

**Taxon:** Chelonanthus alatus (Aubl.) Pulle

**Family:** Gentianaceae

**Common Name(s):** arbol de mal casada  
wild tobacco

**Synonym(s):** Chelonanthus acutangulus (Ruiz & Irlbachia alata (Aubl.) Maas  
Lisianthus acutangulus Ruiz & Pav.  
Lisianthus alatus Aubl.

**Assessor:** Chuck Chimera

**Status:** Assessor Approved

**End Date:** 5 May 2016

**WRA Score:** 7.0

**Designation:** H(HPWRA)

**Rating:** High Risk

**Keywords:** Annual Herb, Weedy, Bat-Pollinated, Self-Compatible, Wind-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	y
302	Garden/amenity/disturbance weed		
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	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		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	y
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
409	Is a shade tolerant plant at some stage of its life cycle		
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets		
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	y
606	Reproduction by vegetative fragmentation		
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
702	Propagules dispersed intentionally by people	y=1, n=-1	n
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	y
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	y
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m <sup>2</sup> )		
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
	Lepis, K. B. (2009). Evolution and Systematics of <i>Chelonanthus</i> (Gentianaceae). PhD Dissertation. Rutgers, New Brunswick, New Jersey	[No evidence of domestication] "This green-white corolla clade contains the most common and widespread species, <i>Chelonanthus alatus</i> , a polyphyletic species complex composed of six morphological variants."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2016. 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
	Woodson, R. E., Schery, R. W., Elias, T. S., & Robyns, A.. (1975). Flora of Panama. Part VIII. Family 160. Gentianaceae. Annals of the Missouri Botanical Garden, 62(1), 61–101	"Mexico, Central America and southward to Brazil."

202	Quality of climate match data	High
	Source(s)	Notes
	Woodson, R. E., Schery, R. W., Elias, T. S., & Robyns, A.. (1975). Flora of Panama. Part VIII. Family 160. Gentianaceae. Annals of the Missouri Botanical Garden, 62(1), 61–101	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Lepis, K. B. (2009). Evolution and Systematics of <i>Chelonanthus</i> (Gentianaceae). PhD Dissertation. Rutgers, New Brunswick, New Jersey	[Elevation range exceeds 2000+ m, demonstrating environmental versatility] " <i>Chelonanthus acutangulus</i> ... Altitude range: 0-3000 m." ... " <i>Chelonanthus alatus</i> ... Altitude range: 0-2255 m."
	Tropicos.org. 2016. Tropicos [Online Database]. Missouri Botanical Garden. <a href="http://www.tropicos.org/">http://www.tropicos.org/</a> . [Accessed 5 May 2016]	<i>Chelonanthus alatus</i> : Collected from latitudes ranging from 00°15'00" S to 17°53'34"S and 00°07'00" N to 17°22'25" N

Qsn #	Question	Answer
204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Lepis, K. 2016. Biology Dept., Monmouth University. Pers. comm.	"It's native range includes Southern Mexico and Central America, Andes of Bolivia, Peru, Ecuador, Colombia and Venezuela, Caribbean island of Grenada, Amazon Basin of Bolivia, Peru, Ecuador, and Brazil (Acre, Amazonas, Rondônia)."
	Woodson, R. E., Schery, R. W., Elias, T. S., & Robyns, A.. (1975). Flora of Panama. Part VIII. Family 160. Gentianaceae. Annals of the Missouri Botanical Garden, 62(1), 61–101	"Mexico, Central America and southward to Brazil."

205	Does the species have a history of repeated introductions outside its natural range?	n
	Source(s)	Notes
	Lepis, K. B. (2009). Evolution and Systematics of <i>Chelonanthus</i> (Gentianaceae). PhD Dissertation. Rutgers, New Brunswick, New Jersey	No evidence of widespread cultivation or distribution of this species complex outside native range.

301	Naturalized beyond native range	y
	Source(s)	Notes
	Lau, A. 2016. Oahu Early Detection Botanist. Pers. Comm. 29 April	"Army recently found a pretty unusual plant on a road survey, one that finally narrowed down to <i>Chelonanthus acutangulus</i> ." ... Seems like an accidental introduction here, where a small population was found growing out of erosion control matting along Drum road."

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Struwe, L., & Albert, V. A. (2002). Gentianaceae: Systematics and Natural History. Cambridge University Press, Cambridge, UK	"No species in the <i>Macrocarpaea</i> or <i>Irlbachia</i> clades could be fairly termed a weed, whereas <i>Chelonanthus alatus</i> is indeed a weed in secondary vegetation and disturbed areas in large parts of Central and South America."
	Weaver, R. E. (1973). In search of tropical gentians. <i>Arnoldia</i> , 3(3), 189-198	"The lowlands of South America are poor in gentians. The most conspicuous genus is <i>Chelonanthus</i> , and one of these, <i>C. alatus</i> , a weedy plant of roadsides and cut-over fields, is the most common and widespread species of the American tropics."
	Lepis, K. B. (2009). Evolution and Systematics of <i>Chelonanthus</i> (Gentianaceae). PhD Dissertation. Rutgers, New Brunswick, New Jersey	[Weedy and adapted to disturbed habitats] " <i>Chelonanthus acutangulus</i> ... This species is commonly found along roadsides and in open forests such as disturbed primary forests, secondary growth forests, forest remnants and forest edges. Less often, it is found along rivers and in savanna type vegetation." ... " <i>Chelonanthus alatus</i> ... This species occurs in moist areas of forests, savannas, and scrub vegetation, as well as along rivers and roadsides."

303	Agricultural/forestry/horticultural weed	n
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence to date. No evidence of intentional introduction outside native range

304	Environmental weed	n
	<b>Source(s)</b>	<b>Notes</b>
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence to date. No evidence of intentional introduction outside native range

305	Congeneric weed	n
	<b>Source(s)</b>	<b>Notes</b>
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

401	Produces spines, thorns or burrs	n
	<b>Source(s)</b>	<b>Notes</b>
	Woodson, R. E., Schery, R. W., Elias, T. S., & Robyns, A.. (1975). Flora of Panama. Part VIII. Family 160. Gentianaceae. Annals of the Missouri Botanical Garden, 62(1), 61–101	[No evidence] "Herb, 1-5 m tall; stems erect, tetragonal to subterete, slightly winged on the angles, green. Leaves with the lamina broadly ovate to ovate-elliptic, attenuate at the base, acute to short acuminate at the apex, 4-18 cm long and 2.7-10.3 cm wide, thin-chartaceous, the lateral veins in 2 pairs, strongly arcuate, the costa and veins conspicuous beneath."

402	Allelopathic	n
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. 2016. Personal Communication	Unknown

403	Parasitic	n
	<b>Source(s)</b>	<b>Notes</b>
	Woodson, R. E., Schery, R. W., Elias, T. S., & Robyns, A.. (1975). Flora of Panama. Part VIII. Family 160. Gentianaceae. Annals of the Missouri Botanical Garden, 62(1), 61–101	"Herb, 1-5 m tall; stems erect, tetragonal to subterete, slightly winged on the angles, green" [Gentianaceae. No evidence]

404	Unpalatable to grazing animals	n
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. 2016. Personal Communication	Unknown

405	Toxic to animals	n
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Plant is very toxic, a slight overdosage may be fatal." [Unknown if animals would contact or consume plants, or if toxicity would affect them]

406	Host for recognized pests and pathogens	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. 2016. Personal Communication	Unknown

407	Causes allergies or is otherwise toxic to humans	y
	<b>Source(s)</b>	<b>Notes</b>
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Irlbachia alata (Aubl.) Maas subsp. alata (Adenolisianthus virgatus (Progel) Gilg; Chelonanthus acutangulus (Ruiz & Pav.) Gilg; Chelonanthus alatus (Aubl.) Pulle; Chelonanthus alatus (Willd. ex Griseb.) Pulle; Chelonanthus alatus ..." ... Plant is very toxic, a slight overdosage may be fatal. Whole plant bitter, febrifuge, for gastric disturbances, purgative, for visceral obstructions."

408	Creates a fire hazard in natural ecosystems	n
	<b>Source(s)</b>	<b>Notes</b>
	Croat, T.B. 1978. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[No evidence. Unlikely given wet habitat] "Herb, to 1-1.5 (5) m; stems square, glabrous, the corners with thin ribs." ... "In Panama, known principally from premontane wet forest ... known also from tropical moist forest ... from tropical wet f ores! ... and from premontane rain forest"

409	Is a shade tolerant plant at some stage of its life cycle	
	<b>Source(s)</b>	<b>Notes</b>
	Standley, P.C. & Williams, L.O. 1969. Flora of Guatemala. Fieldiana: Botany Volume 24, Part VIII, Number 4. Chicago Natural History Museum	"Moist or wet thickets, often on open or brushy, steep banks" [Possibly occurring only in high light environments]
	Weaver, R. E. (1973). In search of tropical gentians. <i>Arnoldia</i> , 3(3), 189-198	[Possibly No. Occurs in disturbed habitats which typically have high light intensity] "The lowlands of South America are poor in gentians. The most conspicuous genus is Chelonanthus, and one of these, C. alatus, a weedy plant of roadsides and cut-over fields, is the most common and widespread species of the American tropics."

Qsn #	Question	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	<b>Source(s)</b>	<b>Notes</b>
	Lepis, K. B. (2009). Evolution and Systematics of <i>Chelonanthus</i> (Gentianaceae). PhD Dissertation. Rutgers, New Brunswick, New Jersey	" <i>Chelonanthus acutangulus</i> ... It is equally likely to be found in nutrient poor sandy soils and clay soils, and sometimes also in rocky soils." ... " <i>Chelonanthus alatus</i> ... It is most commonly found on white sand, low nutrient soils, but is also reported from clay and lateritic soils and rarely from rocky soil."

411	Climbing or smothering growth habit	n
	<b>Source(s)</b>	<b>Notes</b>
	Woodson, R. E., Schery, R. W., Elias, T. S., & Robyns, A.. (1975). Flora of Panama. Part VIII. Family 160. Gentianaceae. Annals of the Missouri Botanical Garden, 62(1), 61–101	"Herb, 1-5 m tall; stems erect, tetragonal to subterete, slightly winged on the angles, green."

412	Forms dense thickets	
	<b>Source(s)</b>	<b>Notes</b>
	Standley, P.C. & Williams, L.O. 1969. Flora of Guatemala. Fieldiana: Botany Volume 24, Part VIII, Number 4. Chicago Natural History Museum	[Occurs in thickets. Unknown if monocultures are formed] " <i>Chelonanthus alatus</i> ... Moist or wet thickets, often on open or brushy, steep banks, 2,000 m. or less"

501	Aquatic	n
	<b>Source(s)</b>	<b>Notes</b>
	Croat, T.B. 1978. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[Terrestrial herb] "Herb, to 1-1.5 (5) m; stems square, glabrous, the corners with thin ribs." ... "In Panama, known principally from premontane wet forest ... known also from tropical moist forest ... from tropical wet f ores! ... and from premontane rain forest"

502	Grass	n
	<b>Source(s)</b>	<b>Notes</b>
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. <a href="http://www.ars-grin.gov/npgs/index.html">http://www.ars-grin.gov/npgs/index.html</a> . [Accessed 5 May 2016]	Family: Gentianaceae Tribe: Helieae

503	Nitrogen fixing woody plant	n
	<b>Source(s)</b>	<b>Notes</b>
	Woodson, R. E., Schery, R. W., Elias, T. S., & Robyns, A.. (1975). Flora of Panama. Part VIII. Family 160. Gentianaceae. Annals of the Missouri Botanical Garden, 62(1), 61–101	"Herb, 1-5 m tall" [Gentianaceae]

Qsn #	Question	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Woodson, R. E., Schery, R. W., Elias, T. S., & Robyns, A.. (1975). Flora of Panama. Part VIII. Family 160. Gentianaceae. Annals of the Missouri Botanical Garden, 62(1), 61–101	"Herbs, mostly annuals, rarely suffrutescent; the stems usually simple, erect, tetragonal and often slightly winged."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Gleason, H. A., & Killip, E. P.. (1939). The Flora of Mount Auyan-Tepui, Venezuela. Brittonia, 3(2), 141–204	"Chelonanthus alatus (Aubl.) Pulle Cardona 69, 70, 204, in rocky savannas, 1500 m. Rather widely distributed in the Amazonian forests."
	Struwe, L., & Albert, V. A. (2002). Gentianaceae: Systematics and Natural History. Cambridge University Press, Cambridge, UK	"Chelonanthus has probably the widest distribution of all Helieae genera, with the widespread species <i>C. alatus</i> (previously known as <i>Irlbachia alata</i> ) occurring from Mexico in the north, through Central America, the Andes, the Guayana Shield (including Trinidad), east to French Guiana, and south into Amazonas, southern Brazil and Bolivia (Struwe et al., 1999)."
	Tropicos.org. 2016. Tropicos [Online Database]. Missouri Botanical Garden. <a href="http://www.tropicos.org/">http://www.tropicos.org/</a> . [Accessed ]	No evidence. Widespread native distribution

602	Produces viable seed	y
	Source(s)	Notes
	Croat, T.B. 1978. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	"Capsules +/- oblong, brown at maturity, 1-1.5 cm long, the valves thick, held between calyx and strong persistent style base; seeds very numerous, minute, somewhat sticky, square or rectangular."
	Woodson, R. E., Schery, R. W., Elias, T. S., & Robyns, A.. (1975). Flora of Panama. Part VIII. Family 160. Gentianaceae. Annals of the Missouri Botanical Garden, 62(1), 61–101	"tetragonal to slightly irregular, the testa reticulate, 0.2-0.3 mm long."

Qsn #	Question	Answer
603	Hybridizes naturally	
	Source(s)	Notes
	Lepis, K. B. (2009). Evolution and Systematics of <i>Chelonanthus</i> (Gentianaceae). PhD Dissertation. Rutgers, New Brunswick, New Jersey	[Hybridization suspected in genus, but not confirmed] "If these intermediate specimens are hybrids, what other species of <i>Chelonanthus</i> represent the potential parent stock? Six species, <i>C. alatus</i> sensu stricto, <i>C. albus</i> (Spruce ex Progel) Badillo, <i>C. angustifolius</i> , <i>C. grandiflorus</i> (Aubl.) Chodat & Hassl., <i>C. n. sp.</i> (' <i>pteroaulis</i> ' Lepis, Chapter 2) and <i>C. purpurascens</i> (Aubl.) Struwe, S. Nilsson, & V.A. Albert have all been collected in the Venezuelan states of Amazonas and Bolívar where <i>C. hamatus</i> and the intermediates were found. When you consider pollen of the above species <i>C. alatus</i> sensu stricto, <i>C. albus</i> , <i>C. angustifolius</i> , <i>C. grandiflorus</i> and <i>C. n. sp.</i> (' <i>pteroaulis</i> ' Lepis, Chapter 2), all are similar to <i>C. hamatus</i> in that they all shed pollen as tetrads and have pollen of the <i>Chelonanthus</i> -type (Nilsson 1970, 2002; Maguire & Boom, 1989)."

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Dejean, A., Corbara, B., Leroy, C., Delabie, J. H., Rossi, V., & Céréghino, R. (2011). Inherited biotic protection in a Neotropical pioneer plant. <i>PLoS one</i> , 6(3), e18071	" <i>Chelonanthus alatus</i> is self-compatible, with seed dispersal by gravity (barochory) or wind (anemochory) [20,29]."
	Woodson, R. E., Schery, R. W., Elias, T. S., & Robyns, A.. (1975). Flora of Panama. Part VIII. Family 160. Gentianaceae. <i>Annals of the Missouri Botanical Garden</i> , 62(1), 61–101	"Flowers 2.2-3.2 cm long; calyx 4-6 mm long, cupular, the lobes 2-3 mm long, ovate to subrotund, the margins ? membranous; corolla 2.2-3.2 cm long, greenish-yellow, the lobes 5-7 mm long and 6-8 mm wide at the base, ovate, acute at the apex, erect; stamens included or short-exserted, the filaments inserted ca. 1/4 from the base of the corolla, filiform, 1.4-2 cm long, the anthers reflexed, inconspicuously mucronate apically; pistil 2-3 cm long, included or short exserted, the ovary oblongoid, 4-6 mm long, 3-4 mm in diameter, the style terete, thickened, the stigma of 2 flattened oblong lobes, the lobes 3-4 mm long, 6-8 mm in diameter, beaked, the beak (persistent style) to 1.8 cm long"

605	Requires specialist pollinators	y
	Source(s)	Notes
	Dejean, A., Corbara, B., Leroy, C., Delabie, J. H., Rossi, V., & Céréghino, R. (2011). Inherited biotic protection in a Neotropical pioneer plant. <i>PLoS one</i> , 6(3), e18071	" <i>Chelonanthus alatus</i> is a bat-pollinated, pioneer Gentianaceae that clusters in patches where still standing, dried-out stems are interspersed among live individuals." ... "Concerning pollination, because <i>C. alatus</i> is self-compatible and mostly pollinated by bats [20,29] known to visit open flowers in succession, the opportunities for intra-patch pollination are numerous and help to maintain relatedness between individuals. Yet, inter-patch pollination also occurs as nectarivorous bats can travel over relatively long distances [29]."
	Lepis, K. B. (2009). Evolution and Systematics of <i>Chelonanthus</i> (Gentianaceae). PhD Dissertation. Rutgers, New Brunswick, New Jersey	" <i>Chelonanthus alatus</i> sensu lato is a weedy, widespread plant whose morphology is highly variable. This species is notable as one of the few herbaceous angiosperms to be pollinated by bats (Machado et al., 1998)."

Qsn #	Question	Answer
	Croat, T.B. 1978. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	"Inflorescences terminal, simple or compound dichasia, appearing racemose; flowers pedicellate, usually borne on one side of branches, subtended by ovate bracts 2-3 mm long; calyx ca 6 mm long, coriaceous, the lobes 5, blunt, imbricate, keeled; corolla campanulate, pale green, +/- fleshy, weakly 2-lipped, 2-3 cm long, the lobes 5, short, acute but reflexed so as to appear truncate; stamens 5, held tightly against the lower lip; filaments with a marked bend about midway, thick and flattened at base, fused to basal part of corolla tube; anthers shedding pollen before anthesis, sometimes adhering to each other and to style before anthesis; style broadly bilobed, scarcely exceeding stamens, appressed to anthers." ... "The flowers are probably pollinated by medium-sized bees."

606	Reproduction by vegetative fragmentation	
	Source(s)	Notes
	Standley, P.C. & Williams, L.O. 1969. Flora of Guatemala. Fieldiana: Botany Volume 24, Part VIII, Number 4. Chicago Natural History Museum	[Unlikely with annual habit] "Mostly annuals, the stems erect, usually simple, often angulate; leaves penni-nerved;"

607	Minimum generative time (years)	1
	Source(s)	Notes
	Woodson, R. E., Schery, R. W., Elias, T. S., & Robyns, A.. (1975). Flora of Panama. Part VIII. Family 160. Gentianaceae. Annals of the Missouri Botanical Garden, 62(1), 61–101	"Herbs, mostly annuals, rarely suffrutescent"

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Lepis, K. 2016. Biology Dept., Monmouth University. Pers. comm.	[Distribution along roadsides suggests human-facilitated dispersal] "Chelonanthus acutangulus ... Definitely one of the more widespread, weedy species found along roadsides, disturbed open forests and forest edges."
	Lau, A. 2016. Oahu Early Detection Botanist. Pers. Comm. 29 April	[Presumed to have been accidentally dispersed to Oahu, Hawaiian Islands] "Army recently found a pretty unusual plant on a road survey, one that finally narrowed down to Chelonanthus acutangulus." ... Seems like an accidental introduction here, where a small population was found growing out of erosion control matting along Drum road."
	Croat, T.B. 1978. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[Sticky seeds would facilitate external attachment] "seeds very numerous, minute, somewhat sticky, square or rectangular."

702	Propagules dispersed intentionally by people	n
	Source(s)	Notes
	Lau, A. 2016. Oahu Early Detection Botanist. Pers. Comm. 29 April	"Seems like an accidental introduction here"

Qsn #	Question	Answer
	Weaver, R. E. (1973). In search of tropical gentians. <i>Arnoldia</i> , 3(3), 189-198	[Unattractive species unlikely to be cultivated outside native range] "The lowlands of South America are poor in gentians. The most conspicuous genus is <i>Chelonanthus</i> , and one of these, <i>C. alatus</i> , a weedy plant of roadsides and cut-over fields, is the most common and widespread species of the American tropics. Unfortunately it is also the least attractive. The plants are tall and coarse and the flowers are green and inconspicuous."
	WRA Specialist. 2016. Personal Communication	No evidence that plants or seeds are sold commercially

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Dejean, A., Corbara, B., Leroy, C., Delabie, J. H., Rossi, V., & Céréghino, R. (2011). Inherited biotic protection in a Neotropical pioneer plant. <i>PLoS one</i> , 6(3), e18071	" <i>Chelonanthus alatus</i> is self-compatible, with seed dispersal by gravity (barochory) or wind (anemochory) [20,29]." [Possible, if plants are cultivated, but no evidence of cultivation within or outside native range]

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Croat, T.B. 1978. <i>Flora of Barro Colorado Island</i> . Stanford University Press, Stanford, CA	"Capsule valves are hygroscopic, arching in dry conditions and allowing wind to pass through to carry away the tiny seeds and straightening again under wet conditions to close the gap. "

705	Propagules water dispersed	y
	Source(s)	Notes
	Lepis, K. B. (2009). <i>Evolution and Systematics of Chelonanthus (Gentianaceae)</i> . PhD Dissertation. Rutgers, New Brunswick, New Jersey	[Distribution along rivers would facilitate dispersal by water] "This species occurs in moist areas of forests, savannas, and scrub vegetation, as well as along rivers and roadsides."
	Dejean, A., Corbara, B., Leroy, C., Delabie, J. H., Rossi, V., & Céréghino, R. (2011). Inherited biotic protection in a Neotropical pioneer plant. <i>PLoS one</i> , 6(3), e18071	[Gravity dispersal in riparian habitats would result in dispersal by water] " <i>Chelonanthus alatus</i> is self-compatible, with seed dispersal by gravity (barochory) or wind (anemochory) [20,29]."
	Croat, T.B. 1978. <i>Flora of Barro Colorado Island</i> . Stanford University Press, Stanford, CA	[Occurs near aquatic habitats. May facilitate water dispersal] "Occasional in clearings, especially the Rear # 8 Lighthouse Clearing; infrequent along the shore."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Dejean, A., Corbara, B., Leroy, C., Delabie, J. H., Rossi, V., & Céréghino, R. (2011). Inherited biotic protection in a Neotropical pioneer plant. <i>PLoS one</i> , 6(3), e18071	" <i>Chelonanthus alatus</i> is self-compatible, with seed dispersal by gravity (barochory) or wind (anemochory) [20,29]."

Qsn #	Question	Answer
707	<b>Propagules dispersed by other animals (externally)</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Croat, T.B. 1978. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[Sticky seeds would facilitate external dispersal] "seeds very numerous, minute, somewhat sticky, square or rectangular."

708	Propagules survive passage through the gut	n
	<b>Source(s)</b>	<b>Notes</b>
	Dejean, A., Corbara, B., Leroy, C., Delabie, J. H., Rossi, V., & Céréghino, R. (2011). Inherited biotic protection in a Neotropical pioneer plant. PLoS one, 6(3), e18071	"Chelonanthus alatus is self-compatible, with seed dispersal by gravity (barochory) or wind (anemochory) [20,29]." [Seeds unlikely to be consumed]

801	Prolific seed production (>1000/m <sup>2</sup> )	
	<b>Source(s)</b>	<b>Notes</b>
	Vieira, I. C. G., & Proctor, J. (2007). Mechanisms of plant regeneration during succession after shifting cultivation in eastern Amazonia. Plant Ecology, 192(2), 303-315	"Table 2 Mean numbers of seeds m <sup>-2</sup> (M) of some common species (with at least 45 seeds in all plots combined) in the seed bank (0–10 cm) of 5-, 10-, and 20-year-old secondary forest stands and in a primary forest in Bragantina, Pará, Brazil. The ranges are for the values in the three plots in each forest-age class" [Potentially. <i>Irlbachia alata</i> seeds recorded as a mean of 492 with a range of 12–1150]
	Croat, T.B. 1978. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[Densities unknown] "Capsules +/- oblong, brown at maturity, 1-1.5 cm long, the valves thick, held between calyx and strong persistent style base; seeds very numerous, minute, somewhat sticky, square or rectangular."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	<b>Source(s)</b>	<b>Notes</b>
	Costa, J. R., Mitja, D., & Leal Filho, N. (2013). Bancos de sementes do solo em pastagens na Amazônia Central. Pesquisa Florestal Brasileira, 33(74), 115-125	"Tabela 3. Importância relativa de morfotipos e espécies encontradas e número de sementes em quatro pastagens, na profundidade de 0 cm a 5 cm, na Amazônia Central." [Seeds of <i>Irlbachia alata</i> present in seed bank. Longevity unknown]
	Struwe, L., & Albert, V. A. (2002). Gentianaceae: Systematics and Natural History. Cambridge University Press, Cambridge, UK	[Longevity for tropical species unspecified] "Dormancy breaking and germination requirements proved quite diverse throughout the family." ... "Seeds of some temperate species may retain their viability for at least three years and germinate in spring or early summer. Germination may be promoted by gibberellic acid."

803	Well controlled by herbicides	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. 2016. Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

Qsn #	Question	Answer
804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

**Summary of Risk Traits:**

High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Thrives in tropical climates
- Naturalizing on Oahu, Hawaiian Islands
- Weed in secondary vegetation and disturbed areas
- Plant reported to be very toxic
- Reproduces by seeds
- Self-compatible
- Small seeds dispersed by wind, gravity
- Seeds are sticky, which would aid in attachment to people, equipment, vehicles or animals
- Common in roadsides & other heavily trafficked areas, which would facilitate accidental dispersal

Low Risk Traits

- No reports of invasiveness or weediness outside native range, but no evidence of cultivation
- Unarmed (no spines, thorns or burrs)
- Medicinal uses
- Reportedly pollinated by bats, which could minimize or limit seed set outside native range