

<b>Taxon:</b> <i>Senna pendula</i> (Willd.) H. S. Irwin & Barneby	<b>Family:</b> Fabaceae
<b>Common Name(s):</b> Christmas senna climbing cassia Easter cassia valamuerto	<b>Synonym(s):</b> <i>Cassia bicapsularis</i> (Misapplied) <i>Cassia pendula</i> Humb. & Bonpl. ex

<b>Assessor:</b> Chuck Chimera	<b>Status:</b> Assessor Approved	<b>End Date:</b> 20 Jun 2016
<b>WRA Score:</b> 14.0	<b>Designation:</b> H(Hawai'i)	<b>Rating:</b> High Risk

**Keywords:** Naturalized, Environmental Weed, Dense Stands, Prolific Seeder, Resprouts

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	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed		
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	y
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	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
408	Creates a fire hazard in natural ecosystems		

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)	y=1, n=0	y
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		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed		
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut		
801	Prolific seed production (>1000/m <sup>2</sup> )	y=1, n=-1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y=-1, n=1	n

**Supporting Data:**

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	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 domestication] "Native to the New World tropics and subtropics, widely cultivated and naturalized; in Hawai'i cultivated and naturalized at low elevations often in dry, disturbed areas, 15-670 m, documented from all of the main islands except Ni'ihau and Kaho'olawe"

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
	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 20 Jun 2016]	"Native: Northern America : Mexico Southern America Brazil: Brazil Caribbean: Cuba; Dominican Republic; Haiti; Hispaniola; Trinidad and Tobago Mesoamerica: Belize; Guatemala; Panama Northern South America: Venezuela Southern South America: Argentina; Paraguay; Uruguay Western South America: Bolivia; Colombia; Peru"

202	Quality of climate match data	High
	Source(s)	Notes
	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 20 Jun 2016]	

203	Broad climate suitability (environmental versatility)	n
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	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.	"in Hawai'i cultivated and naturalized at low elevations often in dry, disturbed areas, 15-670 m"
	Brown, S.H. 2011. <i>Senna pendula</i> Factsheet. IFAS, University of Florida, Fort Myers, FL	"Zone: 10a-12b, 28°F"

204	Native or naturalized in regions with tropical or subtropical climates	y
	<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 20 Jun 2016]	"Native: Northern America : Mexico Southern America Brazil: Brazil Caribbean: Cuba; Dominican Republic; Haiti; Hispaniola; Trinidad and Tobago Mesoamerica: Belize; Guatemala; Panama Northern South America: Venezuela Southern South America: Argentina; Paraguay; Uruguay Western South America: Bolivia; Colombia; Peru Naturalized: Africa Macaronesia: Portugal - Madeira Islands Southern Africa: South Africa Australasia Australia: Australia Northern America South-Central U.S.A.: United States - Texas Southeastern U.S.A.: United States - Florida Southwestern U.S.A.: United States - California Pacific North-Central Pacific: United States - Hawaii Southern America Caribbean: Bahamas"

205	Does the species have a history of repeated introductions outside its natural range?	y
	<b>Source(s)</b>	<b>Notes</b>
	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.	"Native to the New World tropics and subtropics, widely cultivated and naturalized"
	Langeland, K.A. & Burks, K.C. (eds.). 2008. Identification and Biology of Non-Native Plants in Florida's Natural Areas. UF/IFAS Distribution, Gainesville, FL	"naturalized in the Bahamas and Florida, and probably also in southern Alabama, Louisiana, and Mississippi (Isely 1990). Cultivated in all regions of Florida (Hunt 1977, Nelson 1996). Often sold as <i>C. bicapsularis</i> (Isely 1990). Documented by herbarium records from peninsular Florida, from Hillsborough and Brevard south to Dade and Collier counties (Wunderlin et al. 1995)."

Qsn #	Question	Answer
301	<b>Naturalized beyond native range</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	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.	"in Hawai'i cultivated and naturalized at low elevations often in dry, disturbed areas, 15-670 m, documented from all of the main islands except Ni'ihau and Kaho'olawe."
	Langeland, K.A. & Burks, K.C. (eds.). 2008. Identification and Biology of Non-Native Plants in Florida's Natural Areas. UF/IFAS Distribution, Gainesville, FL	"naturalized in the Bahamas and Florida, and probably also in southern Alabama, Louisiana, and Mississippi (Isely 1990)."
	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 20 Jun 2016]	"Naturalized: Africa Macaronesia: Portugal - Madeira Islands Southern Africa: South Africa Australasia Australia: Australia Northern America South-Central U.S.A.: United States - Texas Southeastern U.S.A.: United States - Florida Southwestern U.S.A.: United States - California Pacific North-Central Pacific: United States - Hawaii Southern America Caribbean: Bahamas"
	Csurhes, S. & Edwards, R. 1998. Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	"The plant is very common in gardens in Brisbane and has naturalised in highly disturbed urban bushland and farmland throughout much of coastal south-east Queensland and northern New South Wales, primarily along roadsides and the banks of watercourses."

302	<b>Garden/amenity/disturbance weed</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	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.	[Disturbance weed with negative impacts in pastures and/or natural environment] "naturalized at low elevations often in dry, disturbed areas"

303	<b>Agricultural/forestry/horticultural weed</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Environmental impact: Forms dense stands in pastures and other disturbed areas. Seem to be more of a problem in drier areas." [Possibly, although palatable to livestock]

304	<b>Environmental weed</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>

Qsn #	Question	Answer
	Brisbane City Council. 2016. Weed Identification Tool - Easter cassia <i>Senna pendula</i> var. <i>glabrata</i> . <a href="http://weeds.brisbane.qld.gov.au/weeds/easter-cassia">http://weeds.brisbane.qld.gov.au/weeds/easter-cassia</a> . [Accessed 20 Jun 2016]	"Easter cassia ( <i>Senna pendula</i> var. <i>glabrata</i> ) is regarded as a significant environmental weed in New South Wales and Queensland. It was recently listed as a priority environmental weed in two Natural Resource Management regions, and is actively managed by community groups in Queensland. Typically this species outcompetes native species through it's prolific fruit production and rapid growth rate."
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Forms dense stands in pastures and other disturbed areas. Seem to be more of a problem in drier areas."
	Csurhes, S. & Edwards, R. 1998. Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	"It is not considered to be a significant threat to native bushland."

305	Congeneric weed	y
	Source(s)	Notes
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	<i>Senna alata</i> , <i>S. bicapsularis</i> , <i>S. didymobotrya</i> , <i>S. obtusifolia</i> [listed as significant weeds of natural areas]

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	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] "Scandent or weakly erect, foetid shrubs 2-6 m tall. Leaflets (2) 3-6 (7) pairs, the distal ones larger, broadly to narrowly obovate or obovate-cuneate, (1.8-) 2.2-5.5 (-6.5) cm long, (0.7-) 1-2 (-2.4) cm wide, upper surface green, glabrous, lower surface slightly glaucous, glabrous or sparsely pubescent toward base or along midrib, apex rounded, mucronulate or shallowly emarginate, base obliquely cuneate, petiolar nectaries always between the first and sometimes also second pairs of leaflets, 0.7-2.8 mm long, stipules linear-lanceolate to linear-oblongate, 1.5-9 mm long, caducous. "

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

403	Parasitic	n
	Source(s)	Notes
	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.	"Scandent or weakly erect, foetid shrubs 2-6 m tall" [Fabaceae. No evidence]

404	Unpalatable to grazing animals	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Cab-Jiménez, F. E., Ortega-Cerrilla, M. E., Quero-Carrillo, A. R., Enríquez-Quiroz, J. F., Vaquera-Huerta, H., & Carranco-Jauregui, M. E. (2015). Composición química y digestibilidad de algunos árboles tropicales forrajeros de Campeche, México. <i>Revista Mexicana de Ciencias Agrícolas</i> , 11: 2199-2204	"In order to evaluate their potential as an alternative foraging resource, the chemical composition, digestibility and antinutritional factors of <i>Lysiloma latisiliquum</i> , <i>Senna racemosa</i> , <i>Bauhinia divaricata</i> , <i>Senna pendula</i> , <i>Albizia lebbeck</i> , <i>Piscidia piscipula</i> , and <i>Lonchocarpus rugosus</i> , were determined." ... "The greatest digestibility of DM was for <i>S. pendula</i> (89.1 and 85.0%), and the lowest for <i>L. rugosus</i> (40.1 and 48%), in both seasons."

405	Toxic to animals	n
	Source(s)	Notes
	Cab-Jiménez, F. E., Ortega-Cerrilla, M. E., Quero-Carrillo, A. R., Enríquez-Quiroz, J. F., Vaquera-Huerta, H., & Carranco-Jauregui, M. E. (2015). Composición química y digestibilidad de algunos árboles tropicales forrajeros de Campeche, México. <i>Revista Mexicana de Ciencias Agrícolas</i> , 11: 2199-2204	[No evidence] "In order to evaluate their potential as an alternative foraging resource, the chemical composition, digestibility and antinutritional factors of <i>Lysiloma latisiliquum</i> , <i>Senna racemosa</i> , <i>Bauhinia divaricata</i> , <i>Senna pendula</i> , <i>Albizia lebbeck</i> , <i>Piscidia piscipula</i> , and <i>Lonchocarpus rugosus</i> , were determined." ... "The greatest digestibility of DM was for <i>S. pendula</i> (89.1 and 85.0%), and the lowest for <i>L. rugosus</i> (40.1 and 48%), in both seasons."
	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	No evidence
	Wagstaff, D.J. 2008. <i>International poisonous plants checklist: an evidence-based reference</i> . CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	n
	Source(s)	Notes
	Brown, S.H. 2011. <i>Senna pendula</i> Factsheet. IFAS, University of Florida, Fort Myers, FL	"Potential Pests: Caterpillars, Hibiscus Mealybugs, Scales"

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	No evidence
	Wagstaff, D.J. 2008. <i>International poisonous plants checklist: an evidence-based reference</i> . CRC Press, Boca Raton, FL	No evidence

Qsn #	Question	Answer
408	<b>Creates a fire hazard in natural ecosystems</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	[May contribute to fuel load in fire prone areas] 'Forms dense stands in pastures and other disturbed areas. Seem to be more of a problem in drier areas.'
409	<b>Is a shade tolerant plant at some stage of its life cycle</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Floridata. 2016. <i>Senna pendula</i> . <a href="http://floridata.com/Plants/Fabaceae/Senna%20pendula/578">http://floridata.com/Plants/Fabaceae/Senna%20pendula/578</a> . [Accessed 20 Jun 2016]	"Light: Full sun for best flowering. Will tolerate partial shade."
410	<b>Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Langeland, K.A. & Burks, K.C. (eds.). 2008. Identification and Biology of Non-Native Plants in Florida's Natural Areas. UF/IFAS Distribution, Gainesville, FL	"does well in sandy soil"
	Queensland University of Technology – Institute for Sustainable Resources. 2007. Samford Ecological Research Facility – Weed Management Plan. QUT, Brisbane, Qld	"Easter Cassia is an extremely invasive species which tolerates a wide range of environmental conditions. It favours damp, disturbed areas but will readily colonise any disturbed habitat."
	Floridata. 2016. <i>Senna pendula</i> . <a href="http://floridata.com/Plants/Fabaceae/Senna%20pendula/578">http://floridata.com/Plants/Fabaceae/Senna%20pendula/578</a> . [Accessed 20 Jun 2016]	"Easy to grow and fast-growing. Moderately salt tolerant. Likes sandy soil." ... "Moisture: Prefers moist soil, but not waterlogged. Only moderately drought tolerant."
411	<b>Climbing or smothering growth habit</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Shrub that tends to sprawl over other plants, rocks, and fences."
412	<b>Forms dense thickets</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Forms dense stands in pastures and other disturbed areas. Seem to be more of a problem in drier areas."
	Queensland University of Technology – Institute for Sustainable Resources. 2007. Samford Ecological Research Facility – Weed Management Plan. QUT, Brisbane, Qld	"This species relies on ants, humans, rodents, gravity and water to disperse its seeds and will often be found in almost monospecific colonies."
501	<b>Aquatic</b>	<b>n</b>



Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Terrestrial] "Woodland, riparian habitats, tropical hammocks, coastal beaches. This is a variable species, belonging to a complex with numerous varieties."
<b>502</b>	<b>Grass</b>	<b>n</b>
	<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 20 Jun 2016]	Family: Fabaceae (alt.Leguminosae) Subfamily: Caesalpinioideae Tribe: Cassieae Subtribe: Cassiinae
<b>503</b>	<b>Nitrogen fixing woody plant</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Downing, A. & Downing, K. 2012. Plant of the Week - Cassia or Senna? Macquarie University, Sydney, Australia	"How do you tell a Senna from a Cassia? Both belong to the sub-family Caesalpinioideae of the pea family, Fabaceae, but they're not peas, don't have the characteristic papilionaceous (butterfly like) pea flowers and don't have nitrogen fixing nodules on their roots2."
<b>504</b>	<b>Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	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.	"Scandent or weakly erect, foetid shrubs 2-6 m tall."
<b>601</b>	<b>Evidence of substantial reproductive failure in native habitat</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Contu, S. 2012. <i>Senna pendula</i> . The IUCN Red List of Threatened Species 2012: e.T19892504A20140710. <a href="http://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T19892504A20140710.en">http://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T19892504A20140710.en</a> . [Accessed 20 Jun 2016]	" <i>Senna pendula</i> is widespread and common in its natural range and it has been introduced elsewhere. There are no major threats to this species at present and the populations is believed to be stable, hence it is rated as Least Concern."
<b>602</b>	<b>Produces viable seed</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Langeland, K.A. & Burks, K.C. (eds.). 2008. Identification and Biology of Non-Native Plants in Florida's Natural Areas. UF/IFAS Distribution, Gainesville, FL	"Flowers in late fall to early winter, producing numerous seeds in each pod (Isely 1990)."
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"Seed production is prolific and the long-lived seeds are dispersed by water and soil movement"
<b>603</b>	<b>Hybridizes naturally</b>	

Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. 2016. Personal Communication	Unknown

604	Self-compatible or apomictic	
	<b>Source(s)</b>	<b>Notes</b>
	Marazzi, B., & Endress, P. K. (2008). Patterns and development of floral asymmetry in <i>Senna</i> (Leguminosae, Cassiinae). <i>American Journal of Botany</i> , 95(1), 22-40	[Unknown] "In monomorphic enantiostylous taxa, such as <i>Senna</i> , the presence of both left and right floral morphs on the same plant and the observation that many of these plants are self-compatible indicate that geitonogamous self-pollination between different morphs is possible."

605	Requires specialist pollinators	n
	<b>Source(s)</b>	<b>Notes</b>
	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.	"Flowers in racemes 3- 30 cm long, pedicels 8-37 mm long, bracts subulate-lanceolate, 1-4 mm long, caducous as pedicels begin to elongate calyx lobes yellowish to reddish brown, outer ones ovate to elliptic-lanceolate, 3-10 mm long, the innermost obovate to elliptic-suborbicular, 7-15.5 mm long, margins membranous; petals golden yellow to orangish yellow, fading yellow, the standard broadly obovate-flabellate, the others ovate to obovate, the abaxial ones sometimes oblong-elliptic, the longest one 11-26 mm long; staminodes linear-oblanco late to rhombic-orbicular or inversely deltate, 1.2-4.5 mm long; filaments of 4 median stamens 1.4-4 mm long, those of lateral abaxial stamens dilated, 6.5-20 mm long, that of central abaxial stamen 1.6-7 mm long; anther of central abaxial stamen sterile, fertile anthers dehiscent by Ushaped slits."
	Ramírez, N. (2004). Ecology of pollination in a tropical Venezuelan savanna. <i>Plant Ecology</i> , 173(2), 171-189	"Table A1. Plant species, Life form, habitat, and pollination modes of 164 plant species of a Venezuelan Central Plain" [ <i>Senna pendula</i> Willd. var. <i>meticola</i> I. and B. - Pollination System = Bee]

606	Reproduction by vegetative fragmentation	n
	<b>Source(s)</b>	<b>Notes</b>
	Floridata. 2016. <i>Senna pendula</i> . <a href="http://floridata.com/Plants/Fabaceae/Senna%20pendula/578">http://floridata.com/Plants/Fabaceae/Senna%20pendula/578</a> . [Accessed 20 Jun 2016]	"Propagation: By seeds."
	Weber, E. 2003. <i>Invasive Plant Species of the World. A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	"The plant resprouts from the base after damage"

607	Minimum generative time (years)	
	<b>Source(s)</b>	<b>Notes</b>
	Brown, S.H. 2011. <i>Senna pendula</i> Factsheet. IFAS, University of Florida, Fort Myers, FL	"Growth Rate: Fast"

Qsn #	Question	Answer
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Brisbane City Council. 2016. Weed Identification Tool - Easter cassia <i>Senna pendula</i> var. <i>glabrata</i> . <a href="http://weeds.brisbane.qld.gov.au/weeds/easter-cassia">http://weeds.brisbane.qld.gov.au/weeds/easter-cassia</a> . [Accessed 20 Jun 2016]	"Seeds are often dispersed in dumped garden waste. They may also be spread by water or in contaminated soil."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Contu, S. 2012. <i>Senna pendula</i> . The IUCN Red List of Threatened Species 2012: e.T19892504A20140710. <a href="http://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T19892504A20140710.en">http://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T19892504A20140710.en</a> . [Accessed 20 Jun 2016]	"It is commonly cultivated as an ornamental."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	City of Gold Coast. 2014. Environmental weed fact sheets - Easter Cassia. <a href="http://www.goldcoast.qld.gov.au/documents/bf/weed-profile-easter-cassia-pdf-2014.pdf">http://www.goldcoast.qld.gov.au/documents/bf/weed-profile-easter-cassia-pdf-2014.pdf</a> . [Accessed 20 Jun 2016]	"Dispersal mechanisms cultivated-humans, rubbish dumping especially persistent fruit pods, rodents, ants, water"

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	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.	"Pods pendulous, chartaceous, cylindrical or compressed-cylindrical, straight or slightly curved, often portions sterile and then variably distorted, 7-18 cm long, tardily or not dehiscent, the meso carp and exocarp separating when fruit fully ripe, the cavity with membranous interseminal septa. Seeds in 1-2 rows, brown, smooth and glossy or dull, obliquely obovoid, perpendicular to capsule axis, embedded in copious or scanty pulp, 4.1-6.6 mm long, without an areole."

705	Propagules water dispersed	y
	Source(s)	Notes
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"Seed production is prolific and the long-lived seeds are dispersed by water and soil movement"
	Brisbane City Council. 2016. Weed Identification Tool - Easter cassia <i>Senna pendula</i> var. <i>glabrata</i> . <a href="http://weeds.brisbane.qld.gov.au/weeds/easter-cassia">http://weeds.brisbane.qld.gov.au/weeds/easter-cassia</a> . [Accessed ]	"Seeds are often dispersed in dumped garden waste. They may also be spread by water or in contaminated soil. Long-lived seeds are also dispersed by water and soil movement"

Qsn #	Question	Answer
706	<b>Propagules bird dispersed</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Langeland, K. 2003. Merry Christmas Senna. Wildland Weeds 7(1): 11-12	"Seeds may be dispersed by birds, mammals, and/or human conveyance but specific dispersal agents have not been identified."

707	<b>Propagules dispersed by other animals (externally)</b>	
	<b>Source(s)</b>	<b>Notes</b>
	City of Gold Coast. 2014. Environmental weed fact sheets - Easter Cassia. <a href="http://www.goldcoast.qld.gov.au/documents/bf/weed-profile-easter-cassia-pdf-2014.pdf">http://www.goldcoast.qld.gov.au/documents/bf/weed-profile-easter-cassia-pdf-2014.pdf</a> . [Accessed 20 Jun 2016]	[Ants may be attracted to pulp on seeds] "Dispersal mechanisms cultivated-humans, rubbish dumping especially persistent fruit pods, rodents, ants, water"
	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.	[Pulp may contribute to ant dispersal] "Pods pendulous, chartaceous, cylindrical or compressed-cylindrical, straight or slightly curved, often portions sterile and then variably distorted, 7-18 cm long, tardily or not dehiscent, the meso carp and exocarp separating when fruit fully ripe, the cavity with membranous interseminal septa. Seeds in 1-2 rows, brown, smooth and glossy or dull, obliquely obovoid, perpendicular to capsule axis, embedded in copious or scanty pulp, 4.1-6.6 mm long, without an areole."

708	<b>Propagules survive passage through the gut</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Langeland, K.A. & Burks, K.C. (eds.). 2008. Identification and Biology of Non-Native Plants in Florida's Natural Areas. UF/IFAS Distribution, Gainesville, FL	[Unknown. Possible that seeds consumed by browsing animals may survive gut passage] "Seeds may be dispersed by birds, mammals, and/or human conveyance but specific dispersal agents have not been identified."

801	<b>Prolific seed production (&gt;1000/m<sup>2</sup>)</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Langeland, K. 2003. Merry Christmas Senna. Wildland Weeds 7(1): 11-12	"Christmas senna produces flowers from October through January. Large numbers of seeds are produced, which mature through the spring and summer."
	Langeland, K.A. & Burks, K.C. (eds.). 2008. Identification and Biology of Non-Native Plants in Florida's Natural Areas. UF/IFAS Distribution, Gainesville, FL	"Flowers in late fall to early winter, producing numerous seeds in each pod (Isely 1990)."
	Csurhes, S. & Edwards, R. 1998. Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	" <i>Senna pendula</i> is a small South American shrub (2-5m) which produces masses of bright yellow flowers in March/April, followed by hundreds of pods each containing 5-10 seeds."

802	<b>Evidence that a persistent propagule bank is formed (&gt;1 yr)</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"Seed production is prolific and the long-lived seeds are dispersed by water and soil movement" [Longevity of seeds unknown]

Qsn #	Question	Answer
	City of Gold Coast. 2014. Environmental weed fact sheets - Easter Cassia. <a href="http://www.goldcoast.qld.gov.au/documents/bf/weed-profile-easter-cassia-pdf-2014.pdf">http://www.goldcoast.qld.gov.au/documents/bf/weed-profile-easter-cassia-pdf-2014.pdf</a> . [Accessed 20 Jun 2016]	"Viability 10 years"

803	Well controlled by herbicides	y
	Source(s)	Notes
	Langeland, K. 2003. Merry Christmas Senna. <i>Wildland Weeds</i> 7(1): 11-12	"Christmas senna can be controlled by foliar or basal bark herbicide application. The following foliar applications on a spray-to-wet basis have been found effective: 1.0% Roundup Pro, 0.5% Garlon 3A + 0.375% Induce, 0.50 oz/gal Escort + 0.375% Induce, 3.13% Brush-B-Gon. Basal bark application of 10% Garlon 4 in oil is used by the Southwest Florida Water Management District (Mack Sweat, 2003 personal communication)."
	Weber, E. 2003. <i>Invasive Plant Species of the World. A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	"Larger plants are cut and the cut stumps treated with herbicide. Foliar sprays are most effective on seedlings and on fresh regrowth"
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. <i>Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide</i> . CTAHR, UH Manoa, Honolulu, HI	"Management: Based on work with other sennas, probably sensitive to dicamba and triclopyr and tolerant of MCPA."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Weber, E. 2003. <i>Invasive Plant Species of the World. A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	"The plant resprouts from the base after damage"
	Langeland, K.A. & Burks, K.C. (eds.). 2008. <i>Identification and Biology of Non-Native Plants in Florida's Natural Areas</i> . UF/IFAS Distribution, Gainesville, FL	[Recovers from freezing & pruning] "Hardy north of the frost line; will come back if tops killed by freezing (Maxwell and Maxwell 1961). Grows easily once established (Nelson 1996). Quite salt tolerant; does well in sandy soil; needs pruning regularly to contain sprawl (Maxwell and Maxwell 1961)."
	Kubiak, P. J. 2009. Fire responses of bushland plants after the January 1994 wildfires in northern Sydney. <i>Cunninghamia</i> , 11(1): 131-165	R = majority of adult plants resprouted after the fires

Qsn #	Question	Answer
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	n
	<b>Source(s)</b>	<b>Notes</b>
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	[Presumably No] "Distribution: Native of tropical and subtropical Americas. Now widely distributed as an ornamental and naturalized. In Hawai'i, common in lowland pastures and other disturbed areas including dry zones such as Kona and Moloka'i and wetter areas such as Hana, Maui, and east Kaua'i. Not recorded on Ni'i'hau. <i>Senna pendula</i> Environmental impact: Forms dense stands in pastures and other disturbed areas. Seem to be more of a problem in drier areas."
	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.	[Presumably No] "in Hawai'i cultivated and naturalized at low elevations often in dry, disturbed areas, 15-670 m, documented from all of the main islands except Ni'i'hau and Kaho'olawe"

**Summary of Risk Traits:**

High Risk / Undesirable Traits

- Thrives in tropical climates
- Widely naturalized, including all main Hawaiian Islands
- Disturbance weed of pastures & natural environment
- Other *Senna* species are invasive
- Tolerates many soil types
- Forms dense stands
- Reproduces by seeds
- Seeds dispersed by water, ants, rodents, soil movement, dumped garden waste & intentionally by people
- Prolific seed production
- Seeds form a persistent seed bank
- Able to coppice & resprout after cutting, pruning or fire

Low Risk Traits

- Unarmed (no spines, thorns or burrs)
- Palatable to browsing & grazing animals
- Non-toxic
- Ornamental
- Not reported to spread vegetatively
- Herbicides provide effective control