Taxon: Aristolochia trilobata L. **Family:** Aristolochiaceae

Common Name(s): Dutchman's pipe **Synonym(s):** Aristolochia caracasana Spreng.
Aristolochia macroura Gomes
Aristolochia trifida Lam.
Howardia surinamensis (Willd.)
Howardia trifida (Lam.) Klotzsch
Howardia trilobata (L.) Klotzsch

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 2 Mar 2017

WRA Score: 3.0 **Designation:** EVALUATE **Rating:** Evaluate

Keywords: Tropical, Vine, Shade-Tolerant, Unarmed, Gravity-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	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)	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		
406	Host for recognized pests and pathogens		

Qsn #	Question	Answer Option	Answer
407	Causes allergies or is otherwise toxic to humans		
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	y
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	n
606	Reproduction by vegetative fragmentation		
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		
704	Propagules adapted to wind dispersal		
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m2)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
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**
	Pfeifer, H. (1966). Revision of the North and Central American Hexandrous Species of Aristolochia (Aristolochiaceae). Annals of the Missouri Botanical Garden, 53(2), 115-196	No evidence of domestication

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. 2017. 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**
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 1 Mar 2017]	"Native: Southern America Brazil: Brazil - Bahia, - Espirito Santo, - Para, - Parana, - Rio de Janeiro, - Santa Catarina, - Sao Paulo Caribbean: Antigua and Barbuda; Bermuda; Cuba; Dominica; Dominican Republic; Guadeloupe; Haiti; Jamaica; Martinique; Puerto Rico; St. Lucia; St. Vincent and Grenadines - St. Vincent; Trinidad and Tobago - Trinidad; Virgin Islands (British) - Tortola; Virgin Islands (U.S.) - St. Thomas Central America: Belize; Costa Rica; Honduras; Nicaragua; Panama Northern South America: French Guiana; Guyana; Suriname; Venezuela - Carabobo, - Federal District Southern South America: Argentina - Buenos Aires, - Chaco, - Corrientes, - Entre Rios, - Misiones, - Santa Fe; Uruguay Western South America: Colombia"

202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 1 Mar 2017]	

Qsn #	Question	Answer
203	**Broad climate suitability (environmental versatility)**	**n**
	Source(s)	**Notes**
	Dave's Garden. 2017. Dutchman's Pipe - Aristolochia trilobata. http://davesgarden.com/guides/pf/go/55366/. [Accessed 1 Mar 2017]	"Hardiness: USDA Zone 8b: to -9.4 °C (15 °F) USDA Zone 9a: to -6.6 °C (20 °F) USDA Zone 9b: to -3.8 °C (25 °F) USDA Zone 10a: to -1.1 °C (30 °F) USDA Zone 10b: to 1.7 °C (35 °F) USDA Zone 11: above 4.5 °C (40 °F)"
	Trade Winds Fruit. 2017. Dutchman's Pipe - Aristolochia trilobata. http://www.tradewindsfruit.com/content/dutchmans-pipe.htm. [Accessed 1 Mar 2017]	"It is quite adaptable and can be grown in subtropical areas, tropical areas, and any place where temperatures don't frequently drop below 30F."
	Nicolson, D.H. 1991. Flora of Dominica, Part 2: Dicotyledoneae. Smithsonian Contributions to Botany, Number 77, 274 pp.	"New World tropics; in Dominica near east coast at 300 m"

204	**Native or naturalized in regions with tropical or subtropical climates**	**y**
	Source(s)	**Notes**
	Pfeifer, H. (1966). Revision of the North and Central American Hexandrous Species of Aristolochia (Aristolochiaceae). Annals of the Missouri Botanical Garden, 53(2), 115-196	"At clearing margins, in thickets and woodlands, along the Caribbean side of Central America from British Honduras to Panama, and throughout the West Indies."

205	**Does the species have a history of repeated introductions outside its natural range?**	**y**
	Source(s)	**Notes**
	Imada, C.T., Staples, G.W. & Herbst, D.R. 2005. Annotated Checklist of Cultivated Plants of Hawai'i. http://www2.bishopmuseum.org/HBS/botany/cultivatedplants/. [Accessed 2 Mar 2017]	"Aristolochia trilobata Linnaeus Synonyms: Syn. Aristolochia macroura Gomes Locations: Ho'omaluhia Botanical Garden Waimea Arboretum & Botanical Garden"
	Dave's Garden. 2017. Dutchman's Pipe - Aristolochia trilobata. http://davesgarden.com/guides/pf/go/55366/. [Accessed 1 Mar 2017]	"This plant has been said to grow in the following regions: Oakland, California Petaluma, California San Francisco, California Cape Coral, Florida Jacksonville, Florida Lutz, Florida New Port Richey, Florida Saint Petersburg, Florida Sarasota, Florida Ocean Springs, Mississippi Galveston, Texas San Antonio, Texas Spring, Texas Salisbury, Vermont"
	Boos, J. O. (1986). The Family Aristolochiaceae in Trinidad, with reference to its medicinal uses, its folklore, and its use as a larval foodplant by Papilionidae. Living World, Journal of the Trinidad and Tobago Field Naturalists' Club, 1985-1986: 48-51	"This plant is perhaps the most widely distributed species of Aristolochia in the area, being found throughout the West Indies, down the Gulf Coast of Mexico through Central America, Panama and into South America. I have found it only under cultivation on Trinidad and Tobago."

301	**Naturalized beyond native range**	**n**

Qsn #	Question	Answer
	Source(s)	**Notes**
	Boos, J. O. (1986). The Family Aristolochiaceae in Trinidad, with reference to its medicinal uses, its folklore, and its use as a larval foodplant by Papilionidae. Living World, Journal of the Trinidad and Tobago Field Naturalists' Club, 1985-1986: 48-51	"This plant is perhaps the most widely distributed species of Aristolochia in the area, being found throughout the West Indies, down the Gulf Coast of Mexico through Central America, Panama and into South America. I have found it only under cultivation on Trinidad and Tobago. However, it has been reported from the Manzanilla Road growing wild, but human habitation occurs in this area so it probably has gone wild from someone's garden."
	Pfeifer, H. (1966). Revision of the North and Central American Hexandrous Species of Aristolochia (Aristolochiaceae). Annals of the Missouri Botanical Garden, 53(2), 115-196	[No evidence for A. trilobata] "Aristolochia labiata, a South American plant, in our area is known only from cultivated plants; it may be becoming naturalized in some areas." ... "Aristolochia ringens is naturalized in Florida. I suspect it is a native of South America and only secondarily introduced in our area." ... "Aristolochia clematiti ... European; said to be naturalized from gardens and on ballast in a few localities, evidently not spreading actively into new areas (Baltimore, Maryland; Philadelphia, Pennsylvania; Boston, Massachusetts; Ithaca, New York and Montreal, Quebec)."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai‘i Press and Bishop Museum Press, Honolulu, HI.	[No evidence of A. trilobata] "Aristolochia littoralis ... Native range obscure, but probably from South America; in Hawai'i cultivated, occasionally escaping and now sparingly naturalized at least in the Pearl Harbor area, O'ahu. First collected in 1922"

302	Garden/amenity/disturbance weed	n
	Source(s)	**Notes**
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

303	Agricultural/forestry/horticultural weed	n
	Source(s)	**Notes**
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

304	Environmental weed	n
	Source(s)	**Notes**
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

305	Congeneric weed	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	CABI, 2017. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"A. elegans is listed in the Global Compendium of Weeds as “agricultural weed, cultivation escape, environmental weed, garden thug, naturalized, noxious weed, sleeper weed, weed” (Randall, 2012). It received a very high PIER risk score of 13 (reject for import) (PIER, 2015). The species is invasive in several parts of Asia Pacific and Cuba (Oviedo-Prieto et al, 2012; Randall, 2012), is known to be detrimental to native biodiversity in Australia, where it is one of the 50 worst invaders in Queensland (Queensland DAFF, 2015), and is a Category II invasive species in Florida (Florida Exotic Pest Plant Council, 2013). It is used in traditional medicine but, like other Aristolochia species, is associated with an increased incidence of cancer (Debelle et al, 2008; Krell and Stebbing, 2013; Michl et al., 2013). The light seeds are easily spread by wind and water (Weeds of Australia, 2015)."
	Queensland Government. (2017). Weeds of Australia. Aristolochia elegans. http://keyserver.lucidcentral.org. [Accessed 1 Mar 2017]	"Dutchman's pipe (Aristolochia elegans) is regarded as an environmental weed in Queensland and New South Wales, and as a potential environmental weed or "sleeper weed" in many other regions of Australia. It is of most concern in south-eastern Queensland, and it was recently ranked among the top 50 most invasive plants in this region. It is also regarded as a potentially serious environmental weed in north-eastern New South Wales. Like many other species of exotic vines, Dutchman's pipe (Aristolochia elegans) competes with and replaces native plants via its smothering growth. It readily invades dry rainforests, lowland rainforests and riparian vegetation, replacing native vines and preventing the growth and regeneration of other native plants. Community groups are trying to eradicate this plant from several environmentally significant locations in Queensland (e.g. in Burleigh Heads National Park). However, Dutchman's pipe (Aristolochia elegans) is more well known for its impact on the Richmond birdwing butterfly (Ornithoptera richmondia). This butterfly is listed as a vulnerable species under Queensland legislation and the invasion of remnant habitat by Dutchman's pipe (Aristolochia elegans) is a serious contributing factor to its decline. Birdwing vine (Pararistolochia praevenosa), a similar plant that is native to northern New South Wales and southern Queensland, is the sole food plant of the Richmond birdwing butterfly (Ornithoptera richmondia). This native vine is being replaced by Dutchman's pipe (Aristolochia elegans) making it hard for the female adult butterflies to find. Because the exotic vine is so similar, the female butterflies are also fooled into laying their eggs on it. However, Dutchman's pipe (Aristolochia elegans) is toxic to the larvae and when they hatch they are unable to feed and eventually perish. Therefore, removal of this weed is one of the primary strategies of the Richmond Birdwing Recovery Network. The larvae of other native butterflies are also known to perish on Dutchman's pipe (Aristolochia elegans), including the big greasy (Cressida cressida) and the red-bodied swallowtail (Pachlopta polydorus)."

Qsn #	Question	Answer
401	**Produces spines, thorns or burrs**	**n**
	Source(s)	**Notes**
	Rizzini, C. (1960). Flora of Panama. Part IV. Fascicle III. Annals of the Missouri Botanical Garden, 47(4), 263-359	[No evidence] "Twining, glabrous lianas. Leaves alternate, spiral, subpalmate, 3-lobate, truncate at the base, glabrous, ca. 6 cm. wide, 6 cm. long. Pseudostipules present."

402	Allelopathic	
	Source(s)	**Notes**
	Baličević, R., Ravlić, M., Mišić, M., & Mikić, I. (2015). Allelopathic effect of Aristolochia clematitis L. Pp. 54–58 In 50th Croatian and 10th International Symposium on Agriculture. Opatija, Croatia	[Allelopathy documented in congener] "The aim of the study was to examine effect of water extracts from Aristolochia clematitis L. on weed species Tripleurospermum inodorum (L.) C.H. Schultz. In Petri dish assay water extracts from fresh and dry biomass in concentrations of 1, 5 and 10% were evaluated. In pots with soil, extracts from fresh biomass in concentrations of 5 and 10% were assessed. Extracts from fresh biomass had no significant effect on germination, but reduced root length of weed seedlings. Shoot length was greatly stimulated up to 45.5%. Extracts from dry biomass, in Petri dishes, showed inhibitory effect especially in treatments with higher concentrations. All parameters were inhibited for 100% when 10% extract was applied. Also, application of extracts from fresh biomass in soil medium had no effect on germination and seedling growth of T. inodorum."

403	Parasitic	n
	Source(s)	**Notes**
	Rizzini, C. (1960). Flora of Panama. Part IV. Fascicle III. Annals of the Missouri Botanical Garden, 47(4), 263-359	"Twining, glabrous lianas" [Aristolochiaceae. No evidence]

404	Unpalatable to grazing animals	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	Unknown

405	Toxic to animals	
	Source(s)	**Notes**

Qsn #	Question	Answer
	de Oliveira, B. M. S., et al. (2017). Essential Oil of Aristolochia trilobata: Synthesis, Routes of Exposure, Acute Toxicity, Binary Mixtures and Behavioral Effects on Leaf-Cutting Ants. Molecules, 22(3), 335	[Unknown. Toxic properties to insects reported] "Abstract: Plants of the genus Aristolochia have been frequently reported as important medicinal plants. Despite their high bioactive potential, to date, there are no reports of their effects on leaf-cutting ants. Therefore, the present study aimed to evaluate the insecticidal activity of the essential oil of Aristolochia trilobata and its major components on Atta sexdens and Acromyrmex balzani, two species of leaf-cutting ants. The bioassays were performed regarding routes of exposure, acute toxicity, binary mixtures of the major components and behavioral effects. Twenty-five components were identified in the essential oil of A. trilobata using a gas chromatographic system equipped with a mass spectrometer and a flame ionization detector. The components found in higher proportions were sulcatyl acetate, limonene, p-cymene and linalool. The essential oil of A. trilobata and its individual major components were efficient against A. balzani and A. sexdens workers when applied by fumigation. These components showed fast and efficient insecticidal activity on ants. The components acted synergistically and additively on A. balzani and A. sexdens, respectively, and caused a strong repellency/irritability in the ants. Thus, our results demonstrate the great potential of the essential oil of A. trilobata and its major components for the development of new insecticides."

406	Host for recognized pests and pathogens	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	Unknown

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	**Notes**
	de Oliveira, B. M. S., et al. (2017). Essential Oil of Aristolochia trilobata: Synthesis, Routes of Exposure, Acute Toxicity, Binary Mixtures and Behavioral Effects on Leaf-Cutting Ants. Molecules, 22(3), 335	"Abstract: Plants of the genus Aristolochia have been frequently reported as important medicinal plants. Despite their high bioactive potential, to date, there are no reports of their effects on leaf-cutting ants. Therefore, the present study aimed to evaluate the insecticidal activity of the essential oil of Aristolochia trilobata and its major components on Atta sexdens and Acromyrmex balzani, two species of leaf-cutting ants. The bioassays were performed regarding routes of exposure, acute toxicity, binary mixtures of the major components and behavioral effects. Twenty-five components were identified in the essential oil of A. trilobata using a gas chromatographic system equipped with a mass spectrometer and a flame ionization detector. The components found in higher proportions were sulcatyl acetate, limonene, p-cymene and linalool. The essential oil of A. trilobata and its individual major components were efficient against A. balzani and A. sexdens workers when applied by fumigation. These components showed fast and efficient insecticidal activity on ants. The components acted synergistically and additively on A. balzani and A. sexdens, respectively, and caused a strong repellency/irritability in the ants. Thus, our results demonstrate the great potential of the essential oil of A. trilobata and its major components for the development of new insecticides."

Qsn #	Question	Answer
	Dave's Garden. 2017. Dutchman's Pipe - Aristolochia trilobata. http://davesgarden.com/guides/pf/go/55366/. [Accessed 2 Mar 2017]	"Danger: All parts of plant are poisonous if ingested"
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Medicinal uses. Possibly toxic at incorrect dosage] "(Leaf decoction for diabetes, snakebites, hypertension, as abortifacient, postpartum, to ease parturition. Magicoreligious beliefs, vine planted against bewitchment.)"
	Bridgewater, S. 2012. A Natural History of Belize: Inside the Maya Forest. University of Texas Press, Austin	[Medicinal uses. Potentially toxic] "Aristolochia trilobata ... A tea made by boiling the chopped stem in water is reputedly effective against a wide range of ailments, including flu, stomach upsets, gastritis, and high blood pressure. However, the plant genus is known to contain carcinogenic compounds, and its continuous use is not recommended."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	**Notes**
	Pfeifer, H. (1966). Revision of the North and Central American Hexandrous Species of Aristolochia (Aristolochiaceae). Annals of the Missouri Botanical Garden, 53(2), 115-196	"At clearing margins, in thickets and woodlands, along the Caribbean side of Central America from British Honduras to Panama, and throughout the West Indies" [No evidence that it occurs in fire prone habitats, although it could potentially act as a fuel ladder]

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	**Notes**
	Balick, M. J., & O'Brien, H. (2004). Ethnobotanical and floristic research in Belize: accomplishments, challenges and lessons learned. Ethnobotany Research & Applications 2: 77-88	"Direct sunlight scorches the leaves of new plants indicating that there is little tolerance to direct sunlight."
	Trade Winds Fruit. 2017. Dutchman's Pipe - Aristolochia trilobata. http://www.tradewindsfruit.com/content/dutchmans-pipe.htm. [Accessed 1 Mar 2017]	"Grow in full sun or shade."
	Dave's Garden. 2017. Dutchman's Pipe - Aristolochia trilobata. http://davesgarden.com/guides/pf/go/55366/. [Accessed 1 Mar 2017]	"Sun Exposure: Light Shade"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	**Notes**
	My Rare Plants. 2011. Aristolochia. http://myrareplants.blogspot.com/2011/10/aristolochia.html. [Accessed 2 Mar 2017]	"(Aristolochia trilobata) ... This vine thrives in almost full sun or partial shade with little or no care. It will grow in most any type of soil. In frost free areas it grows continuously. In colder areas it can be container grown."
	Dave's Garden. 2017. Dutchman's Pipe - Aristolochia trilobata. http://davesgarden.com/guides/pf/go/55366/. [Accessed 2 Mar 2017]	"Soil pH requirements: 6.6 to 7.5 (neutral) 7.6 to 7.8 (mildly alkaline)"

411	Climbing or smothering growth habit	y

Qsn #	Question	Answer
	Source(s)	**Notes**
	Rizzini, C. (1960). Flora of Panama. Part IV. Fascicle III. Annals of the Missouri Botanical Garden, 47(4), 263-359	"Twining, glabrous lianas. Leaves alternate, spiral, subpalmate, 3-lobate, truncate at the base, glabrous, ca. 6 cm. wide, 6 cm. long."

412	Forms dense thickets	n
	Source(s)	**Notes**
	Pfeifer, H. (1966). Revision of the North and Central American Hexandrous Species of Aristolochia (Aristolochiaceae). Annals of the Missouri Botanical Garden, 53(2), 115-196	[A liana that is a component of thicket vegetation] "At clearing margins, in thickets and woodlands, along the Caribbean side of Central America from British Honduras to Panama, and throughout the West Indies."

501	Aquatic	n
	Source(s)	**Notes**
	Pfeifer, H. (1966). Revision of the North and Central American Hexandrous Species of Aristolochia (Aristolochiaceae). Annals of the Missouri Botanical Garden, 53(2), 115-196	[Terrestrial liana] "At clearing margins, in thickets and woodlands, along the Caribbean side of Central America from British Honduras to Panama, and throughout the West Indies."

502	Grass	n
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 1 Mar 2017]	Family: Aristolochiaceae Subfamily: Aristolochioideae

503	Nitrogen fixing woody plant	n
	Source(s)	**Notes**
	Acevedo-Rodríguez, P. 2005. Vines and Climbing Plants of Puerto Rico and the Virgin Islands. Contributions from the United States National Herbarium Volume 51: 1-483. Smithsonian Institution, Washington, D.C.	"Slightly woody vine, twining, 3-5 m in length. Stems slender, shiny, cylindrical, glabrous, pink on the younger portions." [Aristolochiaceae]

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	**Notes**
	Pfeifer, H. (1966). Revision of the North and Central American Hexandrous Species of Aristolochia (Aristolochiaceae). Annals of the Missouri Botanical Garden, 53(2), 115-196	"Glabrous, strong lianas. Leaves deeply to barely palmately 3-lobed, truncate at the base, 3-15 cm broad, 10-15 cm long. Pseudostipules suborbiculate, amplexicaul."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	**Notes**

Qsn #	Question	Answer
	Standley, P.C. & Dahlgren, B.E. 1937. Flora of Costa Rica - Vol. 18 - Part II. Field Museum of Natural History, Chicago	"Aristolochia trilobata L. Atlantic coast. A species of wide distribution. Leaves 3-lobate, the lobes obtuse; flowers very large, the blade ovate, with a narrow terminal appendage 12-15 cm. long."
	Acevedo-Rodríguez, P. 2005. Vines and Climbing Plants of Puerto Rico and the Virgin Islands. Contributions from the United States National Herbarium Volume 51: 1-483. Smithsonian Institution, Washington, D.C.	[No evidence] "Phenology: Flowering and fruiting almost throughout the year. Status: Native, locally common. Distribution: In forests and coastal thickets. Also on Cayo Santiago, Vieques, and St. John; along the Antilles, from Belize to Panama, Colombia, and the Guiana's."

602	Produces viable seed	y
	Source(s)	**Notes**
	Balick, M. J., & O'Brien, H. (2004). Ethnobotanical and floristic research in Belize: accomplishments, challenges and lessons learned. Ethnobotany Research & Applications 2: 77-88	"The plant was noted to flower and produce seeds around between March and April each year."

603	Hybridizes naturally	
	Source(s)	**Notes**
	Pfeifer, H. (1966). Revision of the North and Central American Hexandrous Species of Aristolochia (Aristolochiaceae). Annals of the Missouri Botanical Garden, 53(2), 115-196	[Unknown if natural hybridization can occur] "A proven hybrid exists between A. labiata Willd. and A. trilobata L. and was described in the Gardeners' Chronicle (Anon., 50: 300, 1911.) as A. X kewensis W. W. It was later again described by Ekman & Schmidt as A. domingensis (Notizbl. Bot. Gart. Berlin 12: 393, 1935)."

604	Self-compatible or apomictic	
	Source(s)	**Notes**
	Pfeifer, H. (1966). Revision of the North and Central American Hexandrous Species of Aristolochia (Aristolochiaceae). Annals of the Missouri Botanical Garden, 53(2), 115-196	[Unknown for A. trilobata] "Flowers of A. serpentaria suspected of being self-pollinating"

Qsn #	Question	Answer
	Sakai, S. (2002). Aristolochia spp.(Aristolochiaceae) pollinated by flies breeding on decomposing flowers in Panama. American Journal of Botany, 89(3), 527-534	[Unknown. Self-compatibility documented in genus] "Breeding and pollination systems of Aristolochia spp.— The failure to set fruit in self-pollinated flowers and the extremely high fruit set in cross-pollinated flowers of Aristolochia maxima suggest that the species is self-incompatible. Although self-incompatibility is suggested in some species of the genus (e.g., A. gigas [5 A. grandiflora] and A. ridicula; Petch, 1924), it has rarely been demonstrated by hand-pollination. On the other hand, A. inflata is self-compatible because flowers pollinated with self-pollen showed high fruit set. The difference in self-compatibility may explain much higher fruit set of A. inflata (18.7%) than that of A. maxima (2.4%) in openpollinated controls (Table 1). Self-compatibility seems to be more common in the genus (Petch, 1924; Razzak, Ali, and Ali, 1992). Self-pollinated flowers set fruits in A. elegans [5 A. littoralis] (Petch, 1924). Fruit set of bagged flowers was not significantly different from that of open-pollinated flowers in A. bracteolata (Razzak, Ali, and Ali, 1992). Cleistogamy is suspected in A. serpentaria (Pfeifer, 1966). A single fruit from a bagged, untreated flower indicates that autogamy can occur in A. inflata, but pollinators are essential for successful fertilization even in this self-compatible plant, considering the fact that bagged flowers had lower fruit set than the open-pollinated controls (Table 1). Furthermore, cross-pollinated flowers of A. maxima and self-pollinated flowers of A. inflata had much higher fruit set than the open-pollinated controls of each species, suggesting that limitation of compatible pollen is an important proximate factor in determining fruit set in the two species (Table 1)."

605	Requires specialist pollinators	n
	Source(s)	**Notes**
	Sakai, S. (2002). Aristolochia spp.(Aristolochiaceae) pollinated by flies breeding on decomposing flowers in Panama. American Journal of Botany, 89(3), 527-534	"In all Aristolochia species studied so far, flies of different families, including Anthomyiidae, Chloropidae, Milichiidae, Phoridae, Sarcophagidae, and Syrphidae, have been recorded as pollinators (Cammerloher, 1923; Petch, 1924; Brues, 1928; Lindner, 1928; Brantjes, 1980; Costa and Hime, 1983; Wolda and Sabrosky, 1986; Hall and Brown, 1993)."
	Rizzini, C. (1960). Flora of Panama. Part IV. Fascicle III. Annals of the Missouri Botanical Garden, 47(4), 263-359	"One constantly finds reference in the literature to the fetid odor of Aristolochia flowers. While many of them are truly fetid and evil smelling, many are odorless and a few have been described as having either a sweet or a resinous odor. The flowers ostensibly are pollinated by various species of Diptera"
	Boos, J. O. (1986). The Family Aristolochiaceae in Trinidad, with reference to its medicinal uses, its folklore, and its use as a larval foodplant by Papilionidae. Living World, Journal of the Trinidad and Tobago Field Naturalists' Club, 1985-1986: 48-51	"The flowers are reminiscent of the pitcher plants of N. America (Sarracenia), and attract flies and beetles for pollination."

Qsn #	Question	Answer
606	**Reproduction by vegetative fragmentation**	
	Source(s)	**Notes**
	Balick, M. J., & O'Brien, H. (2004). Ethnobotanical and floristic research in Belize: accomplishments, challenges and lessons learned. Ethnobotany Research & Applications 2: 77-88	"The appearance of adventitious roots on nodes that trailed on the ground gave an early indication of the possible of propagation by cuttings."

607	Minimum generative time (years)	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	Unknown

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	**Notes**
	Pfeifer, H. (1966). Revision of the North and Central American Hexandrous Species of Aristolochia (Aristolochiaceae). Annals of the Missouri Botanical Garden, 53(2), 115-196	"Fruits cylindric, 9 cm long, 2.5 cm wide, dehiscence acropetal, septifragal, the hypanthium absent. Seeds numerous, flat, triangular, 8 mm wide, 8 mm long, 1 mm thick" [Seeds relatively small, but lack means of external attachment]
	Boos, J. O. (1986). The Family Aristolochiaceae in Trinidad, with reference to its medicinal uses, its folklore, and its use as a larval foodplant by Papilionidae. Living World, Journal of the Trinidad and Tobago Field Naturalists' Club, 1985-1986: 48-51	"The seed pods split at the bottom allowing the seeds to fall to the ground."

702	Propagules dispersed intentionally by people	y
	Source(s)	**Notes**
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	"Aristolochia trilobata ... Major Pathway/s: Herbal, Ornamental Dispersed by: Humans"

703	Propagules likely to disperse as a produce contaminant	
	Source(s)	**Notes**
	Boos, J. O. (1986). The Family Aristolochiaceae in Trinidad, with reference to its medicinal uses, its folklore, and its use as a larval foodplant by Papilionidae. Living World, Journal of the Trinidad and Tobago Field Naturalists' Club, 1985-1986: 48-51	"The seed pods split at the bottom allowing the seeds to fall to the ground." [No evidence, but seeds could potentially fall into soil when lianas grow over other potted plants, vegetation etc.]

704	Propagules adapted to wind dispersal	
	Source(s)	**Notes**
	Pfeifer, H. (1966). Revision of the North and Central American Hexandrous Species of Aristolochia (Aristolochiaceae). Annals of the Missouri Botanical Garden, 53(2), 115-196	"Fruits cylindric, 9 cm long, 2.5 cm wide, dehiscence acropetal, septifragal, the hypanthium absent. Seeds numerous, flat, triangular, 8 mm wide, 8 mm long, 1 mm thick" [Possibly wind dispersed for short distances]

Qsn #	Question	Answer
	Boos, J. O. (1986). The Family Aristolochiaceae in Trinidad, with reference to its medicinal uses, its folklore, and its use as a larval foodplant by Papilionidae. Living World, Journal of the Trinidad and Tobago Field Naturalists' Club, 1985-1986: 48-51	"The seed pods split at the bottom allowing the seeds to fall to the ground."

705	Propagules water dispersed	y
	Source(s)	**Notes**
	Balick, M. J., & O'Brien, H. (2004). Ethnobotanical and floristic research in Belize: accomplishments, challenges and lessons learned. Ethnobotany Research & Applications 2: 77-88	"Contribo (Aristolochia trilobata L.), a trailing and twining herbaceous vine, grows mostly along the cool banks of rivers and streams. Although the main branches of the plant are found below the canopy, most of its vines trail the upper branches of the surrounding trees. Thickets are generally preferred for growth as they make available a network of branches and vines for the plant to trail on." [Probably Yes. Seeds dispersed by gravity & commonly occurs near rivers]

706	Propagules bird dispersed	n
	Source(s)	**Notes**
	Acevedo-Rodríguez, P. 2005. Vines and Climbing Plants of Puerto Rico and the Virgin Islands. Contributions from the United States National Herbarium Volume 51: 1-483. Smithsonian Institution, Washington, D.C.	"Capsules oblong, 6-8 cm long, with 6 longitudinal ribs; seeds numerous, membranaceous, triangular, ca. 7 mm long, compressed."
	Boos, J. O. (1986). The Family Aristolochiaceae in Trinidad, with reference to its medicinal uses, its folklore, and its use as a larval foodplant by Papilionidae. Living World, Journal of the Trinidad and Tobago Field Naturalists' Club, 1985-1986: 48-51	"The seed pods split at the bottom allowing the seeds to fall to the ground."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	**Notes**
	Pfeifer, H. (1966). Revision of the North and Central American Hexandrous Species of Aristolochia (Aristolochiaceae). Annals of the Missouri Botanical Garden, 53(2), 115-196	"Fruits cylindric, 9 cm long, 2.5 cm wide, dehiscence acropetal, septifragal, the hypanthium absent. Seeds numerous, flat, triangular, 8 mm wide, 8 mm long, 1 mm thick" [Seeds relatively small, but lack means of external attachment]

Qsn #	Question	Answer
708	**Propagules survive passage through the gut**	**n**
	Source(s)	**Notes**
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. 2010). Guidance for addressing the Australian Weed Risk Assessment questions. Plant Protection Quarterly, 25(2): 56-74	"Answer 'no' where the taxon is unlikely to be eaten by animals or if seeds are not viable following passage through the gut."
	Boos, J. O. (1986). The Family Aristolochiaceae in Trinidad, with reference to its medicinal uses, its folklore, and its use as a larval foodplant by Papilionidae. Living World, Journal of the Trinidad and Tobago Field Naturalists' Club, 1985-1986: 48-51	"The seed pods split at the bottom allowing the seeds to fall to the ground."

801	Prolific seed production (>1000/m2)	
	Source(s)	**Notes**
	Pfeifer, H. (1966). Revision of the North and Central American Hexandrous Species of Aristolochia (Aristolochiaceae). Annals of the Missouri Botanical Garden, 53(2), 115-196	[Seeds numerous, but densities unknown] "Fruits cylindric, 9 cm long, 2.5 cm wide, dehiscence acropetal, septifragal, the hypanthium absent. Seeds numerous, flat, triangular, 8 mm wide, 8 mm long, 1 mm thick"

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	**Notes**
	Baskin, C.C. & Baskin, J.M. 2014. Seeds Ecology, Biogeography, and Evolution of Dormancy and Germination. Second Edition. Academic Press, San Francisco, CA	Unknown. Several Aristolochia species have seeds with morphological dormancy.

803	Well controlled by herbicides	
	Source(s)	**Notes**
	Queensland Government. 2016. Dutchman's pipe. Aristolochia elegans. Restricted invasive plant. The State of Queensland, Department of Agriculture and Fisheries, Queensland, AU	[Unknown. Herbicides used on Aristolochia elegans, but efficacy unspecified] "Herbicides are most effective if sprayed before plants reach maturity. There is no herbicide currently registered for control of Dutchman's pipe in Queensland; however, an off-label use permit allows the use of various herbicides for the control of environmental weeds in non-agricultural areas, bushland and forests."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	**Notes**
	My Rare Plants. 2011. Aristolochia. http://myrareplants.blogspot.com/2011/10/aristolochia.html. [Accessed 2 Mar 2017]	[Unknown. Related plants regrow after dying back] "Aristolochia elegans ... In frost free areas it grows continuously. In areas where the vine freezes it will regrow vigorously in the spring"

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	

Qsn #	Question	Answer
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits
• Thrives in tropical climates
• Other Aristolochia species are invasive weeds
• Medicinal, & potentially toxic, properties
• Shade tolerant
• Tolerates many soil types
• Climbing & potentially smothering habit
• Reproduces by seeds
• May be able to spread vegetatively
• Seeds dispersed by gravity, possibly wind & intentionally by people
• Limited ecological information reduces accuracy of risk prediction

Low Risk Traits
• No confirmed reports of invasiveness or naturalization
• Unarmed (no spines, thorns, or burrs)
• Ornamental

Second Screening Results for Vines & Lianas

(A) Reported as a weed of cultivated lands?> No
(B) Unpalatable to grazers or known to form dense stands?> No
(C) Shade tolerant or known to form dense stands?> Yes. Shade tolerant
(D) Bird- Or clearly wind- dispersed?> Possibly Wind-dispersed
(E) Life cycle <4 years? Unknown
Outcome = Evaluate Further