	Question	Answer
	Lok, A. F. S. L., & Tan, H. T. W. (2009). Tuberous, epiphytic, rubiaceous myrmecophytes of Singapore. Nature in Singapore, 2, 231-236	"Dispersal in both genera is well-documented, with both being predominantly ant-dispersed; the ants carrying the seeds of the plants away from the parent plant, and leaving them in ant tunnels along the bark of the tree, where they later germinate into a new plant. We have however observed the fruits being eaten by flowerpeckers (Diacaeum species) which usually perch on a nearby branch to minimise disturbance to the myrmecophyte or sometimes they even take the fruit in flight."
	Lemmens, R.H.M.J. & Bunyapraphatsara, N. (Eds.). (2003). Plant Resources of South-East Asia. No 12(3). Medicinal and Poisonous Plants 3. Backhuys Publishers, Leiden, The Netherlands	"Fruit a fleshy drupe c. 7 mm long, developing within cavities in the stem, extruded when mature, yellow, orange-red to pink when ripe, with 4-6 pyrenes." [Observed to be dispersed by ants, but birds might also be attracted to the fleshy fruit and potentially play a role in seed dispersal]
	A Fascinating Green World. (2014). Myrmecodia tuberosa (Ant Plant). March 11. https://austinbotany.wordpress.com/2015/03/11/myrmecodia-tuberosa-ant-plant/. [Accessed 16 Apr 2023]	"Fruit: 1-10 pyrenes, red/orange, fleshy berry/drupe, dispersed by ants (presumably) or birds"
	Dave's Garden. (2023). Ant Plant - Myrmecodia tuberosa. https://davesgarden.com/guides/pf/go/2119/. [Accessed 14 Apr 2023]	"On Apr 11, 2006, chanin from Bangkok, Thailand wrote: ... Someone asked me if all Myrmecodias grow sideways off a trunk or branch. In fact, I found Myrmecodia grow in all direction, even hanging out off the branch with just held on by their roots. But I've to say that most plants prefer the side way. The reason, I think, because of the gravity. This not only their weight, but also while the seed dispersor :ants or birds, drop the Myrmecodia's seed on to the branch or tree trunk. Naturally, the rain will rinse most of seed down, so what remains should be more on the side or beneath of the branch than the upright position, before the lucky seed germination."
	Flora Fauna Web. (2023). Myrmecodia tuberosa. https://www.nparks.gov.sg/florafaunaweb/flora/2/2/2255. [Accessed 16 Apr 2023]	"The seeds are also dispersed by ants, as well as small frugivorous birds."
	Madison, M. (1979). Distribution of epiphytes in a rubber plantation in Sarawak. Selbyana, 5(2), 207-213	[Presumably ant-dispersed, but birds may also play a limited role in seed dispersal] "Three of the four fleshy-fruited epiphytes show a random distribution in the plot as would be expected for bird-dispersed species over these distances. Myrmecodia tuberosa shows a highly clumped distribution. Janzen (1974) observed that seeds of this species are often dispersed by ants, and Docters van Leeuwen (1929) observed in Java that seeds of M. echinata are at least occasionally dispersed by ants, though birds are considered the primary vectors. The occurrence of Myrmecodia tuberosa in four adjacent trees, together with ant-inhabited Dischidia species in all four trees, suggests that in this case ant-dispersal may be a factor."

707	Propagules dispersed by other animals (externally)	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Lok, A. F. S. L., & Tan, H. T. W. (2009). Tuberous, epiphytic, rubiaceous myrmecophytes of Singapore. Nature in Singapore, 2, 231-236	"Dispersal in both genera is well-documented, with both being predominantly ant-dispersed; the ants carrying the seeds of the plants away from the parent plant, and leaving them in ant tunnels along the bark of the tree, where they later germinate into a new plant. We have however observed the fruits being eaten by flowerpeckers (Diacaeum species) which usually perch on a nearby branch to minimise disturbance to the myrmecophyte or sometimes they even take the fruit in flight."
	Madison, M. (1979). Distribution of epiphytes in a rubber plantation in Sarawak. Selbyana, 5(2), 207-213	[Ant-dispersed] "Three of the four fleshy-fruited epiphytes show a random distribution in the plot as would be expected for bird-dispersed species over these distances. Myrmecodia tuberosa shows a highly clumped distribution. Janzen (1974) observed that seeds of this species are often dispersed by ants, and Docters van Leeuwen (1929) observed in Java that seeds of M. echinata are at least occasionally dispersed by ants, though birds are considered the primary vectors. The occurrence of Myrmecodia tuberosa in four adjacent trees, together with ant-inhabited Dischidia species in all four trees, suggests that in this case ant-dispersal may be a factor."

708	Propagules survive passage through the gut	y
	Source(s)	**Notes**
	Madison, M. (1979). Distribution of epiphytes in a rubber plantation in Sarawak. Selbyana, 5(2), 207-213	[Dispersed by ants, but possibly also consumed by birds] "Three of the four fleshy-fruited epiphytes show a random distribution in the plot as would be expected for bird-dispersed species over these distances. Myrmecodia tuberosa shows a highly clumped distribution. Janzen (1974) observed that seeds of this species are often dispersed by ants, and Docters van Leeuwen (1929) observed in Java that seeds of M. echinata are at least occasionally dispersed by ants, though birds are considered the primary vectors. The occurrence of Myrmecodia tuberosa in four adjacent trees, together with ant-inhabited Dischidia species in all four trees, suggests that in this case ant-dispersal may be a factor."
	Lok, A. F. S. L., & Tan, H. T. W. (2009). Tuberous, epiphytic, rubiaceous myrmecophytes of Singapore. Nature in Singapore, 2, 231-236	[Presumably survives gut passage when consumed by birds] "Dispersal in both genera is well-documented, with both being predominantly ant-dispersed; the ants carrying the seeds of the plants away from the parent plant, and leaving them in ant tunnels along the bark of the tree, where they later germinate into a new plant. We have however observed the fruits being eaten by flowerpeckers (Diacaeum species) which usually perch on a nearby branch to minimise disturbance to the myrmecophyte or sometimes they even take the fruit in flight."

801	Prolific seed production (>1000/m2)	
	Source(s)	**Notes**
	Lemmens, R.H.M.J. & Bunyapraphatsara, N. (Eds.). (2003). Plant Resources of South-East Asia. No 12(3). Medicinal and Poisonous Plants 3. Backhuys Publishers, Leiden, The Netherlands	"Fruit a fleshy drupe c. 7 mm long, developing within cavities in the stem, extruded when mature, yellow, orange-red to pink when ripe, with 4-6 pyrenes. "

Qsn #	Question	Answer
802	**Evidence that a persistent propagule bank is formed (>1 yr)**	**n**
	Source(s)	**Notes**
	LLIFLE. (2022). Myrmecodia tuberosa. http://www.llifle.com/Encyclopedia/SUCCULENTS/Family/Rubiaceae/20538/Myrmecodia_tuberosa. [Accessed 14 Apr 2023]	"The flowers are self-pollinating and produce easily fruits and seeds, but the seeds remains viable for a very short time and must be sown immediately after harvesting. The seeds germinate equally well in light and darkness, lay them on the surface of the sowing mix, do not bury them. Fresh seed germinates quickly within a week and often the day after they were sown, ie, within twenty-four hours, and the initial swelling of the tuber is visible almost immediately."

803	**Well controlled by herbicides**	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	Unknown

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	Unknown

Summary of Risk Traits:

Myrmecodia tuberosa, also known as the ant plant, is an epiphyte native to Malesia, Vietnam, the Solomon Islands, and northern Australia that has a symbiotic relationship with some ant species. Ants use the hollow body of the plant as shelter, defend the plant from other insects, and provide nutrients to the plant through their waste. There are no reports that ant plants have naturalized or become invasive outside their native range, although the ant, and possibly bird-dispersed seeds suggest they could naturalize in suitable tropical habitats. Nevertheless, the risk of negative impacts to the Hawaiian Islands appears to be low.

High Risk / Undesirable Traits
• Grows over a broad elevation range in regions with tropical climates.
• Thick, tuberous stems may be covered with spines.
• Reproduces by seeds.
• Self-fertile
• Seeds dispersed by ants, birds, and through intentional cultivation.
• Limited information on cultivation outside its native range may reduce accuracy of risk prediction.

Low Risk Traits
• No reports of naturalization or invasiveness, but not reported to be widely cultivated outside its native range.
• No reports of toxicity.
• Grows best in high light environments (dense shade may inhibit spread),
• Reported to be slow growing.
• Seeds remain viable for a short time (unlikely to form a seed bank or be spread accidentally).

Second Screening Results for Herbs or Low Stature Shrubby Life Forms

(A) Reported as a weed of cultivated lands? No.
(B) Unpalatable to grazers or known to form dense stands? Palatable to gibbons, and no evidence that it reaches high densities.
Outcome = Accept (Low Risk)