

Family: *Acanthaceae*

Taxon: *Ruellia squarrosa*

Synonym: *Dipteracanthus squarrosus* Fenzl (basionym) **Common Name:** water bluebell

Questionnaire :	current 20090513	Assessor:	Patti Clifford	Designation: H(HPWRA)
Status:	Assessor Approved	Data Entry Person:	Patti Clifford	WRA Score 7
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	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		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	n
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	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	y
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	y
605	Requires specialist pollinators	y=-1, n=0	n
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	n
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	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	
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	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y=-1, n=1	

Designation: H(HPWRA)

WRA Score 7

Supporting Data:

101	2011. WRA Specialist. Personal Communication.	[Is the species highly domesticated? No] No evidence of domestication that reduces invasiveness.
102	2011. WRA Specialist. Personal Communication.	[Has the species become naturalized where grown?] NA
103	2011. WRA Specialist. Personal Communication.	[Does the species have weedy races?] NA
201	2011. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network (GRIN) [Online Database Index]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"?] Native range: Veracruz, Mexico.
202	2011. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network (GRIN) [Online Database Index]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Quality of climate match data? High] Native range: Veracruz, Mexico.
203	2003. Llamas, K.A.. Tropical Flowering Plants. Timber Press, Portland, OR	[Broad climate suitability (environmental versatility)? No] USDA Hardiness Zones: 9-11.
203	2011. Kemper Center for Home Gardening. <i>Ruellia squarrosa</i> . Missouri Botanical Garden, http://www.mobot.org/gardeninghelp/plantfinder/plant.asp?code=A543	[Broad climate suitability (environmental versatility)? No] Zone 8-10.
204	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.	[Native or naturalized in regions with tropical or subtropical climates? Yes] Naturalized in Le Reunion.
204	2011. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network (GRIN) [Online Database Index]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Native or naturalized in regions with tropical or subtropical climates? Yes] Native to Veracruz, Mexico.
205	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.	[Does the species have a history of repeated introductions outside its natural range? Yes] Naturalized in Le Reunion.
205	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Does the species have a history of repeated introductions outside its natural range? Yes] Grown as a ground cover and bedding plant in many home gardens and landscapes in Hawaii.
205	2007. Hosking, J.R./Conn, B.J./Lepschi, B.J./Barker, C.H.. Plant species first recognized as naturalised for New South Wales in 2002 and 2003, with additional comments for species recognized as naturalised for 2000-2001. <i>Cunninghamia</i> . 10(1): 139-166.	[Does the species have a history of repeated introductions outside its natural range? Yes] Naturalized in Australia and Okinawa.
301	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.	[Naturalized beyond native range? Yes] <i>Ruellia squarrosa</i> is naturalized in Le Reunion.
301	2007. Hosking, J.R./Conn, B.J./Lepschi, B.J./Barker, C.H.. Plant species first recognized as naturalised for New South Wales in 2002 and 2003, with additional comments for species recognized as naturalised for 2000-2001. <i>Cunninghamia</i> . 10(1): 139-166.	[Naturalized beyond native range? Yes] New South Wales distribution: Naturalized in "Allocasuarina torulosa and Angophora costata forest. Observed in Hunt's Creek Reserve in North Rocks, Sydney, growing in shaded creekside areas. Also recorded from shady situations in Queensland." Naturalized in Okinawa.
302	2007. Randall, R.P.. Global Compendium of Weeds - Index [Online Database]. http://www.hear.org/gcw/	[Garden/amenity/disturbance weed? No] No evidence.

303	2007. Randall, R.P.. Global Compendium of Weeds - Index [Online Database]. http://www.hear.org/gcw/	[Agricultural/forestry/horticultural weed? No] No evidence.
304	2007. Randall, R.P.. Global Compendium of Weeds - Index [Online Database]. http://www.hear.org/gcw/	[Environmental weed? No] No evidence.
305	2009. Florida EPPC's 2009 invasive plant species list. Florida Exotic Pest Council, http://www.fleppc.org/list/09list.htm	[Congeneric weed? Yes] <i>Ruellia brittoniana</i> is classified as a Class I weed by the Florida Exotic Pest Council. Invasive exotics that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives. This definition does not rely on the economic severity or geographic range of the problem, but on the documented ecological damage caused.
401	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Produces spines, thorns or burrs? No] No spine, thorns or burrs. [genus description]
402	2011. WRA Specialist. Personal Communication.	[Allelopathic?] Unknown.
403	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Parasitic? No] Acanthaceae.
404	2011. WRA Specialist. Personal Communication.	[Unpalatable to grazing animals?] Unknown.
405	2011. WRA Specialist. Personal Communication.	[Toxic to animals?] Unknown.
406	2011. Kemper Center for Home Gardening. <i>Ruellia squarrosa</i> . Missouri Botanical Garden, http://www.mobot.org/gardeninghelp/plantfinder/plant.asp?code=A543	[Host for recognized pests and pathogens? No] No serious disease or pest problems.
407	2011. National Center for Biotechnology Information. PubMed. U.S. National Library of Medicine, Bethesda, Maryland http://www.ncbi.nlm.nih.gov/	[Causes allergies or is otherwise toxic to humans? No] No evidence.
407	2011. Specialized Information Services, U.S. National Library of Medicine. TOXNET toxicology data network [online database]. National Institutes of Health, http://toxnet.nlm.nih.gov/	[Causes allergies or is otherwise toxic to humans? No] No evidence.
408	2011. WRA Specialist. Personal Communication.	[Creates a fire hazard in natural ecosystems? No] Herbaceous. [unlikely to carry fire]
409	2003. Llamas, K.A.. Tropical Flowering Plants. Timber Press, Portland, OR	[Is a shade tolerant plant at some stage of its life cycle? Yes] Full to part sun.
409	2007. Hosking, J.R./Conn, B.J./Lepschi, B.J./Barker, C.H.. Plant species first recognized as naturalised for New South Wales in 2002 and 2003, with additional comments for species recognized as naturalised for 2000-2001. <i>Cunninghamia</i> . 10(1): 139-166.	[Is a shade tolerant plant at some stage of its life cycle? Yes] Observed in Hunt's Creek Reserve in North Rocks, Sydney, growing in shaded creekside areas. Also recorded from shady situations in Queensland."
410	2011. Dave's Gardern. PlantFiles: <i>Ruellia</i> , water bluebell, <i>Ruellia squarrosa</i> . Dave's Garden, http://davesgarden.com/guides/pf/go/1326/	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? No] Soil pH requirements: 7.6 to 7.8 (mildly alkaline), 7.9 to 8.5 (alkaline)
411	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Climbing or smothering growth habit? No] Perennial herb, 12-18" high.
412	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Forms dense thickets? No] Herbaceous perennial.
501	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Aquatic? No] Terrestrial, perennial herb.

502	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Grass? No] Acanthaceae.
503	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Nitrogen fixing woody plant? No] Acanthaceae. Herbaceous.
504	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? Yes] Propagate by cuttings, seeds, or division of mature clumps.
504	2011. Dave's Garden. PlantFiles: Ruellia, water bluebell, Ruellia squarrosa. Dave's Garden, http://davesgarden.com/guides/pf/go/1326/	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? Yes] Propagate by dividing rhizomes, tubers, corms or bulbs (including offsets).
601	2011. WRA Specialist. Personal Communication.	[Evidence of substantial reproductive failure in native habitat? No] No evidence.
602	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.	[Produces viable seed? Yes] Reproduces by seed and vegetatively.
602	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Produces viable seeds? Yes] Propagate by cuttings, seed, or division of mature clumps.
603	2011. WRA Specialist. Personal Communication.	[Hybridizes naturally?] Unknown.
604	1966. Long, R.W.. Artificial interspecific hybridization in Ruellia (Acanthaceae). American Journal of Botany. 53: 917-927.	[Self-compatible or apomictic? Yes] In this study on artificial interspecific hybridization in Ruellia, fertility of parent species was determined before plants were crossed. All Ruellia spp. examined (including Ruellia squarrosa) were highly self-compatible.
605	1966. Long, R.W.. Artificial interspecific hybridization in Ruellia (Acanthaceae). American Journal of Botany. 53: 917-927.	[Requires specialist pollinators?] In this study on artificial interspecific hybridization in Ruellia, fertility of parent species was determined before plants were crossed. All Ruellia spp. examined (including Ruellia squarrosa) were highly self-compatible.
606	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.	[Reproduction by vegetative fragmentation? Yes] Reproduces by seed and vegetatively.
607	2011. WRA Specialist. Personal Communication.	[Minimum generative time (years)?] Unknown.
701	2011. WRA Specialist. Personal Communication.	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? No] No evidence of unintentional dispersal.
702	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Propagules dispersed intentionally by people? Yes] Grown as a ground cover and bedding plant in many home gardens and landscapes in Hawaii.
703	2011. WRA Specialist. Personal Communication.	[Propagules likely to disperse as a produce contaminant? No] No evidence.
704	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Propagules adapted to wind dispersal? No] Capsules.
705	2007. Hosking, J.R./Conn, B.J./Lepschi, B.J./Barker, C.H.. Plant species first recognized as naturalised for New South Wales in 2002 and 2003, with additional comments for species recognized as naturalised for 2000-2001. Cunninghamia. 10(1): 139-166.	[Propagules water dispersed? Yes] Naturalized in "Allocasuarina torulosa and Angophora costata forest. Observed in Hunt's Creek Reserve in North Rocks, Sydney, growing in shaded creekside areas. Also recorded from shady situations in Queensland."
706	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Propagules bird dispersed? No] Capsules.

707	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Propagules dispersed by other animals (externally)? No] Capsules. [no means of external attachment.
708	2011. WRA Specialist. Personal Communication.	[Propagules survive passage through the gut?] Unknown.
801	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Prolific seed production (>1000/m2)? No] Herbs 12-15" high, flowers solitary; capsule with about 12 seeds.
802	2011. WRA Specialist. Personal Communication.	[Evidence that a persistent propagule bank is formed (>1 yr)?] Unknown.
803	2011. WRA Specialist. Personal Communication.	[Well controlled by herbicides?] Unknown.
804	2011. Dave's Gardern. PlantFiles: Ruellia, water bluebell, <i>Ruellia squarrosa</i> . Dave's Garden, http://davesgarden.com/guides/pf/go/1326/	[Tolerates, or benefits from, mutilation, cultivation, or fire?] Propagate by dividing rhizomes.
805	2011. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)?] Unknown.