

Assessment date 9 August 2016

<b><i>Thunbergia fragrans</i> ALL ZONES</b>		<b>Answer</b>	<b>Score</b>
1.01	Is the species highly domesticated?	n	0
1.02	Has the species become naturalised where grown?		
1.03	Does the species have weedy races?		
2.01	Species suited to Florida's USDA climate zones (0-low; 1-intermediate; 2-high) North Zone: suited to Zones 8, 9 Central Zone: suited to Zones 9, 10 South Zone: suited to Zone 10		2
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)		2
2.03	Broad climate suitability (environmental versatility)	y	1
2.04	Native or naturalized in habitats with periodic inundation North Zone: mean annual precipitation 50-70 inches Central Zone: mean annual precipitation 40-60 inches South Zone: mean annual precipitation 40-60 inches	y	1
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range	y	2
3.02	Garden/amenity/disturbance weed	n	0
3.03	Weed of agriculture	n	0
3.04	Environmental weed	y	4
3.05	Congeneric weed	y	2
4.01	Produces spines, thorns or burrs	n	0
4.02	Allelopathic	unk	0
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals	unk	-1
4.05	Toxic to animals	unk	0
4.06	Host for recognised pests and pathogens	unk	0
4.07	Causes allergies or is otherwise toxic to humans	unk	0
4.08	Creates a fire hazard in natural ecosystems	unk	0
4.09	Is a shade tolerant plant at some stage of its life cycle	n	0
4.10	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols.	unk	0
4.11	Climbing or smothering growth habit	y	1
4.12	Forms dense thickets	unk	0
5.01	Aquatic	n	0
5.02	Grass	n	0
5.03	Nitrogen fixing woody plant	n	0
5.04	Geophyte	n	0
6.01	Evidence of substantial reproductive failure in native habitat	n	0
6.02	Produces viable seed	y	1

6.03	Hybridizes naturally	unk	-1
6.04	Self-compatible or apomictic	unk	-1
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative propagation	y	1
6.07	Minimum generative time (years)	unk	-1
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y	1
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant	unk	-1
7.04	Propagules adapted to wind dispersal	unk	-1
7.05	Propagules water dispersed	y	1
7.06	Propagules bird dispersed	unk	-1
7.07	Propagules dispersed by other animals (externally)	n	-1
7.08	Propagules dispersed by other animals (internally)	unk	-1
8.01	Prolific seed production	unk	-1
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	unk	-1
8.03	Well controlled by herbicides	unk	1
8.04	Tolerates, or benefits from, mutilation or cultivation	y	1
8.05		?	
<b>Total Score</b>			<b>7</b>
<b>Implemented Pacific Second Screening</b>			<b>no</b>
<b>Risk Assessment Results</b>			<b>High</b>

section	# questions answered	satisfy minimum?
A		11 yes
B		4 yes
C		13 yes
total		28 yes

	Reference	Source data
1.01		cultivated, but no evidence of selection for reduced weediness
1.02		
1.03		
2.01	1. PERAL NAPPFAST Global Plant Hardiness ( <a href="http://www.nappfast.org/Plant_hardiness/NAPPFAST%20Global%20zones/10-year%20climate/PLANT_HARDINESS_10YR%20lgn.d.tif">http://www.nappfast.org/Plant_hardiness/NAPPFAST%20Global%20zones/10-year%20climate/PLANT_HARDINESS_10YR%20lgn.d.tif</a> ). 2. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896">http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896</a> (1-06-2016).	No computer analysis was performed. 1. Global hardiness zone: 8, 9, 10, 11, 12, 13 ; equivalent to USDA Hardiness zones:USDA Zone 8a: to -12.2 °C (10 °F) 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 11a: to USDA Zone (40 °F) USDA Zone 11b: to (45 °F) USDA Zone 12a: to (50 °F) USDA Zone 12b: to (55 °F). . 2. Native to Asia-Temperate China: China - Guangdong, - Guizhou, - Sichuan, - Yunnan, - Guangxi, - Hainan Eastern Asia: Taiwan Asia-Tropical Indian Subcontinent: Bhutan; India; Nepal; Sri Lanka Indo China: Cambodia; Laos; Thailand; Vietnam Malesia: Philippines
2.02		
2.03	1. Köppen-Geiger climate map ( <a href="http://www.hydrol-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf">http://www.hydrol-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf</a> ). 2. GBIF <a href="http://www.gbif.org/species/5415458">http://www.gbif.org/species/5415458</a> (1-6-2016)	1. Distribution in the native/cultivated range occurs in Cfa, Cwa, Aw, Am, Af
2.04	1. Climate Charts. World Climate Maps. <a href="http://www.climate-charts.com/World-Climate-Maps.html#rain">http://www.climate-charts.com/World-Climate-Maps.html#rain</a> (8-19-2015) 2. GBIF <a href="http://www.gbif.org/species/5415458">http://www.gbif.org/species/5415458</a> (1-6-2016)	Native areas with 39 to 198 inches of precipitation annually.
2.05	1. CABI <a href="http://www.cabi.org/isc/datasheet/119843">http://www.cabi.org/isc/datasheet/119843</a> (1-6-2016) 2. <a href="http://eol.org/data_objects/21472080">http://eol.org/data_objects/21472080</a> accessed 4/28/2016	1. It has been widely cultivated as an ornamental and now it is cultivated and naturalized in North, Central and South America, the Caribbean and on many islands in the Indian and Pacific Ocean 2. wide distribution outside the native range.
3.01	1.Yen-Hsueh Tseng and Chern-Hsiung Ou 4(2) 59-62, 2002 <i>Thunbergia fragrans</i> Roxb. (Acanthaceae) A Newly Naturalized Plant in Taiwan Taiwan Endemic Species Research Institute,Taiwan Department of Forestry 2. CABI <a href="http://www.cabi.org/isc/datasheet/119843">http://www.cabi.org/isc/datasheet/119843</a> (1-6-2016)	1. <i>Thunbergia fragrans</i> Roxb. is recently found naturalized in the central part of Taiwan. 2. It has been widely cultivated as an ornamental and now it is cultivated and naturalized in North, Central and South America, the Caribbean and on many islands in the Indian and Pacific Ocean
3.02		no evidence
3.03	1. 1997. Nishimoto, R.K.. Herbicide options for weed control in papaya. Integrated Pest Management Reviews. 2: 109-111.	1. Glyphosate has provided control of <i>Thunbergia fragrans</i> in agricultural fields of papaya.
3.04	1. CABI <a href="http://www.cabi.org/isc/datasheet/119843">http://www.cabi.org/isc/datasheet/119843</a> (1-6-2016) 2. Queensland Government <a href="http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/html/Thunbergia_fragrans.htm">http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/html/Thunbergia_fragrans.htm</a> (1-4-2015) 3.	1. <i>T. fragrans</i> is included in the Global Compendium of Weeds where is listed as an “environmental weed,” and it is also listed as invasive in Australia, Japan, Singapore, Cuba, Puerto Rico, Hawaii and French Polynesia among others... Impact outcomes Conflict Damaged ecosystem services Ecosystem change/ habitat alteration Host damage Modification of successional patterns Monoculture formation Reduced native biodiversity Threat to/ loss of native species 2. Fragrant thunbergia ( <i>Thunbergia fragrans</i> ) is regarded as a potentially significant environmental weed in Queensland. 3. Threatens remnant vegetation in the wet tropics. Degrades creek and river banks.

3.05	<p>1. Queensland Government <a href="http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/html/Thunbergia_grandiflora.htm">http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/html/Thunbergia_grandiflora.htm</a> (12-15-2015)</p> <p>2. Invasive Species Compendium <a href="http://www.cabi.org/isc/datasheet/117524">http://www.cabi.org/isc/datasheet/117524</a> (12-15-2015) [Julissa Rojas-Sandoval, Department of Botany-Smithsonian NMNH, Washington DC, USA, Pedro Acevedo-Rodríguez, Department of Botany-Smithsonian NMNH, Washington DC, USA]</p> <p>3. Department of Agriculture, Fisheries and Forestry Biosecurity Queensland Fact sheet DECLARED CLASS 1 AND 2 PEST PLANT PP23 PP23 September 2007 <a href="https://www.moretonbay.qld.gov.au/uploadedFiles/moretonbay/environment/vegetation/thunbergia.pdf">https://www.moretonbay.qld.gov.au/uploadedFiles/moretonbay/environment/vegetation/thunbergia.pdf</a> (12-15-2015)</p>	<p>1. Thunbergia species are a major threat to remnant vegetation in the Wet Tropics. <i>T. laurifolia</i> is a vigorous, perennial, climbing vine. It is not as widespread as the closely related blue trumpet vine <i>T. grandiflora</i>, and infestations can be eradicated before they become uncontrollable. Prevention is the most cost-effective form of weed control. Keep uninfested areas free of Thunbergia species. In Queensland <i>T. laurifolia</i> is a declared weed and landholders are required to control it.</p>
4.01	<p>1. 2000. Whistler, W.A.. Tropical Ornamentals: A Guide. Timber Press, Portland, OR</p>	<p>These features are not in the species description: Vine, herbaceous, twining. Leaves simple, opposite, blade ovate to arrowhead-shaped, usually 5-12 cm long (2-5 in). Flowers continuously throughout the year; flowers solitary or paired, axillary on a long stalk with a pair of leafy bracts below, not fragrant. Corolla of fused petals, salverform, tube 2-3 cm long (3/4 - 1 1/4 in), with a spreading five-lobed limb 4-6 cm across (1 5/8 - 2 1/2 in), white. Fruit a subglobose capsule with an extended terminal beak to 2 cm long (3/4 in)</p>
4.02		no evidence
4.03		no evidence
4.04		no evidence
4.05		no evidence
4.06		no evidence
4.07		no evidence
4.08		no evidence
4.09	<p>1. Dave's Garden <a href="http://davesgarden.com/guides/pf/go/2756/#b">http://davesgarden.com/guides/pf/go/2756/#b</a> (1-7-2015)</p> <p>2. CABI <a href="http://www.cabi.org/isc/datasheet/119843">http://www.cabi.org/isc/datasheet/119843</a> (1-6-2016)</p>	<p>1. Full sun 2. It is able to grow beneath closed forests (i.e., shaded areas) as well as in areas with full-sunlight exposure</p>
4.10		no evidence
4.11	<p>1. Queensland Government <a href="http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/html/Thunbergia_fragrans.htm">http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/html/Thunbergia_fragrans.htm</a> (1-4-2015)</p> <p>2. Department of Agriculture, Fisheries and Forestry Biosecurity Queensland Fact sheet DECLARED CLASS 1 AND 2 PEST PLANT PP23 PP23 September 2007 <a href="https://www.moretonbay.qld.gov.au/uploadedFiles/moretonbay/environment/vegetation/thunbergia.pdf">https://www.moretonbay.qld.gov.au/uploadedFiles/moretonbay/environment/vegetation/thunbergia.pdf</a> (12-15-2015)</p> <p>3. Flowers of India <a href="http://www.flowersofindia.net/catalog/slides/Sweet%20Clock%20Vine.html">http://www.flowersofindia.net/catalog/slides/Sweet%20Clock%20Vine.html</a> (1-6-2016)</p>	<p>1. A low-growing, slender-stemmed, spreading creeper or climbing vine. 2. a small low vine with slender climbing stems and white flowers</p>
4.12		no evidence
5.01		Family: Acanthaceae
5.02		Family: Acanthaceae
5.03		Family: Acanthaceae
5.04		no evidence
6.01		no evidence
6.02	<p>Queensland Government <a href="http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/html/Thunbergia_fragrans.htm">http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/html/Thunbergia_fragrans.htm</a> (1-4-2015)</p> <p>2. PIER <a href="http://www.hear.org/pier/species/thunbergia_fragrans.htm">http://www.hear.org/pier/species/thunbergia_fragrans.htm</a> (1-5-2015)</p> <p>3. Dave's Garden <a href="http://davesgarden.com/guides/pf/go/2756/#b">http://davesgarden.com/guides/pf/go/2756/#b</a> (1-7-2015)</p>	<p>1. This species reproduces by seeds and also vegetatively via fragments of stems and roots. 2. Propagation: Seeds, cuttings, and fragments of stems and roots. 3. Propagated from seed</p>
6.03		no evidence
6.04	<p>1. CABI <a href="http://www.cabi.org/isc/datasheet/119843">http://www.cabi.org/isc/datasheet/119843</a> (1-6-2016)</p>	Reproduces asexually

6.05	1. 1974. Percival, M.. Floral ecology of coastal scrub in Southeast Jamaica. <i>Biotropica</i> . 6: 104- 129. 2. 2007. Schmidt-Lebuhn, A.N./Schwerdtfeger, M./Kessler, M./Lohaus, G.. Phylogenetic constraints vs. ecology in the nectar composition of Acanthaceae. <i>Flora-Morphology, Distribution, Functional Ecology of Plants</i> . 202: 62-69. 3. CABI <a href="http://www.cabi.org/isc/datasheet/119843">http://www.cabi.org/isc/datasheet/119843</a> (1-6-2016)	Flowers of <i>Thunbergia fragrans</i> were visited throughout the daylight hours by two species of native insects and by non-natives species of Thysanoptera. There was a good percentage of seedset of the flowers following visitation. 2. Nectar composition and concentration were analyzed for 75 samples of 70 species of Acanthaceae representing all major intrafamilial groups. Analyses of variance were conducted to test for significant differences between pollination syndromes and between taxonomical or phylogenetic groups ( genera). The available data indicate that the characteristics of nectar in Acanthaceae are predominantly determined by adaptation to needs of the pollinators rather than by phylogenetic constraints." <i>Thunbergia fragrans</i> was categorized as having a sphingophilous (moth) pollination syndrome. 3. In the case of <i>T. fragrans</i> , pollinators are unknown, but based on floral traits the species could be considered entomophilous
6.06	1. Queensland Government <a href="http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/html/Thunbergia_fragrans.htm">http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/html/Thunbergia_fragrans.htm</a> (1-4-2015) 2. CABI <a href="http://www.cabi.org/isc/datasheet/119843">http://www.cabi.org/isc/datasheet/119843</a> (1-6-2016)	1. This species reproduces by seeds and also vegetatively via fragments of stems and roots. 2. Considering that <i>T. fragrans</i> spreads sexually by seeds and vegetatively by cuttings, stem fragments, and roots, the likelihood of invading and colonizing new habitats remains high.
6.07		no evidence
7.01	1. Queensland Government <a href="http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/html/Thunbergia_fragrans.htm">http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/html/Thunbergia_fragrans.htm</a> (1-4-2015) 2. CABI <a href="http://www.cabi.org/isc/datasheet/119843">http://www.cabi.org/isc/datasheet/119843</a> (1-6-2016)	A potential weed of closed forests, forest margins, watercourses (i.e. riparian areas), urban bushland, disturbed sites, roadsides and plantation crops in tropical and sub-tropical regions... Dispersal of this species is usually facilitated by it being grown in gardens (i.e. as an ornamental), with stem fragments and seeds subsequently being spread in dumped garden waste. 2. <i>T. fragrans</i> is an herbaceous fast-growing vine widely cultivated as an ornamental in tropical and subtropical regions of the world, but it is also a common weed in moist disturbed areas, in particular along roadsides
7.02	1. Queensland Government <a href="http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/html/Thunbergia_fragrans.htm">http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/html/Thunbergia_fragrans.htm</a> (1-4-2015) 2. CABI <a href="http://www.cabi.org/isc/datasheet/119843">http://www.cabi.org/isc/datasheet/119843</a> (1-6-2016)	1. Dispersal of this species is usually facilitated by it being grown in gardens (i.e. as an ornamental), with stem fragments and seeds subsequently being spread in dumped garden waste. 2. In most cases, this species has been intentionally introduced as an ornamental and it has escaped from cultivation and naturalized in both relatively unaltered and disturbed forests, riversides, roadsides and urban bushland
7.03		no evidence
7.04		no evidence
7.05	1. CABI <a href="http://www.cabi.org/isc/datasheet/119843">http://www.cabi.org/isc/datasheet/119843</a> (1-6-2016) 2. Queensland Government <a href="https://www.business.qld.gov.au/industry/agriculture/species/declared-pests/weeds/white-thunbergia">https://www.business.qld.gov.au/industry/agriculture/species/declared-pests/weeds/white-thunbergia</a> (1-8-2016)	1. Seeds and plant fragments can be spread in dumped garden waste, and by water, soil movement, garden tools, and vehicles 2. Root pieces can spread by floodwater.
7.06		no evidence
7.07	1. 2000. Whistler, W.A.. <i>Tropical Ornamentals: A Guide</i> . Timber Press, Portland, OR	no evidence of mechanism for attachment
7.08		no evidence
8.01		no evidence
8.02		no evidence
8.03	1. CABI <a href="http://www.cabi.org/isc/datasheet/119843">http://www.cabi.org/isc/datasheet/119843</a> (1-6-2016)	In Australia, the only herbicide active registered for the control of <i>Thunbergia</i> species is imazapyr. This herbicide should be applied in a ratio of 7.5 ml/L water. For effective control, apply the herbicide when the plant is actively growing
8.04	1. CABI <a href="http://www.cabi.org/isc/datasheet/119843">http://www.cabi.org/isc/datasheet/119843</a> (1-6-2016)	Tolerates, or benefits from, cultivation, browsing pressure, mutilation, fire
8.05		no evidence