

Family: *Acanthaceae*

Taxon: *Justicia pectoralis*

Synonym: *Dianthera pectoralis* (Jacq.) J.F. Gmel.
Dianthera pectoralis (Jacq.) Murray
Ecbolium pectorale (Jacq.)
Justicia pectoralis var. *stenophylla* (no access)

Common Name: Death angel
curía
Tilo

Questionnaire :	current 20090513	Assessor:	Chuck Chimera	Designation:	H(HPWRA)
Status:	Assessor Approved	Data Entry Person:	Chuck Chimera	WRA Score	8
101	Is the species highly domesticated?			y=-3, n=0	n
102	Has the species become naturalized where grown?			y=1, n=-1	
103	Does the species have weedy races?			y=1, n=-1	
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	n
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)	y
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			y=1, n=0	
403	Parasitic			y=1, n=0	n
404	Unpalatable to grazing animals			y=1, n=-1	
405	Toxic to animals			y=1, n=0	
406	Host for recognized pests and pathogens			y=1, n=0	n
407	Causes allergies or is otherwise toxic to humans			y=1, n=0	
408	Creates a fire hazard in natural ecosystems			y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle			y=1, n=0	y

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	n
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	
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	y=1, n=-1	
604	Self-compatible or apomictic	y=1, n=-1	
605	Requires specialist pollinators	y=-1, n=0	y
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -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	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	
705	Propagules water dispersed	y=1, n=-1	
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	
708	Propagules survive passage through the gut	y=1, n=-1	
801	Prolific seed production (>1000/m2)	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	
803	Well controlled by herbicides	y=-1, n=1	
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y=-1, n=1	

Designation: H(HPWRA)

WRA Score **8**

Supporting Data:

101	1978. Croat, T.B.. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[Is the species highly domesticated? No] No evidence
102	2012. WRA Specialist. Personal Communication.	NA
103	2012. WRA Specialist. Personal Communication.	NA
201	1978. Croat, T.B.. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[Species suited to tropical or subtropical climate(s) 2- High] "Wide ranging and weedy throughout the New World tropics, including the West Indies. In Panama, known from tropical moist forest in the Canal Zone (both slopes), Cordon, Chirigqui (David), Panama, and Darien and from premontane wet forest in Panama (Chiman)."
202	1978. Croat, T.B.. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[Quality of climate match data? 2-high] "Wide ranging and weedy throughout the New World tropics, including the West Indies. In Panama, known from tropical moist forest in the Canal Zone (both slopes), Cordon, Chirigqui (David), Panama, and Darien and from premontane wet forest in Panama (Chiman)."
203	2005. McDade, L.A./Tripp, E.A./Daniel, T.F.. Acanthaceae of La Selva Biological Station. La Selva Biological Station, La Selva, Costa Rica http://clade.ansp.org/botany/people/mcdade/La_Selva_Acanths.pdf	[Broad climate suitability (environmental versatility)? No] "Distribution. Mexico south to Peru, Bolivia, Brazil, Antilles. In Costa Rica, the species is known from below 1000m on both slopes; it is not known from tropical dry forest."
203	2012. Dave's Gardern. PlantFiles: Freshcut - Justicia pectoralis. http://davesgarden.com/guides/pf/go/82123/	[Broad climate suitability (environmental versatility)? No] "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)"
204	1978. Croat, T.B.. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[Native or naturalized in regions with tropical or subtropical climates? Yes] "Wide ranging and weedy throughout the New World tropics, including the West Indies. In Panama, known from tropical moist forest in the Canal Zone (both slopes), Cordon, Chirigqui (David), Panama, and Darien and from premontane wet forest in Panama (Chiman)."
204	2003. Wunderlin, R.P./Hansen, B.F.. Guide to the Vascular Plants of Florida. University Press of Florida, Gainesville, FL	[Native or naturalized in regions with tropical or subtropical climates? Yes] "Disturbed sites. Rare; Hillsborough and Miami-Dade Cos. Native to tropical America."
205	2012. WRA Specialist. Personal Communication.	[Does the species have a history of repeated introductions outside its natural range? No] Broad native range in Neotropics and South America. Otherwise, introduced and naturalized in Florida
301	2003. Wunderlin, R.P./Hansen, B.F.. Guide to the Vascular Plants of Florida. University Press of Florida, Gainesville, FL	[Naturalized beyond native range? Yes] "Disturbed sites. Rare; Hillsborough and Miami-Dade Cos. Native to tropical America."
302	1978. Croat, T.B.. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[Garden/amenity/disturbance weed? Yes] "Wide ranging and weedy throughout the New World tropics, including the West Indies."
302	1978. Woodson, Jr.; R.E./Schery, R.W./Durkee, L.H.. Flora of Panama. Part IX. Family 177. Acanthaceae. Annals of the Missouri Botanical Garden. 65(1): 155-283.	[Garden/amenity/disturbance weed? Yes] "This species is a common weed of roadsides and waste places at elevations near sea level in tropical America and the West Indies."
302	1979. Holm, L. G./Pancho, J.V./Herberger, J.P./Plucknett, D.L.. A Geographical Atlas of World Weeds. John Wiley and Sons, New York, NY	[Garden/amenity/disturbance weed? Yes] Listed as a common weed of Trinidad
303	2007. Randall, R.P.. Global Compendium of Weeds - Justicia pectoralis [Online Database]. http://www.hear.org/gcw/species/justicia_pectoralis/	[Agricultural/forestry/horticultural weed? No] No evidence
304	2007. Randall, R.P.. Global Compendium of Weeds - Justicia pectoralis [Online Database]. http://www.hear.org/gcw/species/justicia_pectoralis/	[Environmental weed? No] No evidence
305	2004. Meyer, J-Y./Lavergne, C.. Beautés fatales : Acanthaceae species as invasive alien plants on tropical Indo-Pacific Islands. Diversity and Distributions. 10: 333-347.	[Congeneric weed? Yes] "Justicia carnea is an ornamental shrub commonly cultivated in tropical countries and islands for its dense inflorescence of attractive pink flowers. The species was only known in ' one or two gardens ' in the 1930s on Rarotonga (Cook Is.) (Wilder, 1931: 100) and has since extensively spread (infested area > 500 m ²) in a single valley of the island, chocking out the native and secondary wet vegetation. The species seems to reproduce only by vegetative means."

401	1978. Woodson, Jr.; R.E./Schery, R.W./Durkee, L.H.. Flora of Panama. Part IX. Family 177. Acanthaceae. Annals of the Missouri Botanical Garden. 65(1): 155-283.	[Produces spines, thorns or burrs? No] "Herbs to 2 m tall; stems weak, erect or ascending, often rooting at the lower nodes, subquadrangular, grooved, glabrous to puberulous, the hairs retrorse."
402	2012. WRA Specialist. Personal Communication.	[Allelopathic? Unknown]
403	1978. Croat, T.B.. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[Parasitic? No] No evidence
404	2012. WRA Specialist. Personal Communication.	[Unpalatable to grazing animals? Unknown]
405	2009. Lagarto, A./Bueno, V./Guerra, I./Valdés, O./Gabilondo and Jorge Rodríguez, T.. Acute and Subchronic Oral Toxicities of <i>Justicia pectoralis</i> J. Extract in Wistar Rats. The Open Natural Products Journal. 2: 53-58.	[Toxic to animals? Unlikely, but may contain toxic chemicals that could potentially poison animals] "Abstract: We have studied the acute and subchronic oral toxicities of <i>Justicia pectoralis</i> J hydroalcoholic extract in Wistar rats. In acute test, both sexes of adult Wistar rats were given single po dose of <i>J. pectoralis</i> extract at 2000 mg/kg. Following euthanasia 14 days later, mortality and signs of toxicity were not observed. In subchronic test, <i>J. pectoralis</i> extract was po administered to both sexes of Wistar rats at 10, 100 and 1000 mg/kg/day, 5 days per week for 90 days. The major toxicological endpoints examined included animal body weight, food intake, selected tissue weights, and histopathological examinations. In addition, we examined blood elements and blood chemistry. Of the blood elements, the blood clotting time was significantly affected in males and females after 90 days. For blood chemistry parameters, cholesterol, ALT, bilirubin, and urea were affected. Organs and tissues abnormalities were not observed in histopathological examination. These results indicate that the effects observed are low and include slight variations in blood clotting time and biochemical parameters."
406	2012. Top Tropicals. <i>Justicia pectoralis</i> . Top Tropicals Botanical Garden, http://toptropicals.com/catalog/uid/Justicia_pectoralis.htm	[Host for recognized pests and pathogens? No] "With few problems and pests, it weathers our summers with ease, and can't survive freezing temperatures. (By Lu Weber)."
407	1997. Lino, C.S./Taveira, M.L./Viana, G.S.B./Matos, F.J.A.. Analgesic and Antiinflammatory Activities of <i>Justicia pectoralis</i> Jacq and its Main Constituents: Coumarin and Umbelliferone. Phytotherapy Research. 11: 211-215.	[Causes allergies or is otherwise toxic to humans? Possibly if taken at incorrect dose] " <i>Justicia pectoralis</i> Jacq., var. <i>Stenophylla</i> Leonard (Acanthaceae), is a medicinal herb largely utilized in the Northern and Northeastern regions of Brazil as an expectorant, antiasthmatic and analgesic. It is also used against cough and bronchitis and as an hallucinogen by the South American indians; in this case, probably because of the presence in its leaves of N,N-dimethyltryptamine (Melo and Andrade, 1989)."
407	2009. Ocampo, R./Balick, M.J.. Plants of Semillas Sagradas: An Ethnomedicinal Garden in Costa Rica. Finca Luna Nueva Extractos de Costa Rica,,	[Causes allergies or is otherwise toxic to humans? No evidence] "Toxicity: This plant is known to contain hepatotoxic coumarins, although there are no reports of toxicity that can be attributed to the presence of these particular substances. Reference is also made to a study that involved a decoction of 2,889 kg of fresh aerial parts to 7,850 l of distilled water that was lyophilized and administered orally (5 g/kg/day/5 days) to Swiss mice of both sexes that caused no deaths or noticeable signs of toxicity (Germosén-Robineau 2005)."
407	2012. Top Tropicals. <i>Justicia pectoralis</i> . Top Tropicals Botanical Garden, http://toptropicals.com/catalog/uid/Justicia_pectoralis.htm	[Causes allergies or is otherwise toxic to humans? No evidence] "Its leaves and stems contain coumarin, an anticoagulant. It is used medicinally in S. America and has been used as an admixture in virola snuffs, partially for it's vanilla-like smell."
408	1978. Woodson, Jr.; R.E./Schery, R.W./Durkee, L.H.. Flora of Panama. Part IX. Family 177. Acanthaceae. Annals of the Missouri Botanical Garden. 65(1): 155-283.	[Creates a fire hazard in natural ecosystems? No] "This species is a common weed of roadsides and waste places at elevations near sea level in tropical America and the West Indies." [No evidence]
409	2012. Heavenly Products. <i>Justicia pectoralis</i> (Tilo). https://www.heavenly-products.com/cart/justicia-pectoralis-tilo-bare-rooted-p-644.html	[Is a shade tolerant plant at some stage of its life cycle? Yes] "Likes to Grow in Shady Spots"
409	2012. Top Tropicals. <i>Justicia pectoralis</i> . Top Tropicals Botanical Garden, http://toptropicals.com/catalog/uid/Justicia_pectoralis.htm	[Is a shade tolerant plant at some stage of its life cycle? Yes] "The leaves are yellowish when it is grown in full sun and become a rich, dark green in shady situations."
410	2012. Dave's Gardern. PlantFiles: Freshcut - <i>Justicia pectoralis</i> . http://davesgarden.com/guides/pf/go/82123/	[Tolerates a wide range of soil conditions? No] "Soil pH requirements: 6.6 to 7.5 (neutral) 7.6 to 7.8 (mildly alkaline)"

411	1978. Woodson, Jr.; R.E./Schery, R.W./Durkee, L.H.. Flora of Panama. Part IX. Family 177. Acanthaceae. Annals of the Missouri Botanical Garden. 65(1): 155-283.	[Climbing or smothering growth habit? No] "Herbs to 2 m tall; stems weak, erect or ascending, often rooting at the lower nodes, subquadrangular, grooved, glabrous to puberulous, the hairs retrorse."
412	1992. Lachman-White, D.A./Adams, C.D./O'D Trotz, U.. A guide to the medicinal plants of coastal Guyana. Commonwealth Secretariat Publications, London, UK	[Forms dense thickets? In thickets, but no indication that this species forms a monoculture] "In low open thickets and grassy places."
501	1978. Woodson, Jr.; R.E./Schery, R.W./Durkee, L.H.. Flora of Panama. Part IX. Family 177. Acanthaceae. Annals of the Missouri Botanical Garden. 65(1): 155-283.	[Aquatic? No] Terrestrial
502	1978. Woodson, Jr.; R.E./Schery, R.W./Durkee, L.H.. Flora of Panama. Part IX. Family 177. Acanthaceae. Annals of the Missouri Botanical Garden. 65(1): 155-283.	[Grass? No] Acanthaceae
503	1978. Woodson, Jr.; R.E./Schery, R.W./Durkee, L.H.. Flora of Panama. Part IX. Family 177. Acanthaceae. Annals of the Missouri Botanical Garden. 65(1): 155-283.	[Nitrogen fixing woody plant? No] Acanthaceae
504	1978. Woodson, Jr.; R.E./Schery, R.W./Durkee, L.H.. Flora of Panama. Part IX. Family 177. Acanthaceae. Annals of the Missouri Botanical Garden. 65(1): 155-283.	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "Herbs to 2 m tall; stems weak..." [No evidence]
601	1978. Croat, T.B.. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[Evidence of substantial reproductive failure in native habitat? No] No evidence
601	1978. Woodson, Jr.; R.E./Schery, R.W./Durkee, L.H.. Flora of Panama. Part IX. Family 177. Acanthaceae. Annals of the Missouri Botanical Garden. 65(1): 155-283.	[Evidence of substantial reproductive failure in native habitat? No] No evidence
602	1978. Woodson, Jr.; R.E./Schery, R.W./Durkee, L.H.. Flora of Panama. Part IX. Family 177. Acanthaceae. Annals of the Missouri Botanical Garden. 65(1): 155-283.	[Produces viable seed? Yes] "Capsules clavate, to 8 mm long, 2 mm wide, puberulous; seeds orbicular, flattened, 1.5 mm in diameter."
602	2012. Top Tropicals. <i>Justicia pectoralis</i> . Top Tropicals Botanical Garden, http://toptropicals.com/catalog/uid/Justicia_pectoralis.htm	[Produces viable seed? Yes] "Velvety flattened seeds are found in seed capsule."
603	2012. WRA Specialist. Personal Communication.	[Hybridizes naturally? Unknown]
604	1978. Croat, T.B.. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[Self-compatible or apomictic? Unknown] "flowers sessile, sparse; calyx ca. 2.5 mm long, the pubescence as on inflorescence branches, the lobes long, sharp, the uppermost shorter; corolla bilabiate, lavender except for white base, the upper lip sparsely pubescent outside, narrow, folded, enclosing style in medial groove, the lower lip trilobate, its middle lobe corrugated with prominent raised, white lateral veins extending into tube on either side of medial groove; stamens 2, affixed laterally, arching to center, anthers horseshoe-shaped, loosely clasping style; style slender, 7-8 mm long, curved downward at apex."
605	1978. Croat, T.B.. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[Requires specialist pollinators? Yes] "Pollination is effected by a small insect, which crawls into the tube (no doubt with the corrugated, somewhat downturned lower lip acting as a landing platform). In crawling beneath the arched stamens, it spreads pollen on its back. At the same time the style is released from its groove and strikes the pollinator's back."
606	2012. Top Tropicals. <i>Justicia pectoralis</i> . Top Tropicals Botanical Garden, http://toptropicals.com/catalog/uid/Justicia_pectoralis.htm	[Reproduction by vegetative fragmentation? Yes] "Tilo is a climbing or trailing herb with slender stems that root at the nodes...To propagate, any node will put out roots."
607	1992. Lachman-White, D.A./Adams, C.D./O'D Trotz, U.. A guide to the medicinal plants of coastal Guyana. Commonwealth Secretariat Publications, London, UK	[Minimum generative time (years)? Unknown] "A perennial lo herb with slender branches rooting sparingly from the nodes..." [Unknown, but probably between 1-2 years]

701	1978. Woodson, Jr.; R.E./Schery, R.W./Durkee, L.H.. Flora of Panama. Part IX. Family 177. Acanthaceae. Annals of the Missouri Botanical Garden. 65(1): 155-283.	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? Yes] "This species is a common weed of roadsides and waste places at elevations near sea level in tropical America and the West Indies." [Distribution suggests species is probably moved via human traffic]
701	2005. McDade, L.A./Tripp, E.A./Daniel, T.F.. Acanthaceae of La Selva Biological Station. La Selva Biological Station, La Selva, Costa Rica http://clade.ansp.org/botany/people/mcdade/La_Selva_Acanths.pdf	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? Yes] "At La Selva, plants have mostly been collected in secondary areas near the developed parts of the reserve, and along the edges of trails running through fairly open areas." [Distribution along trails suggests inadvertent dispersal]
702	2012. Heavenly Products. Justicia pectoralis (Tilo). https://www.heavenly-products.com/cart/justicia-pectoralis-tilo-bare-rooted-p-644.html	[Propagules dispersed intentionally by people? Yes] Grown for medicinal purposes
702	2012. Top Tropicals. Justicia pectoralis. Top Tropicals Botanical Garden, http://toptropicals.com/catalog/uid/Justicia_pectoralis.htm	[Propagules dispersed intentionally by people? Yes] Planted as an ornamental
703	2012. WRA Specialist. Personal Communication.	[Propagules likely to disperse as a produce contaminant? No] No evidence that this plant is cultivated with produce.
704	1978. Croat, T.B.. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[Propagules adapted to wind dispersal? Possibly for short distances] "Capsules club-shaped, acute at apex, 6-8 mm long, 1.5 mm broad, puberulent, seeds ca. 1.5 mm broad, covered with papillae, the papillae minute, immediately becoming sticky upon wetting."
704	1992. Lachman-White, D.A./Adams, C.D./O'D Trotz, U.. A guide to the medicinal plants of coastal Guyana. Commonwealth Secretariat Publications, London, UK	[Propagules adapted to wind dispersal? Possibly for short distances] "Capsules dehiscent elastically."
705	2000. van Andel, T.R.. Non-timber forest products of the North-West District of Guyana Part II. Tropenbos-Guyana Programme, Georgetown, Guyana	[Propagules water dispersed? Possibly] "Along forest creeks, often planted in house yards." [Potentially dispersed along waterways]
706	1978. Croat, T.B.. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[Propagules bird dispersed? No] "Capsules club-shaped, acute at apex, 6-8 mm long, 1.5 mm broad, puberulent, seeds ca. 1.5 mm broad, covered with papillae, the papillae minute, immediately becoming sticky upon wetting." [Not fleshy-fruited, or adapted for internal bird dispersal]
707	1978. Croat, T.B.. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[Propagules dispersed by other animals (externally)? Unknown] "Capsules club-shaped, acute at apex, 6-8 mm long, 1.5 mm broad, puberulent, seeds ca. 1.5 mm broad, covered with papillae, the papillae minute, immediately becoming sticky upon wetting." [Stickiness may allow seeds to adhere to animals]
708	1978. Croat, T.B.. Flora of Barro Colorado Island. Stanford University Press, Stanford, CA	[Propagules survive passage through the gut? Unknown] "Capsules club-shaped, acute at apex, 6-8 mm long, 1.5 mm broad, puberulent, seeds ca. 1.5 mm broad, covered with papillae, the papillae minute, immediately becoming sticky upon wetting." [Capsules and seeds not adapted for consumption and internal dispersal]
801	1978. Woodson, Jr.; R.E./Schery, R.W./Durkee, L.H.. Flora of Panama. Part IX. Family 177. Acanthaceae. Annals of the Missouri Botanical Garden. 65(1): 155-283.	[Prolific seed production (>1000/m ²)? Unlikely] "Herbs to 2 m tall ... Capsules clavate, to 8 mm long, 2 mm wide, puberulous; seeds orbicular, flattened, 1.5 mm in diameter." [No evidence that this relatively small plant would grown in dense thickets and achieve such high seed densities]
802	2008. Royal Botanic Gardens Kew. Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/	[Evidence that a persistent propagule bank is formed (>1 yr)? Unknown]
803	2012. WRA Specialist. Personal Communication.	[Well controlled by herbicides? Unknown] No information found on herbicide efficacy or chemical control of this species.
804	2012. WRA Specialist. Personal Communication.	[Tolerates, or benefits from, mutilation, cultivation, or fire? Unknown]
805	2012. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown]