

Family: *Acanthaceae*

Taxon: *Odontonema tubaeforme*

Synonym: *Justicia coccinea hort.*

Common Name Fire Spike

Justicia tubaeformis Bertol. (basionym)

Odontonema strictum (Nees) Kuntze

Thyrsacanthus strictus Nees

Questionnaire :	current 20090513	Assessor:	Chuck Chimera	Designation:	H(HPWRA)
Status:	Assessor Approved	Data Entry Person:	Chuck Chimera	WRA Score	11
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	y
204	Native or naturalized in regions with tropical or subtropical climates			y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?			y=-2, ?=-1, n=0	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)	
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)	y
305	Congeneric weed			n=0, y = 1*multiplier (see Appendix 2)	
401	Produces spines, thorns or burrs			y=1, n=0	n
402	Allelopathic			y=1, n=0	n
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			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	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	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	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	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 11

Supporting Data:

101	2008. Gargiullo, M.B./Magnuson, B.L./Kimball, L.D. A field guide to plants of Costa Rica. Oxford University Press US, New York, NY	No evidence
102	2011. WRA Specialist. Personal Communication.	NA
103	2011. WRA Specialist. Personal Communication.	NA
201	2000. Whistler, W.A.. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"...native to Central America but is widely cultivated for its dense inflorescences of red flowers."
201	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.	"Region of Origin: Native of Panama, Nicaragua, Honduras, Costa Rica, Belize and Mexico."
202	2000. Whistler, W.A.. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"...native to Central America..."
203	2006. Irish, M.. Perennials for the Southwest: plants that flourish in arid gardens. Timber Press, Portland, OR	"Distribution: From southern Mexico to Panama at elevations from sea level to 4600 ft. (1400 m)." [elevation range exceeds 1000 m, demonstrating environmental versatility]
204	2000. Whistler, W.A.. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"...native to Central America..."
205	1991. Smith, A.C.. Flora Vitiensis Nova - A New Flora of Fiji (Spermatophytes Only). Volume 5.. National Tropical Botanical Garden, Lawai, Hawaii	"cultivated from near sea level to about 250 m. elevation" [Fiji]
205	2000. Whistler, W.A.. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"...widely cultivated for its dense inflorescences of red flowers."
301	2006. Irish, M.. Perennials for the Southwest: plants that flourish in arid gardens. Timber Press, Portland, OR	"Naturalized in the United States in Florida"
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.	"Locations where the species has been collected are where garden waste had been dumped. These areas are on the edge of disturbed tall open forest. In the first collection area <i>O. tubaeforme</i> was growing with <i>Delairea odorata</i> , <i>Monstera deliciosa</i> , <i>Lantana camara</i> , <i>Cinnamomum camphora</i> and native trees and shrubs... <i>Odontonema tubaeforme</i> has also been observed in Hunt's Creek Reserve at North Rocks and remnant bushland at Pennant Hills, Sydney and is recorded as naturalised in Queensland (Cook and Moreton pastoral districts) (Bean in Henderson 2002) with the first naturalised specimen (Sharpe 4302 & Batianoff – BRI) collected from Noosa National Park, Noosa in March 1986 (Barker 1996). This species is naturalised on Lord Howe Island (Batianoff 200311, Le Cussan 1128 – both BRI) and is widely naturalised in French Polynesia, Hawaii and Samoa where it forms dense monospecific stands (between 100 and 500 m ² in area) in wet forests (Meyer & Lavergne 2004)."
301	2010. CSIRO. Australian Tropical Rainforest Plants [online database] - <i>Odontonema tubaeforme</i> . http://keys.trin.org.au:8080/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Odontonema_tubaeforme.htm	"An introduced species originally from Central America, now naturalized in NEQ and also in south eastern Queensland. Altitudinal range in NEQ not known but collected at 760 m. Grows in disturbed areas on the margins of rain forest and around settlements."
302	2010. CSIRO. Australian Tropical Rainforest Plants [online database] - <i>Odontonema tubaeforme</i> . http://keys.trin.org.au:8080/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Odontonema_tubaeforme.htm	"An introduced species originally from Central America, now naturalized in NEQ and also in south eastern Queensland. Altitudinal range in NEQ not known but collected at 760 m. Grows in disturbed areas on the margins of rain forest and around settlements." [a weed of disturbed areas with environmental impacts. See 3.04]
303	2007. Randall, R.P.. Global Compendium of Weeds - <i>Odontonema tubaeforme</i> [Online Database]. http://www.hear.org/gcw/species/odontonema_tubaeforme/	No evidence

304	2002. Space, J.C./Flynn, T.. Report to the Government of Samoa on invasive plant species of environmental concern. U.S.D.A. Forest Service, Honolulu, HI	" <i>Odontonema tubaeforme</i> (totoe, fire spike, cardinal flower) is invasive at a number of locations on both Upolu and Savai'i. It is a serious problem due to its ability to invade the understory. While it is present on a number of Pacific islands, the infestations seen in Samoa are the worst seen to date...nvasive in a number of locations; control in sensitive and natural areas such as Vailima Reserve."
304	2002. Space, J.C./Flynn, T.. Report to the Government of the Cook Islands on invasive plant species of environmental concern. U.S.D.A. Forest Service, Honolulu, HI	" <i>Odontonema tubaeforme</i> (fire spike, cardinal flower) was seen to a limited extent in the wild on Rarotonga and Mangaia. This species is invasive at a number of locations in moist forests in Samoa. Although it primarily spreads by vegetative means, it is a problem species due to its ability to invade the understory. "
304	2007. Randall, R.P.. Global Compendium of Weeds - <i>Odontonema tubaeforme</i> [Online Database]. http://www.hear.org/gcw/species/odontonema_tubaeforme/	"environmental weed, garden thug, naturalised, weed"
305	2007. Randall, R.P.. Global Compendium of Weeds - Index [Online Database]. http://www.hear.org/gcw/	<i>O. cuspidatum</i> , <i>O. strictum</i> , & <i>O. callistachyum</i> listed as naturalized or weeds, but taxonomic confusion makes differentiation of impacts between putative species difficult.
401	2008. Gargiullo, M.B./Magnuson, B.L./Kimball, L.D.. A field guide to plants of Costa Rica. Oxford University Press US, New York, NY	"Shrub to 2.5 m tall, stems green, nodes with line across leaf stalk bases. Leaves opposite, stalk none or to 3 cm long, blade 11-36 cm long, 4-11 cm wide, elliptic, pointed at both ends, margin sometimes bluntly toothed." [no spines, thorns, or burrs]
402	2011. Learn 2 Grow. Plant Search - <i>Odontonema tubaeforme</i> . http://www.learn2grow.com/plants/odontonema-tubaeforme/	"Plant it in mixed tropical shrub borders intermingled with other classics like hibiscus, croton and dracaena." [no evidence of allelopathy]
403	2008. Gargiullo, M.B./Magnuson, B.L./Kimball, L.D.. A field guide to plants of Costa Rica. Oxford University Press US, New York, NY	"Shrub to 2.5 m tall, stems green, nodes with line across leaf stalk bases." [no evidence that <i>O. tubaeforme</i> is parasitic]
404	2011. Floridata. <i>Odontonema strictum</i> . http://www.floridata.com/ref/O/odon_str.cfm	"Unfortunately, white-tailed deer love firespike too, and will eat the leaves. Defoliated plants will grow new leaves, but if the deer persist, the plant eventually will be killed." [referring to <i>O. strictum</i> , a synonym for <i>O. tubaeforme</i>]
405	2011. Dave's Garden. PlantFiles: Firespike, Cardinal Guard, Scarlet Flame. http://davesgarden.com/guides/pf/go/1854/	"Danger: N/A" [popular ornamentals with no evidence of toxicity to animals or humans]
406	2006. Brooks, F.. List of Plant Diseases in American Samoa 2006. Land Grant Technical Report No. 44. American Samoa Community College Land Grant Program, Pago Pago, AS	"Plant-parasitic algae and their host plants. "Five species of parasitic algae in the genus <i>Cephaleuros</i> and two in <i>Stomatochroon</i> are listed, followed by the family, genus, and species of their host(s)." [<i>Cephaleuros virescens</i> affects <i>Odontonema tubiforme</i> , but no indication of impacts or importance of algae]
406	2009. Francis, J.K.. Wildland Shrubs of the United States & its Territories: Thamnic Descriptions General Technical Report IITF-WB-1. U.S.D.A. Forest Service International Institute of Tropical Forestry, http://www.fs.fed.us/global/iitf/wildland_shrubs.htm	"The plants are mostly free of pests and disease but may occasionally be attacked by mealy bugs (<i>Pseudococcidae</i>) (Woman's Club of Havana 1952)." [referring to the related and morphologically similar <i>O. cuspidatum</i>]
407	2011. Dave's Garden. PlantFiles: Firespike, Cardinal Guard, Scarlet Flame. http://davesgarden.com/guides/pf/go/1854/	"Danger: N/A" [popular ornamentals with no evidence of toxicity to animals or humans]
408	2008. Gargiullo, M.B./Magnuson, B.L./Kimball, L.D.. A field guide to plants of Costa Rica. Oxford University Press US, New York, NY	"Light gaps in wet forests, edges, stream margins." [habitat suggests species is unlikely to create fire hazards]
409	2006. Irish, M.. Perennials for the Southwest: plants that flourish in arid gardens. Timber Press, Portland, OR	"Exposure: Filtered shade or deep shade...Use firespike anywhere that the sun will not hit it directly, particularly in the deserts."
410	2006. Irish, M.. Perennials for the Southwest: plants that flourish in arid gardens. Timber Press, Portland, OR	"It grows in any kind of soil from rich clay to rocky, native soil."
411	2008. Gargiullo, M.B./Magnuson, B.L./Kimball, L.D.. A field guide to plants of Costa Rica. Oxford University Press US, New York, NY	"Shrub to 2.5 m tall, stems green, nodes with line across leaf stalk bases." [not climbing or smothering]

412	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.	"...widely naturalised in French Polynesia, Hawaii and Samoa where it forms dense monospecific stands (between 100 and 500 m2 in area) in wet forests..."
501	2008. Gargiullo, M.B./Magnuson, B.L./Kimball, L.D.. A field guide to plants of Costa Rica. Oxford University Press US, New York, NY	"Shrub to 2.5 m tall, stems green, nodes with line across leaf stalk bases." [terrestrial]
502	2008. Gargiullo, M.B./Magnuson, B.L./Kimball, L.D.. A field guide to plants of Costa Rica. Oxford University Press US, New York, NY	Acanthaceae
503	2008. Gargiullo, M.B./Magnuson, B.L./Kimball, L.D.. A field guide to plants of Costa Rica. Oxford University Press US, New York, NY	Acanthaceae [not a nitrogen fixing woody plant]
504	2008. Gargiullo, M.B./Magnuson, B.L./Kimball, L.D.. A field guide to plants of Costa Rica. Oxford University Press US, New York, NY	"Shrub to 2.5 m tall, stems green, nodes with line across leaf stalk bases." [not a geophyte]
601	2008. Gargiullo, M.B./Magnuson, B.L./Kimball, L.D.. A field guide to plants of Costa Rica. Oxford University Press US, New York, NY	"...flowers in whorls at nodes; blooms all year. Fruit dry, club-shaped, to 3 cm long, 0.4 cm wide." [no evidence of substantial reproductive failure in Costa Rica]
602	2011. Dave's Garden. PlantFiles: Firespike, Cardinal Guard, Scarlet Flame. http://davesgarden.com/guides/pf/go/1854/	Propagation Methods: From softwood cuttings; From seed; direct sow after last frost"
603	2011. WRA Specialist. Personal Communication.	Unknown
604	2000. Nadkarni, N./Wheelwright, N.T.. Monteverde: ecology and conservation of a tropical cloud forest. Oxford University Press, New York, NY	Appendix 1 lists <i>O. tubaeforme</i> as having hermaphroditic sexual system [but does not indicate if plants are self-compatible]
605	2000. Nadkarni, N./Wheelwright, N.T.. Monteverde: ecology and conservation of a tropical cloud forest. Oxford University Press, New York, NY	Appendix 1 lists <i>O. tubaeforme</i> as hummingbird pollinated.
605	2008. Gargiullo, M.B./Magnuson, B.L./Kimball, L.D.. A field guide to plants of Costa Rica. Oxford University Press US, New York, NY	"Flowers red or pink, bilaterally symmetrical, tubular, to 3 cm long, 0.5 cm wide at throat, petal lobes 5, flaring, 2 fused above, 3 below, to 0.8 cm long; inflorescence at ends of branches, spikelike to 35 cm long, flowers in whorls at nodes; blooms all year."
605	2011. Learn 2 Grow. Plant Search - <i>Odontonema tubaeforme</i> . http://www.learn2grow.com/plants/odontonema-tubaeforme/	"Hummingbirds love the vibrant blooms of purple firespike."
606	2006. Irish, M.. Perennials for the Southwest: plants that flourish in arid gardens. Timber Press, Portland, OR	"The numerous thin, green stems rise from a rhizomatous base."
606	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.	"Apart from four clumps growing in native woodland where J.R. Hosking 2195 was collected, there were many hundreds of stems recorded within Macquarie Nature Reserve at Port Macquarie (information recorded on label for J.R. Hosking 2195). This species appears to be spreading vegetatively, initially reaching areas via dumped garden waste. Vegetative spread is reported as the main means of spread on Pacific islands (Meyer & Lavergne 2004)."
606	2009. Francis, J.K.. Wildland Shrubs of the United States & its Territories: Thamnisc Descriptions General Technical Report IITF-WB-1. U.S.D.A. Forest Service International Institute of Tropical Forestry, http://www.fs.fed.us/global/iitf/wildland_shrubs.htm	"Once established, plants spread by root suckers. The stems also layer (root) readily when they become prostrate." [referring to related & morphologically similar <i>O. cuspidatum</i>]
607	2011. Learn 2 Grow. Plant Search - <i>Odontonema tubaeforme</i> . http://www.learn2grow.com/plants/odontonema-tubaeforme/	"Fast-growing in the heat and humidity of summer, the upright stems have oval deep green leaves that taper at the tips." [fast growing shrub, & able to spread vegetatively. See 6.06]

701	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.	"Locations where the species has been collected are where garden waste had been dumped."
702	2000. Whistler, W.A.. <i>Tropical Ornamentals: A Guide</i> . Timber Press, Portland, OR	"...widely cultivated for its dense inflorescences of red flowers."
702	2010. CSIRO. Australian Tropical Rainforest Plants [online database] - <i>Odontonema tubaeforme</i> . http://keys.trin.org.au:8080/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Odontonema_tubaeforme.htm	"Commonly grown in gardens as an ornamental shrub."
703	2000. Whistler, W.A.. <i>Tropical Ornamentals: A Guide</i> . Timber Press, Portland, OR	"Fruit a club-shaped capsule, infrequently formed in cultivation." [no evidence of produce contamination]
704	2000. Nadkarni, N./Wheelwright, N.T.. <i>Monteverde: ecology and conservation of a tropical cloud forest</i> . Oxford University Press, New York, NY	Appendix 1 lists <i>O. tubaeforme</i> as having explosively dehiscent seeds [but otherwise not adapted for wind dispersal]
705	2008. Save Our Waterways Now. Weeds to Whack - <i>Odontonema tubaeforme</i> (ACANTHACEAE) Fire Spike. http://www.saveourwaterwaysnow.com.au/01 cms/details_pop.asp?ID=1235	"An emerging weed along Enoggera waterways probably naturalised because of dumping of garden waste, but could also be spreading by seed." [Australia]
705	2009. Francis, J.K.. <i>Wildland Shrubs of the United States & its Territories: Thamnic Descriptions General Technical Report IITF-WB-1</i> . U.S.D.A. Forest Service International Institute of Tropical Forestry, http://www.fs.fed.us/global/iitf/wildland_shrubs.htm	"Cardinal's guard is most common in disturbed areas (Stevens and others 2001), along streams and drains, and in extra moist places in secondary forests. Most of the stands of cardinal's guard in Puerto Rico have originated from abandoned gardens or errant pieces of stem or root that have been transported by streams or dumped in the woods with garden prunings." [refers to related, & taxonomically similar species <i>O. cuspidatum</i> . Potential exists for <i>O. tubaeforme</i> to be dispersed in a similar manner]
706	1994. Liogier, H.A.. <i>Descriptive Flora of Puerto Rico and Adjacent Islands. Spermatophyta, Volume III. Cyrillaceae to Myrtaceae</i> . La Editorial, UPR, San Juan, Puerto Rico	"Capsule oblong, contracted at base and stipe-like; seeds or fewer, lenticular or tuberculate-rugose or verrucose." [genus description. Not fleshy-fruited, & no evidence of dispersal by birds]
706	2000. Whistler, W.A.. <i>Tropical Ornamentals: A Guide</i> . Timber Press, Portland, OR	"Fruit a club-shaped capsule, infrequently formed in cultivation."
707	1994. Liogier, H.A.. <i>Descriptive Flora of Puerto Rico and Adjacent Islands. Spermatophyta, Volume III. Cyrillaceae to Myrtaceae</i> . La Editorial, UPR, San Juan, Puerto Rico	"Capsule oblong, contracted at base and stipe-like; seeds or fewer, lenticular or tuberculate-rugose or verrucose." [genus description. No means of external attachment]
707	2000. Whistler, W.A.. <i>Tropical Ornamentals: A Guide</i> . Timber Press, Portland, OR	"Fruit a club-shaped capsule, infrequently formed in cultivation."
708	2011. WRA Specialist. Personal Communication.	Unknown. No evidence that seeds, if formed, would be ingested.
801	2000. Whistler, W.A.. <i>Tropical Ornamentals: A Guide</i> . Timber Press, Portland, OR	"Fruit a club-shaped capsule, infrequently formed in cultivation." [probably due to lack of appropriate pollinators]
801	2008. Save Our Waterways Now. Weeds to Whack - <i>Odontonema tubaeforme</i> (ACANTHACEAE) Fire Spike. http://www.saveourwaterwaysnow.com.au/01 cms/details_pop.asp?ID=1235	"PlantNet records that fruits are not formed in Australia."
802	2011. WRA Specialist. Personal Communication.	Unknown, although seeds may be rarely, if ever, produced in Hawaiian Islands or other island ecosystems lacking appropriate pollinators.
803	2011. WRA Specialist. Personal Communication.	Unknown. No information found on control of <i>O. tubaeforme</i> with herbicides.
804	2009. Francis, J.K.. <i>Wildland Shrubs of the United States & its Territories: Thamnic Descriptions General Technical Report IITF-WB-1</i> . U.S.D.A. Forest Service International Institute of Tropical Forestry, http://www.fs.fed.us/global/iitf/wildland_shrubs.htm	"...grows rapidly from suckers and must be pruned frequently when used as hedges..." [refers to related & morphologically similar <i>O. cuspidatum</i> . <i>O. tubaeforme</i> , with similar growth habit & ability to root from vegetative fragments, is also presumed to tolerate frequent pruning & cutting]

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- 804 2011. Learn 2 Grow. Plant Search - *Odontonema tubaeforme*. "It can be severely cut back in the beginning of the warm rainy season and allowed to rejuvenate. "
<http://www.learn2grow.com/plants/odontonema-tubaeforme/>
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- 805 2011. WRA Specialist. Personal Communication. Unknown
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