

<b>Taxon:</b> Piper sarmentosum Roxb.	<b>Family:</b> Piperaceae
<b>Common Name(s):</b> chaphlu lolot pepper pokok kadok wild betel wild pepper	<b>Synonym(s):</b> Chavica hainana C. de Candolle Chavica sarmentosa (Rox-burgh) Miquel Piper albispicum C. de Candolle Piper brevicaule C. de Candolle; Piper gymnostachyum C. de Candolle Piper lolot C. de Candolle Piper pierrei C. de Candolle Piper saigonense C. de Candolle

<b>Assessor:</b> Chuck Chimera	<b>Status:</b> Approved	<b>End Date:</b> 3 Apr 2024
<b>WRA Score:</b> 9.0	<b>Designation:</b> H(HPWRA)	<b>Rating:</b> High Risk

**Keywords:** Dioecious Herb, Naturalizing, Weedy, Shade-tolerant, Spreads Vegetatively

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	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n = question 205	y
302	Garden/amenity/disturbance weed	y = 1*multiplier (see Appendix 2), n = 0	y
303	Agricultural/forestry/horticultural weed		
304	Environmental weed		
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	y = 1, n = -1	n
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

Qsn #	Question	Answer Option	Answer
408	Creates a fire hazard in natural ecosystems	y = 1, n = 0	n
409	Is a shade tolerant plant at some stage of its life cycle	y = 1, n = 0	y
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y = 1, n = 0	n
411	Climbing or smothering growth habit	y = 1, n = 0	n
412	Forms dense thickets	y = 1, n = 0	y
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	n
605	Requires specialist pollinators	y = -1, n = 0	n
606	Reproduction by vegetative fragmentation	y = 1, n = -1	y
607	Minimum generative time (years)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
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		
706	Propagules bird dispersed	y = 1, n = -1	y
707	Propagules dispersed by other animals (externally)	y = 1, n = -1	n
708	Propagules survive passage through the gut	y = 1, n = -1	y
801	Prolific seed production (>1000/m2)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
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
	Sun, X. et al. (2020). Piper sarmentosum Roxb.: A review on its botany, traditional uses, phytochemistry, and pharmacological activities. Journal of Ethnopharmacology, 263, 112897	[Used for centuries, but no evidence of domestication] "Piper sarmentosum Roxb. (Piperaceae) is a traditional medicinal plant widely distributed in India, Malaysia, Thailand, and the southeastern coastal areas of China including Fujian, Guangdong, and Guizhou. It has been used for centuries for the treatment of wind-cold cough, fever, rheumatism arthralgia, diarrhea dysentery, postpartum foot swelling, stomachache, toothache, diabetes, and traumatic injury."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2024). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2024). 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
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Forests or wet places near villages; near sea level to 1000 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Xizang, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Philippines, Vietnam]. Used as medicine traditionally."
	USDA, Agricultural Research Service, National Plant Germplasm System. (2024). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch">https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch</a> . [Accessed 25 Mar 2024]	"Native Asia-Temperate CHINA: China [Fujian Sheng, Guangdong Sheng, Guangxi Zhuangzu Zizhiqu, Guizhou Sheng, Xizang Zizhiqu, Yunnan Sheng] Asia-Tropical INDIAN SUBCONTINENT: India INDO-CHINA: Cambodia, Laos, Vietnam MALESIA: Indonesia, Malaysia, Philippines"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2024). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch">https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch</a> . [Accessed 25 Mar 2024]	"Native Asia-Temperate CHINA: China [Fujian Sheng, Guangdong Sheng, Guangxi Zhuangzu Zizhiqu, Guizhou Sheng, Xizang Zizhiqu, Yunnan Sheng] Asia-Tropical INDIAN SUBCONTINENT: India INDO-CHINA: Cambodia, Laos, Vietnam MALESIA: Indonesia, Malaysia, Philippines"

203	Broad climate suitability (environmental versatility)	y
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[1000 m elevation range] "Forests or wet places near villages; near sea level to 1000 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Xizang, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Philippines, Vietnam]."
	Gardner, R. O. (2006). Piper (Piperaceae) in the Philippine Islands: the climbing species. Blumea-Biodiversity, Evolution and Biogeography of Plants, 51(3), 569-586	[Low altitudes in the Philippines] "Piper sarmentosum Roxb. Stoloniferous shrub or low scrambler, to c. 1 m tall. Leaf blades ovate, c. 10 × 4 cm, membranous, ± palmate-veined with 2 or 3 pairs of lateral nerves, puberulent below; petiole c. 0.5-1.5 cm long. Inflorescences leaf-opposed, unisexual, the female spike c. 1-2 cm long, fruitlets shortly embedded in rachis, c. 2 mm diameter. At low altitudes."
	USDA, Agricultural Research Service, National Plant Germplasm System. (2024). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch">https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch</a> . [Accessed 2 Apr 2024]	[Occurs in temperate and tropical regions] "Native Asia-Temperate CHINA: China [Fujian Sheng, Guangdong Sheng, Guizhou Sheng, Yunnan Sheng, Guangxi Zhuangzu Zizhiqu, Xizang Zizhiqu] Asia-Tropical INDIAN SUBCONTINENT: India INDO-CHINA: Cambodia, Laos, Vietnam MALESIA: Indonesia, Malaysia, Philippines"

204	<b>Native or naturalized in regions with tropical or subtropical climates</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Forests or wet places near villages; near sea level to 1000 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Xizang, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Philippines, Vietnam]."
	Faccenda, K. (2024). Report of 24 new naturalized weeds across the islands of Hawai'i. Bishop Museum Occasional Papers 156: 71-110	[Potentially on Oahu and Maui] "Piper sarmentosum (syn. P. lolot) is now showing signs of naturalization where it is spreading aggressively via stolons on O'ahu and Maui. On O'ahu it was found forming a large colony of at least 50 square meters at the Judd Trail trailhead off Nu'uuanu Pali Dr., where it was likely dumped at one point. Another colony was also found over 100 meters away from the road on the other side of the stream suggesting it may be reproducing via seed. Even larger colonies were seen at Lyon Arboretum, but this was purely vegetative spread from cultivated plants (Figure 25). It was also seen forming large patches on East Maui, where it was spreading from cultivation."

205	<b>Does the species have a history of repeated introductions outside its natural range?</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans References: Australia-N-354, Australia-W-1210, La Reunion-U-1321, Global--1324."
	Faccenda, K. (2024). Report of 24 new naturalized weeds across the islands of Hawai'i. Bishop Museum Occasional Papers 156: 71-110	"Piper sarmentosum (syn. P. lolot) is now showing signs of naturalization where it is spreading aggressively via stolons on O'ahu and Maui."
	Dave's Garden. (2024). Piper Species, Wild Betel Leaf, Wild Pepper. Piper sarmentosum. <a href="https://davesgarden.com/guides/pf/go/195337">https://davesgarden.com/guides/pf/go/195337</a> . [Accessed 2 Apr 2024]	"This plant is said to grow outdoors in the following regions: Birmingham, Alabama Dunnellon, Florida Vero Beach, Florida Savannah, Georgia Agana Heights, Guam"

301	<b>Naturalized beyond native range</b>	<b>y</b>
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Qsn #	Question	Answer
	Source(s)	Notes
	Hsu, T. C., & Chung, S. W. (2016). <i>Piper sarmentosum</i> (Piperaceae), a newly naturalized plant in Taiwan. 林業研究季刊 (Forestry Research Quarterly), 38(1), 1-3	" <i>Piper sarmentosum</i> Roxb. (Piperaceae) is reported from Taiwan as a newly naturalized plant. It could be easily distinguished from all native <i>Piper</i> species by its herbaceous habit with erect stems and long creeping stolons."
	Faccenda, K. (2024). Report of 24 new naturalized weeds across the islands of Hawai'i. Bishop Museum Occasional Papers 156: 71-110	[Potentially Oahu and Maui] " <i>Piper sarmentosum</i> (syn. <i>P. lolot</i> ) is now showing signs of naturalization where it is spreading aggressively via stolons on O'ahu and Maui. On O'ahu it was found forming a large colony of at least 50 square meters at the Judd Trail trailhead off Nu'uuanu Pali Dr., where it was likely dumped at one point. Another colony was also found over 100 meters away from the road on the other side of the stream suggesting it may be reproducing via seed. Even larger colonies were seen at Lyon Arboretum, but this was purely vegetative spread from cultivated plants (Figure 25). It was also seen forming large patches on East Maui, where it was spreading from cultivation. Material examined. O'AHU: Lyon Arboretum, Mānoa, in rainforest, shady areas, planted and forming a monotypic understory in several large patches, these patches over 20 m wide, 170 m, 21.334580, -157.803326, 29 Sep 2022, K. Faccenda 2720; Nu'uuanu, parking lot for Judd Trail on Nu'uuanu Pali Dr, wet forest in understory on edge of road and expanding into forest in shady to partially shady areas, forming monocultures and covering at least 50 sq. meters but perhaps more, 223 m, 21.347043, -157.820846, 27 Nov 2022, K. Faccenda & S. Coles 2852; loc. cit., 08 Jan 2023, N. Walvoord et al. 2023-004. MAUI: East Maui, Hāna Distr., Mokulehua Stream, NW of Pu'u Hinai, cultivated originally but seems to be spreading from large patch by underground rhizomes, unsure at this time if viable seeds are produced, 14 Mar 2009, H. Oppenheimer H30907."

302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	CABI (2019). <i>Piper sarmentosum</i> . CABI Compendium. <a href="https://doi.org/10.1079/cabicompendium.119782">https://doi.org/10.1079/cabicompendium.119782</a> . [Accessed 2 Apr 2024]	[Here classified as a weed with potential detrimental impacts to agriculture or the natural environment] " <i>P. sarmentosum</i> is a shade-tolerant, low-growing perennial herb native to Vietnam and elsewhere in Southeast Asia. It is invasive in Hawaii and Pohnpei, where it can smother the ground and compete with agricultural and natural vegetation. It can spread from plant fragments and rhizomes and is sometimes deliberately planted by humans (Englberger, 2009). <i>P. sarmentosum</i> grows very well in the forest understory and can smother the ground. It competes with agricultural and natural vegetation (Englberger, 2009). In some countries the leaves of <i>P. sarmentosum</i> are used to wrap food (Englberger, 2009)."

303	Agricultural/forestry/horticultural weed	
	Source(s)	Notes
	CABI (2019). <i>Piper sarmentosum</i> . CABI Compendium. <a href="https://doi.org/10.1079/cabicompendium.119782">https://doi.org/10.1079/cabicompendium.119782</a> . [Accessed 2 Apr 2024]	[Reported to complete with agricultural plants] " <i>P. sarmentosum</i> is a shade-tolerant, low-growing perennial herb native to Vietnam and elsewhere in Southeast Asia. It is invasive in Hawaii and Pohnpei, where it can smother the ground and compete with agricultural and natural vegetation. It can spread from plant fragments and rhizomes and is sometimes deliberately planted by humans (Englberger, 2009). <i>P. sarmentosum</i> grows very well in the forest understory and can smother the ground. It competes with agricultural and natural vegetation (Englberger, 2009). In some countries the leaves of <i>P. sarmentosum</i> are used to wrap food (Englberger, 2009)."

Qsn #	Question	Answer
304	Environmental weed	
	Source(s)	Notes
	Queensland Government. (2024). Species profile–Piper sarmentosum. <a href="https://apps.des.qld.gov.au/species-search/details/?id=27843">https://apps.des.qld.gov.au/species-search/details/?id=27843</a> . [Accessed 2 Apr 2024]	"Pest status Environmental Weed"
	CABI (2019). Piper sarmentosum. CABI Compendium. <a href="https://doi.org/10.1079/cabicompendium.119782">https://doi.org/10.1079/cabicompendium.119782</a> . [Accessed 2 Apr 2024]	[Reported to be a weed in Pohnpei. Potential environmental impacts have not been quantified] "P. sarmentosum is a shade-tolerant, low-growing perennial herb native to Vietnam and elsewhere in Southeast Asia. It is invasive in Hawaii and Pohnpei, where it can smother the ground and compete with agricultural and natural vegetation. It can spread from plant fragments and rhizomes and is sometimes deliberately planted by humans (Englberger, 2009). P. sarmentosum grows very well in the forest understory and can smother the ground. It competes with agricultural and natural vegetation (Englberger, 2009). In some countries the leaves of P. sarmentosum are used to wrap food (Englberger, 2009)."

305	Congeneric weed	y
	Source(s)	Notes
	Rogers, H. M., & Hartemink, A. E. (2000). Soil seed bank and growth rates of an invasive species, Piper aduncum, in the lowlands of Papua New Guinea. <i>Journal of Tropical Ecology</i> , 16(02), 243-251	"In the lowlands of Papua New Guinea the exotic tall shrub Piper aduncum L., that originates from South America now dominates much of the secondary fallow vegetation. In many parts of the lowlands Piper aduncum invaded similarly to C. odorata in Asia and Africa and M. calvescens in Polynesia. P. aduncum is indigenous to tropical America where it is found from Mexico to Bolivia. Its habitat in Central America is restricted to evergreen vegetation and near watercourses in seasonally deciduous forests, from sea level to c. 1500 m asl. P. aduncum was introduced in Indonesia in 1860, and is now commonly found in Irian Jaya and Malaysia. In the Pacific it occurs in Fiji but is not found in Hawaii or Northern Australia (Hartemink 1999)."
	Weber, E. (2017). <i>Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	[Piper aduncum] "Spiked pepper invades disturbed vegetation in tropical areas. The fast-growing pioneer plant requires sunlight and bare soil to establish. Seed production is prolific and the shrub accumulates a soil seed bank (Rogers and Hartemink, 2000). Growth is rapid (e.g. 1.7 m/ year) and monospecific stands accumulate a large amount of biomass (Hartemink, 2001). The plant has become a nuisance, for example, in Papua New Guinea, where it is found from sea level to the highlands at 2000 m altitude (Hartemink, 2010). The shrub becomes abundant in secondary fallow vegetation in tropical lowlands and produces dense and tall thickets shading out other species. Invasions of secondary forests and cleared areas can suppress natural forest regeneration as seedlings of native tree and shrub species are unable to grow under spiked pepper (PIER, 2014). The weed poses a threat to biodiversity and affects rural livelihoods by making agricultural land unproductive (Siges et al., 2005)."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes

Qsn #	Question	Answer
	<p>Wu, Z. Y. &amp; Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis</p>	<p>[No evidence] "Herbs to more than 10 m, mostly creeping along ground, most parts very finely powdery pubescent at least when young, dioecious. Fertile stems ± erect. Petiole 2-5 cm (-10 cm on creeping stems), very finely powdery pubescent; leaf blades toward base of stem ovate to suborbicular, those toward apex of stem smaller, ovate or ovate-lanceolate, 7-14 × 6-13 cm, ± membranous, finely glandular, abaxially finely powdery pubescent along veins, adaxially glabrous, base cordate to rounded, sometimes cuneate on apical branches, ± symmetric, apex acute; veins 7, glaucous when dry, abaxially very prominent, apical pair arising 1-2 cm above base, reaching leaf apex; reticulate veins conspicuous. Spikes leaf-opposed. Male spikes white, 1.5-2.5(-3) cm × 2-3 mm; peduncle to ca. as long as spikes; rachis pubescent; bracts transversely elliptic, 0.5-0.6 mm, peltate, ± sessile. Stamens 2; filaments ca. 2 × as long as anthers; anthers subglobose. Female spikes 2-5(-8) cm, to 8 mm thick in fruit; peduncle as in male spikes; rachis glabrous; bracts suborbicular, peltate, 1-1.3 mm in diam. Stigmas (3 or)4(or 5), hispidulous. Drupe subglobose, 4-angled, 2.5-3 mm, partly connate to rachis."</p>

402	Allelopathic	
	Source(s)	Notes
	<p>Piyatida, P., &amp; Kato-Noguchi, H. (2010). Screening of allelopathic activity of eleven Thai medicinal plants on seedling growth of five test plant species. Asian Journal of Plant Sciences, 9(8), 486-491</p>	<p>[Extracts demonstrate allelopathic activity] "Eleven species of Thai medicinal plants, namely <i>Rhinacanthus nasutus</i> (L.) Kurz, <i>Clitoria ternatea</i> L., <i>Mammea siamensis</i> Kosterm., <i>Centella asiatica</i> (L.) Urban, <i>Thunbergia laurifolia</i> Linn., <i>Piper sarmentosum</i> Roxb., <i>Hibiscus sabdariffa</i> L., <i>Moringa oleifera</i> Lam., <i>Tinospora tuberculata</i> Beume, <i>Tiliacora triandra</i> (Colebr.) Diels. and <i>Amomum krevanh</i> Pierre ex. Gagnep. were evaluated their allelopathic potentials against cress (<i>Lepidium sativum</i> L.), lettuce (<i>Lactuca sativa</i> L.), alfalfa (<i>Medicago sativa</i> L.), timothy (<i>Phleum pratense</i> L.) and crabgrass (<i>Digitaria sanguinalis</i> L.). The aqueous methanol extracts of these medicinal plants had inhibitory activity on all test plant species with different inhibition values. The aqueous methanol extracts of <i>H. sabdariffa</i> showed the highest inhibitory effect on cress and alfalfa seedlings. The extract obtained from <i>P. sarmentosum</i>, <i>R. nasutus</i> and <i>T. tuberculata</i> possessed the highest allelopathic potential on lettuce, timothy and crabgrass seedlings, respectively. Inhibitory effects of these medicinal plants were dependent on test plant species. The variation may result, in part, from the different test plant species with different sensitivity to allelochemicals. However, four medicinal plants <i>H. sabdariffa</i>, <i>P. sarmentosum</i>, <i>R. nasutus</i> and <i>T. tuberculata</i> possessed high allelopathic potential and may be good candidates for isolation and identification of allelochemicals. It would also be interesting to evaluate the implication on these evaluation results under field conditions."</p>

403	Parasitic	n
	Source(s)	Notes
	<p>Wu, Z. Y. &amp; Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis</p>	<p>"Herbs to more than 10 m, mostly creeping along ground" [No evidence]</p>

404	Unpalatable to grazing animals	n
	Source(s)	Notes

Qsn #	Question	Answer
	Sun, X. et al. (2020). <i>Piper sarmentosum</i> Roxb.: A review on its botany, traditional uses, phytochemistry, and pharmacological activities. <i>Journal of Ethnopharmacology</i> , 263, 112897	"The active compounds isolated from <i>P. sarmentosum</i> which possessed the potential to inhibit pathogenic bacteria, are considered to be an alternative antibiotic or potential feed additive to control animal pathogens."
	U.S. Department of Commerce. (1963). <i>Illustrated Manual of Forage Plants of China</i> . Office of Technical Services, Joint Publications Research Service, Washington, D.C.	"Uses: Leaves may be used to feed pigs. Also edible for people."

405	Toxic to animals	n
	Source(s)	Notes
	Plants for a Future. (2024). <i>Piper sarmentosum</i> . <a href="https://pfaf.org/USER/Plant.aspx?LatinName=Piper+sarmentosum">https://pfaf.org/USER/Plant.aspx?LatinName=Piper+sarmentosum</a> . [Accessed 2 Apr 2024]	"Known Hazards None Known"
	USDA, Agricultural Research Service, National Plant Germplasm System. (2024). <i>Germplasm Resources Information Network (GRIN-Taxonomy)</i> . National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch">https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch</a> . [Accessed ]	"Uses: Leaves may be used to feed pigs. Also edible for people."

406	Host for recognized pests and pathogens	n
	Source(s)	Notes
	Flora Fauna Web. (2024). <i>Piper sarmentosum</i> . <a href="https://www.nparks.gov.sg/florafauanaweb/flora/2/3/2342">https://www.nparks.gov.sg/florafauanaweb/flora/2/3/2342</a> . [Accessed 2 Apr 2024]	"Diseases May be attacked by grasshoppers. Pest(s) Associated with, Chewing Insects"
	CABI (2019). <i>Piper sarmentosum</i> . <i>CABI Compendium</i> . <a href="https://doi.org/10.1079/cabicompendium.119782">https://doi.org/10.1079/cabicompendium.119782</a> . [Accessed 2 Apr 2024]	"Host of (source-data mining) Liothrips vaneeckei Phytophthora nicotianae (black shank)"

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Quattrocchi, U. (2012). <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	"Antiinflammatory and anodyne, used to cure skin diseases, rheumatism, headache, diarrhea and toothache. Whole plant used as an expectorant, the leaf as a carminative."



Qsn #	Question	Answer
	Sun, X. et al. (2020). Piper sarmentosum Roxb.: A review on its botany, traditional uses, phytochemistry, and pharmacological activities. Journal of Ethnopharmacology, 263, 112897	"At present, although <i>P. sarmentosum</i> , a traditional herbal medicine, has been widely used as an alternative drug in clinic, reports on its safety are lacking. According to ancient books, the clinical dosage of <i>P. sarmentosum</i> in an adult is suggested to be 9-15 g daily, the root dosage is recommended to be 10-15 g, and the internal dose of fruit is 1.5-3 g daily (Chinese Materia Medica, 1999). Most noticeably, it was also recorded that <i>P. sarmentosum</i> consumption was forbidden for pregnant women and those with irregular menstruation due to its blood-activating effect. Relevant toxicological studies showed that the water extracts of leaves of <i>P. sarmentosum</i> showed no subacute toxicity to hematology, liver, and kidney of Sprague-Dawley rats (Mohd Zainudin et al., 2013). The general behavior, adverse reactions and mortality of Sprague-Dawley rats treated with WEPS (50 mg/kg, 300 mg/kg, and 2000 mg/kg) for 28 days, as well as the hematological and biochemical parameters of serum were observed to evaluate the toxicity of <i>P. sarmentosum</i> in vivo. The results showed that except for the significant increase in serum potassium level, the other indexes were in the normal clinical range, thereby indicating the safety of <i>P. sarmentosum</i> in clinical medicine. A previous study demonstrated that WEPS with dosage less than 10 g/kg exhibited no oral toxicity (Peungvicha, 1998). In an acute toxicity test, the EEPS at the dose of 5 g/kg did not produce any abnormal symptoms or mortality in rats (10males and 10 females of each group) during the observation period of 8 h and 7 days (Rititid et al., 2007). An in vivo skin irritation test of the essential oils extracted from <i>P. sarmentosum</i> extracts on albino rabbits and a sensitization test on albino guinea pigs showed that <i>P. sarmentosum</i> could be safely used on the skin with both the calculated primary irritation index value of 2.55 (Bakar et al., 2019). However, there are still many limitations in these studies of the safety of <i>P. sarmentosum</i> , and the further investigations of toxicity clinical experiment and related mechanism of <i>P. sarmentosum</i> are required."
	Hutton, W. (1997). Tropical Herbs & Spices. Tuttle Publishing, Tokyo	"This shade-loving plant grows wild in the dry,, evergreen forests of Thailand and Vietnam,, and is cultivated in Malaysia and Indonesia. The shiny, heart-shaped leaves of the wild pepper (known as la lot by the Vietnamese), are eaten raw when young, or can be cooked."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Hutton, W. (1997). Tropical Herbs & Spices. Tuttle Publishing, Tokyo	"This shade-loving plant grows wild in the dry,, evergreen forests of Thailand and Vietnam,, and is cultivated in Malaysia and Indonesia. The shiny, heart-shaped leaves of the wild pepper (known as la lot by the Vietnamese), are eaten raw when young, or can be cooked."
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence. Unlikely given habit and habitat] "Herbs to more than 10 m, mostly creeping along ground ... Forests or wet places near villages; near sea level to 1000 m."
	U.S. Department of Commerce. (1963). Illustrated Manual of Forage Plants of China. Office of Technical Services, Joint Publications Research Service, Washington, D.C.	[No evidence] "Found growing in patches in damp shady locations under large trees or forests."

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	U.S. Department of Commerce. (1963). Illustrated Manual of Forage Plants of China. Office of Technical Services, Joint Publications Research Service, Washington, D.C.	"Found growing in patches in damp shady locations under large trees or forests."
	Plants for a Future. (2024). Piper sarmentosum. <a href="https://pfaf.org/USER/Plant.aspx?LatinName=Piper+sarmentosum">https://pfaf.org/USER/Plant.aspx?LatinName=Piper+sarmentosum</a> . [Accessed 2 Apr 2024]	"It prefers rich, well-drained soil with partial shade but can tolerate full shade."

Qsn #	Question	Answer
	Dave's Garden. (2024). Piper Species, Wild Betel Leaf, Wild Pepper. <i>Piper sarmentosum</i> . <a href="https://davesgarden.com/guides/pf/go/195337">https://davesgarden.com/guides/pf/go/195337</a> . [Accessed 2 Apr 2024]	"Sun Exposure Light Shade Partial to Full Shade"
410	<b>Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	Plants for a Future. (2024). <i>Piper sarmentosum</i> . <a href="https://pfaf.org/USER/Plant.aspx?LatinName=Piper+sarmentosum">https://pfaf.org/USER/Plant.aspx?LatinName=Piper+sarmentosum</a> . [Accessed 2 Apr 2024]	"It prefers rich, well-drained soil with partial shade but can tolerate full shade."
	Flora Fauna Web. (2024). <i>Piper sarmentosum</i> . <a href="https://www.nparks.gov.sg/florafauweb/flora/2/3/2342">https://www.nparks.gov.sg/florafauweb/flora/2/3/2342</a> . [Accessed 2 Apr 2024]	"Rootzone Tolerance Easy to Grow, Fertile Loamy Soils, Well-Drained Soils, Moist Soils"
	Dave's Garden. (2024). Piper Species, Wild Betel Leaf, Wild Pepper. <i>Piper sarmentosum</i> . <a href="https://davesgarden.com/guides/pf/go/195337">https://davesgarden.com/guides/pf/go/195337</a> . [Accessed 2 Apr 2024]	"Soil pH requirements 6.1 to 6.5 (mildly acidic) 6.6 to 7.5 (neutral) 7.6 to 7.8 (mildly alkaline)"
411	<b>Climbing or smothering growth habit</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Herbs to more than 10 m, mostly creeping along ground, most parts very finely powdery pubescent at least when young, dioecious."
412	<b>Forms dense thickets</b>	y
	<b>Source(s)</b>	<b>Notes</b>
	Faccenda, K. (2024). Report of 24 new naturalized weeds across the islands of Hawai'i. Bishop Museum Occasional Papers 156: 71-110	"Nu'uuanu, parking lot for Judd Trail on Nu'uuanu Pali Dr, wet forest in understory on edge of road and expanding into forest in shady to partially shady areas, forming monocultures and covering at least 50 sq. meters but perhaps more"
501	<b>Aquatic</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Terrestrial] "Forests or wet places near villages; near sea level to 1000 m."
502	<b>Grass</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	Piperaceae

Qsn #	Question	Answer
503	Nitrogen fixing woody plant	n
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	Piperaceae
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Herbs to more than 10 m, mostly creeping along ground, most parts very finely powdery pubescent at least when young, dioecious."
601	Evidence of substantial reproductive failure in native habitat	n
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Forests or wet places near villages; near sea level to 1000 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Xizang, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Philippines, Vietnam]." [No evidence. Widely distributed]
602	Produces viable seed	y
	<b>Source(s)</b>	<b>Notes</b>
	Plants for a Future. (2024). Piper sarmentosum. <a href="https://pfaf.org/USER/Plant.aspx?LatinName=Piper+sarmentosum">https://pfaf.org/USER/Plant.aspx?LatinName=Piper+sarmentosum</a> . [Accessed 2 Apr 2024]	"A dioecious plant, both male and female forms need to be grown if seed is required"
	Faccenda, K. (2024). Report of 24 new naturalized weeds across the islands of Hawai'i. Bishop Museum Occasional Papers 156: 71-110	"Another colony was also found over 100 meters away from the road on the other side of the stream suggesting it may be reproducing via seed. Even larger colonies were seen at Lyon Arboretum, but this was purely vegetative spread from cultivated plants (Figure 25). It was also seen forming large patches on East Maui, where it was spreading from cultivation."
	Flora Fauna Web. (2024). Piper sarmentosum. <a href="https://www.nparks.gov.sg/florafaunaweb/flora/2/3/2342">https://www.nparks.gov.sg/florafaunaweb/flora/2/3/2342</a> . [Accessed 2 Apr 2024]	"Propagation Method - Seed, Stem Cutting"
603	Hybridizes naturally	
	<b>Source(s)</b>	<b>Notes</b>
	Asmarayani, R. (2018). Phylogenetic relationships in Malesian-Pacific Piper (Piperaceae) and their implications for systematics. <i>Taxon</i> , 67(4), 693-724	[Unknown] "Polyploidization might explain the different copies of gapC gene in Asian Piper, but since I detected only a single copy of the gene in decaploid South Pacific Piper ( <i>P. methysticum</i> and <i>P. gibbilimum</i> , both cloned in this study), this may suggest different polyploidization processes, allopolyploidization in the Asian Piper vs. autopolyploidization in the South Pacific Piper, respectively. However, evidence of natural hybridization in Piper is not particularly convincing."
604	Self-compatible or apomictic	n
	<b>Source(s)</b>	<b>Notes</b>

Qsn #	Question	Answer
	Plants for a Future. (2024). <i>Piper sarmentosum</i> . <a href="https://pfaf.org/USER/Plant.aspx?LatinName=Piper+sarmentosum">https://pfaf.org/USER/Plant.aspx?LatinName=Piper+sarmentosum</a> . [Accessed 2 Apr 2024]	"A dioecious plant, both male and female forms need to be grown if seed is required"
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Herbs to more than 10 m, mostly creeping along ground, most parts very finely powdery pubescent at least when young, dioecious."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Flora Fauna Web. (2024). <i>Piper sarmentosum</i> . <a href="https://www.nparks.gov.sg/florafaunaweb/flora/2/3/2342">https://www.nparks.gov.sg/florafaunaweb/flora/2/3/2342</a> . [Accessed 2 Apr 2024]	"Pollination Method(s): Biotic (Fauna)"

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	CABI (2019). <i>Piper sarmentosum</i> . CABI Compendium. <a href="https://doi.org/10.1079/cabicompendium.119782">https://doi.org/10.1079/cabicompendium.119782</a> . [Accessed 2 Apr 2024]	" It can spread from plant fragments and rhizomes and is sometimes deliberately planted by humans (Englberger, 2009)."
	Faccenda, K. (2024). Report of 24 new naturalized weeds across the islands of Hawai'i. Bishop Museum Occasional Papers 156: 71-110	"On O'ahu it was found forming a large colony of at least 50 square meters at the Judd Trail trailhead off Nu'uuanu Pali Dr., where it was likely dumped at one point. Another colony was also found over 100 meters away from the road on the other side of the stream suggesting it may be reproducing via seed. Even larger colonies were seen at Lyon Arboretum, but this was purely vegetative spread from cultivated plants (Figure 25). It was also seen forming large patches on East Maui, where it was spreading from cultivation."

607	Minimum generative time (years)	
	Source(s)	Notes
	CABI (2019). <i>Piper sarmentosum</i> . CABI Compendium. <a href="https://doi.org/10.1079/cabicompendium.119782">https://doi.org/10.1079/cabicompendium.119782</a> . [Accessed 2 Apr 2024]	[Unknown, but may be able to reproduce vegetatively before sexual maturity] " <i>P. sarmentosum</i> is a shade-tolerant, low-growing perennial herb native to Vietnam and elsewhere in Southeast Asia. It is invasive in Hawaii and Pohnpei, where it can smother the ground and compete with agricultural and natural vegetation. It can spread from plant fragments and rhizomes and is sometimes deliberately planted by humans (Englberger, 2009)."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	Notes
	Faccenda, K. (2024). Report of 24 new naturalized weeds across the islands of Hawai'i. Bishop Museum Occasional Papers 156: 71-110	[Possibly Yes] "On O'ahu it was found forming a large colony of at least 50 square meters at the Judd Trail trailhead off Nu'uuanu Pali Dr., where it was likely dumped at one point."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes

Qsn #	Question	Answer
	Flora Fauna Web. (2024). <i>Piper sarmentosum</i> . <a href="https://www.nparks.gov.sg/florafaunaweb/flora/2/3/2342">https://www.nparks.gov.sg/florafaunaweb/flora/2/3/2342</a> . [Accessed 2 Apr 2024]	"Landscaping: It has attractive glossy dark green leaves. It makes a good border plant or ground cover for shaded to semi-shaded sites. Desirable Plant Features: Ornamental Foliage, Ornamental Fruits, Fragrant (Foliage) Landscape Uses: Container Planting, Interiorscape/ Indoor Plant, General, Flowerbed / Border, Roadside Tree / Palm, Parks & Gardens, Small Gardens, Groundcover"
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Crop, Herbal, Ornamental Dispersed by: Humans"

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Unlikely. No evidence to date] "Major Pathway/s: Crop, Herbal, Ornamental Dispersed by: Humans"

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Drupe subglobose, 4-angled, 2.5-3 mm, partly connate to rachis." [Fleshy-fruited]

705	Propagules water dispersed	
	Source(s)	Notes
	Faccenda, K. (2024). Report of 24 new naturalized weeds across the islands of Hawai'i. Bishop Museum Occasional Papers 156: 71-110	"Another colony was also found over 100 meters away from the road on the other side of the stream suggesting it may be reproducing via seed." [Seeds or vegetative fragments may be carried by stream flow]
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"in humid areas, in thickets, in forests and along streambanks" [Potential to be moved by seed or vegetative fragments when growing along streambanks]

706	Propagules bird dispersed	y
	Source(s)	Notes
	Flora Fauna Web. (2024). <i>Piper sarmentosum</i> . <a href="https://www.nparks.gov.sg/florafaunaweb/flora/2/3/2342">https://www.nparks.gov.sg/florafaunaweb/flora/2/3/2342</a> . [Accessed 3 Apr 2024]	"Seed or Spore Dispersal Biotic (Fauna)"
	Wiat, C. (2006). Medicinal plants of Asia and the Pacific. CRC Press, Boca Raton, FL	[Fleshy drupes. Presumably bird or vetebrate dispersed] " <i>Piper sarmentosum</i> Roxb. ( <i>Chavica hainana</i> DC., <i>Chavica sarmentosa</i> [Roxburgh] Miq., <i>Piper albispicum</i> DC., <i>Piper brevicaula</i> DC., <i>Piper gymnostachyum</i> DC., <i>Piper lolot</i> DC., <i>Piper pierrei</i> DC., and <i>Piper saigonense</i> DC.) is a shrub that grows to a height of 50cm in Cambodia, India, Burma, Thailand, Indonesia, Laos, Malaysia, the Philippines, Vietnam, and China. The leaves are simple, alternate, and exstipulate. The blade is lanceolate-elliptical, 10cm × 5cm - 14cm × 6cm - 9.9cm × 3.4cm - 12cm × 2cm, acuminate at the apex, rounded at the base, with two pairs of secondary nerves. The inflorescences are 5mm-long nerves. The fruits are green-red with 4mm × 3mm drupes"

707	Propagules dispersed by other animals (externally)	n
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Wiert, C. (2006). Medicinal plants of Asia and the Pacific. CRC Press, Boca Raton, FL	"The fruits are green-red with 4mm × 3mm drupes" [No means of external attachment]
<b>708</b>	<b>Propagules survive passage through the gut</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Flora Fauna Web. (2024). Piper sarmentosum. <a href="https://www.nparks.gov.sg/florafauweb/flora/2/3/2342">https://www.nparks.gov.sg/florafauweb/flora/2/3/2342</a> . [Accessed 3 Apr 2024]	"Seed or Spore Dispersal: Biotic (Fauna)"
	Wiert, C. (2006). Medicinal plants of Asia and the Pacific. CRC Press, Boca Raton, FL	"The fruits are green-red with 4mm × 3mm drupes" [Presumably yes. Fleshy-fruited]
<b>801</b>	<b>Prolific seed production (&gt;1000/m2)</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Female spikes 2-5(-8) cm, to 8 mm thick in fruit; peduncle as in male spikes; rachis glabrous; bracts suborbicular, peltate, 1-1.3 mm in diam. Stigmas (3 or)4(or 5), hispidulous. Drupe subglobose, 4-angled, 2.5-3 mm, partly connate to rachis." [Unknown]
<b>802</b>	<b>Evidence that a persistent propagule bank is formed (&gt;1 yr)</b>	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. (2024). Personal Communication	Unknown
<b>803</b>	<b>Well controlled by herbicides</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	CABI (2019). Piper sarmentosum. CABI Compendium. <a href="https://doi.org/10.1079/cabicompendium.119782">https://doi.org/10.1079/cabicompendium.119782</a> . [Accessed 2 Apr 2024]	"Physical removal is effective if done repeatedly for an extended period. For chemical control, two to three applications of glyphosate at a high concentration can control the plant."
<b>804</b>	<b>Tolerates, or benefits from, mutilation, cultivation, or fire</b>	
	<b>Source(s)</b>	<b>Notes</b>
	CABI (2019). Piper sarmentosum. CABI Compendium. <a href="https://doi.org/10.1079/cabicompendium.119782">https://doi.org/10.1079/cabicompendium.119782</a> . [Accessed 2 Apr 2024]	"Physical removal is effective if done repeatedly for an extended period. For chemical control, two to three applications of glyphosate at a high concentration can control the plant."
	WRA Specialist. (2024). Personal Communication	Ability to spread vegetatively, and from stem fragments, may make physical control difficult
<b>805</b>	<b>Effective natural enemies present locally (e.g. introduced biocontrol agents)</b>	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. (2024). Personal Communication	Unknown

**Summary of Risk Traits:**

*Piper sarmentosum* (wild betel) is a dioecious tropical herb native to Southeast Asia and is widely distributed throughout the region, particularly in countries like Malaysia, Thailand, Indonesia, and the Philippines. The plant is characterized by its heart-shaped leaves, which have a glossy appearance and a pungent aroma when crushed. In various Southeast Asian cuisines, the leaves of *Piper sarmentosum* are often used as a flavoring agent or eaten raw as part of salads or dishes. They have a slightly peppery taste and are believed to have medicinal properties in traditional medicine systems.

Although widely cultivated, it has only been reported as naturalized in a few locations and is now believed to be naturalizing on the island of Oahu and Maui. Its ability to grow in shaded understories, and form dense ground cover through vegetative means, suggests that it could compete with certain crop plants or native vegetation in the natural environment.

**High Risk / Undesirable Traits**

- Potentially broad elevation range
- Thrives and spreads in regions with tropical climates
- Naturalizing on Oahu and Maui (Hawaiian Islands) and elsewhere
- Reported to be invasive and a potential agricultural or environmental weed of agriculture and the natural environment
- Other species in the genus are invasive weeds
- Potentially allelopathic
- Shade tolerant
- Capable of forming dense ground cover that may compete with or exclude other vegetation
- Reproduces by seeds and vegetatively.
- Drupes and seeds adapted for vertebrate dispersal (birds and other fruit eating animals)
- Also spread through intentional cultivation and as dumped garden waste

**Low Risk Traits**

- Unarmed (no spines, thorns, or burrs)
- Palatable to animals and people
- Non-toxic
- Dioecious (requires male and female plants to produce seeds)
- Herbicides reported to provide effective control

