

Taxon: *Leptospermum polygalifolium* Salisb.

Family: Myrtaceae

Common Name(s): tanton
yellow tea tree

Synonym(s): *Leptospermum flavescens* Sm.

Assessor: Chuck Chimera

Status: Assessor Approved

End Date: 7 Aug 2018

WRA Score: 15.0

Designation: H(Hawai'i)

Rating: High Risk

Keywords: Shrub, Naturalized, Environmental Weed, Dense Stands, Wind-Dispersed

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	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)	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)	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		
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		
409	Is a shade tolerant plant at some stage of its life cycle		

Qsn #	Question	Answer Option	Answer
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	y
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)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	3
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
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	y
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		
801	Prolific seed production (>1000/m2)		
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
803	Well controlled by herbicides		
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)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Thompson, J. (1989). A revision of the genus <i>Leptospermum</i> (Myrtaceae). <i>Telopea</i> 3(3): 301-449	[No evidence of domestication] "Widespread on the tablelands and coast of central eastern New South Wales, extending southward along the coast (Map 7). In heath or dry sclerophyll forest, usually on sandstone, in deep sand or skeletal soils, often in moist depressions or along rocky watercourses."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2018. 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. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 3 Aug 2018]	"Native Australasia AUSTRALIA: Australia [New South Wales (e.), Queensland (e.)]"
	Thompson, J. (1989). A revision of the genus <i>Leptospermum</i> (Myrtaceae). <i>Telopea</i> 3(3): 301-449	"Widespread on the tablelands and coast of central eastern New South Wales, extending southward along the coast"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 3 Aug 2018]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes

Qsn #	Question	Answer
	Florabank. (2018). <i>Leptospermum polygalifolium</i> . http://www.florabank.org.au/ . [Accessed 3 Aug 2018]	"Climate parameters Mean annual rainfall: 650-2150 mm Rainfall distribution pattern: uniform Mean annual temperature: 9-19 °C Mean max. temperature of the hottest month: 20-31 °C Mean min. temperature of the coldest month: -3-8 °C Frosts (approx. no. per year): greater than 20 Frost intensity: light to moderate (0 to -5°C) Altitude: 10-1400 metres"
	Plants for a Future. (2018). <i>Leptospermum polygalifolium</i> . https://pfaf.org . [Accessed 6 Aug 2018]	"USDA hardiness: 7-10"

204	Native or naturalized in regions with tropical or subtropical climates	y
	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.	"in Hawai'i cultivated and naturalized at least in O'ahu arboreta and along Wai'alae Nui Ridge, Ko'olau Mountains, O'ahu."
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 3 Aug 2018]	"Native Australasia AUSTRALIA: Australia [New South Wales (e.), Queensland (e.)]"

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Documented as introduced into New Zealand, US (Hawaii), & India] "Dispersed by: Humans References: New Zealand-N-534, United States of America-N-101, New Zealand-E- 328, Global-W-1376, Global-I-1404, New Zealand-U-2048, India-W-1977."

Qsn #	Question	Answer
301	Naturalized beyond native range	y
	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.	"Leptospermum flavescens ... Native to northeastern Australia; in Hawai'i cultivated and naturalized at least in O'ahu arboreta and along Wai'alaie Nui Ridge, Ko'olau Mountains, O'ahu. Cultivated on O'ahu as early as 1927 (MacDaniels 402, BISH)." [Synonym of <i>Leptospermum polygalifolium</i> Salisb.]
	de Lange, P. J., de Lange, T. J. P., & de Lang, F. J. T. (2005). New exotic plant records, and range in the northern North. Auckland Botanical Society Journal, December: 130-147	"Leptospermum polygalifolium Salisb. subsp. polygalifolium ... Casual. Probably because of past nomenclatural confusion by New Zealand botanists with the rather different <i>L. laevigatum</i> (Gaertner) F.Muell., the naturalisation of this species seems to have been overlooked in recent publications (Heenan et al. 2004a; E.K. Cameron pers. comm., 2004). <i>Leptospermum polygalifolium</i> is commonly grown, at least in the North Island, where it has been confused with kahikatoa (<i>L. scoparium</i> J.R.Forst et G.Forst"
	Wagner, W.L., Herbst, D.R.& Lorence, D.H. 2018. Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/ . [Accessed 3 Aug 2018]	"Leptospermum polygalifolium Salisb. subsp. polygalifolium Status: Naturalized Distribution: O (Ko: Manoa Valley, HSPA Arboretum; Wai'alaie Nui Ridge)"

302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	Environmental weed [see 3.04]

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	Environmental weed [see 3.04]

304	Environmental weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Hawaii Invasive Species Council. 2018. FY18 Funded Projects - Ko'olau Mountains Watershed Partnership – <i>Leptospermum polygalifolium</i> Survey & Control. https://dlnr.hawaii.gov/hisc/projects/fy18/ . [Accessed 6 Aug 2018]	"Isolated stands of this weed have been detected by Ko'olau Mountains Watershed Partnership (KMWP) staff in the Wailupe and Wai'alae Nui Gulches of the southern Ko'olau Mountains between 400 and 500m elevation (Figure 1). Where this species has naturalized it forms dense stands crowding out native plants. <i>L. polygalifolium</i> is a prolific seeder and seeds are wind dispersed, therefore it has the potential to spread widely across the Ko'olau Mountains and dominate mid-elevation watershed forests. The closely related <i>Leptospermum scoparium</i> (manuka) is invasive in mesic to wet forest habitats on Kaua'i, O'ahu and Lana'i, and is currently a focus of KMWP's control efforts. This project would address the management of the highly invasive <i>L. polygalifolium</i> while its distribution is relatively discrete and eradication is still a viable option. This species threaten O'ahu's watersheds by directly competing with native plant and animal species for habitat in the southern Ko'olau mountain range. Native plant species support native bird species, including the endangered Oahu 'elepaio (<i>Chasiempis ibidis</i>), which is known to occur in Wailupe and Wai'alae Nui Gulches. The longer these incipient weeds remain untreated, the greater the risk that native vegetation being negatively affected. During a recent scouting trip in the Wai'alae Nui Gulch, KMWP staff treated over 465 mature <i>L. polygalifolium</i> , in an 11 acre area (Figure 1), indicating the extent of the infestation may be greater than previously suspected. KMWP proposes conducting aerial and ground surveys to delimit the extent of the infestation for both species in Wailupe and Wai'alae Nui Gulch (Figure 1). Using the results of the survey, we will conduct chemical treatment of all accessible plants. Because this species is wind dispersed, KMWP will assess wind direction at different times of day to determine the most likely dispersal directions. Since part of the known infestation of <i>L. polygalifolium</i> is easily accessible from the road, we will coordinate volunteers to help with control efforts for this species wherever possible."
	Egler, F.E. 1937. Specimen Details for <i>Leptospermum polygalifolium</i> subsp. <i>polygalifolium</i> . ID Number 60012. Collection Number 37-47 - 04 Jun 1937. Bishop Museum, Honolulu, HI. http://nsdb.bishopmuseum.org/ . [Accessed]	[Description on botanical collection suggests plant is already becoming an environmental weed in 1937] "Spreading aggressively in grass cover below koa."
	WRA Specialist. 2018. Personal Communication	Targeted for control by the the Ko'olau Mountains Watershed Partnership, Oahu, Hawaiian Islands

305	Congeneric weed	y
	Source(s)	Notes
	Weber, E. 2017. <i>Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	" <i>Leptospermum laevigatum</i> " ... "This shrub is native to coastal heath communities in Australia. The plant is tolerant of salt spray and invades mainly coastal vegetation. It can form extensive and dense thickets displacing the native vegetation and preventing any regeneration of native woody species."

Qsn #	Question	Answer
	Smith, C.W. 1985. Impact of Alien Plants on Hawaii's Native Biota. Pp. 180-250 in Stone & Scott (eds.). Hawaii's terrestrial ecosystems: preservation & management. CPSU, Honolulu, HI	"Leptospermum scoparium ... This small, scrubby tree forms thickets which crowd out other plants. On Lanai, it has infested goat (<i>Capra hircus</i>)-eroded ridgetops, resulting in their stabilization. It appears to have allelopathic activity like many other members of the Myrtaceae. The seeds are dispersed by wind." ... "It is elevation found in mesic habitats between 300-700 m. The principal infestations are on Lana'i and above La'ie in the Ko'olau Mountains, Oahu."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Thompson, J. (1989). A revision of the genus <i>Leptospermum</i> (Myrtaceae). <i>Telopea</i> 3(3): 301-449	[Leaves sometimes pointed, but no spines, thorns or burrs] "Rather slender shrub 1-3 m or more in height, occasionally a small tree to 5 m or more. Leaves oblanceolate or occasionally almost elliptical, usually 10-20 mm long and c. 2(-3) mm wide, the apex broadly to narrowly acute with a soft or occasionally pungent short point, the margins often recurving, the surfaces usually glabrous, the lower often much paler."

402	Allelopathic	n
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	Unknown. No evidence found

403	Parasitic	n
	Source(s)	Notes
	Thompson, J. (1989). A revision of the genus <i>Leptospermum</i> (Myrtaceae). <i>Telopea</i> 3(3): 301-449	"Rather slender shrub 1-3 m or more in height, occasionally a small tree to 5 m or more." [Myrtaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Henderson, M. K., & Keith, D. A. (2002). Correlation of burning and grazing indicators with composition of woody understorey flora of dells in a temperate eucalypt forest. <i>Austral Ecology</i> , 27(2), 121-131	[Medium palatability] "The species recorded represented a wide variety of life-history types and functional groups, although palatability to stock is poorly known (Table 2)." ... "Table 2. Life-history attributes of woody species encountered in quadrat vegetation sampling" [<i>Leptospermum polygalifolium</i> ssp. <i>montanum</i> - Palatability (P) = M, medium]
	Davis, N. E., Coulson, G., & Forsyth, D. M. (2008). Diets of native and introduced mammalian herbivores in shrub-encroached grassy woodland, south-eastern Australia. <i>Wildlife Research</i> , 35(7), 684-694	[Related taxon browsed by mammals] "The two species that had predominantly browser diets (introduced hog deer and native swamp wallabies) consumed <i>L. laevigatum</i> in the greatest proportions, but it accounted for <3% of their diets. <i>L. laevigatum</i> accounted for <1% of the diet of eastern grey kangaroos and was not consumed by common wombats or rabbits. These results suggest that swamp wallabies and hog deer are the species most likely to limit the spread of <i>L. laevigatum</i> ."

Qsn #	Question	Answer
	<p>Clarke, P. J. (2002). Experiments on tree and shrub establishment in temperate grassy woodlands: seedling survival. <i>Austral Ecology</i>, 27(6), 606-615</p>	<p>[Unpalatable to insects. Palatability to livestock uncertain] "Experimental studies of the emergence of shrubs and trees in grassy woodlands on the New England Tablelands, New South Wales, Australia, showed that emergence of seedlings was determined by seed supply, seed predators and seed burial. The survival of these seedlings was then observed in an experiment to test the effects of previous land use, grazing by stock and grazing by other vertebrates. The fate of four eucalypts and six shrub species was followed over 5 years. Across all species more than 50% mortality occurred in the first 6 months prior to the imposition of grazing treatments. These deaths were attributed to the combined effects of insect defoliation, cold, and low soil moisture. Average mortality over all treatments showed two distinct trends: eucalypts and one unpalatable shrub (<i>Leptospermum</i>) had greater than 1% survival over 5 years, whereas <i>Acacia</i>, <i>Cassinia</i> , <i>Indigophera</i> , <i>Lomatia</i> and <i>Xanthorrhoea</i> either had very low or no survival after 5 years. The effect of livestock grazing on seedling numbers was rarely detected because of patchy emergence and mortality due to other causes. However, proportional hazard regression models showed that there was often an increased hazard associated with grazing or grazed landscapes. Overall, those species with high hazard coefficients associated with stock are rare in the landscape, whereas those with lesser risk are more common. Recruitment is likely to be an extremely rare event because the highest proportion of germinable seed sown that survived to a juvenile stage was 0.42% and the mean across all species was 0.12%. No natural recruitment of shrub species was observed over 5 years of observation, suggesting that recruitment is episodic and disturbance driven. Enhancing natural 'regeneration' of woody plants under these circumstances may be more challenging than simply fencing off remnants."</p>

405	Toxic to animals	n
	Source(s)	Notes
	<p>Plants for a Future. (2018). <i>Leptospermum polygalifolium</i>. https://pfaf.org. [Accessed 6 Aug 2018]</p>	<p>Known Hazards: None known</p>
	<p>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</p>	<p>No evidence</p>

Qsn #	Question	Answer
406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Australian Plants online. (1998). <i>Leptospermum</i> . http://anpsa.org.au/APOL11/sep98-3.html . [Accessed 6 Aug 2018]	"The main problems I have experienced have been caused by a small white scale insect which appears in fairly large numbers and affects growth rates. The other problem experienced has been with leaf and twig webbers. They bind a mass of leaves and twigs together from where the caterpillars emerge by night to feed on adjacent leaves. The scale insects can be fairly readily controlled with white oil/carbaryl spray in summer. The leaf and twig webbers can be controlled by carbaryl spray or hand removal of nests. Unless the leaf and twig webber infestation is very severe, the problem is usually one of unsightliness rather than one of major plant damage."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Plants for a Future. (2018). <i>Leptospermum polygalifolium</i> . https://pfaf.org . [Accessed 6 Aug 2018]	Known Hazards: None known
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes
	Hawaii Invasive Species Council. 2018. FY18 Funded Projects - Ko'olau Mountains Watershed Partnership – <i>Leptospermum polygalifolium</i> Survey & Control. https://dlnr.hawaii.gov/hisc/projects/fy18/ . [Accessed]	[Ability to form dense stands, & to resprout after fire suggest that <i>Leptospermum polygalifolium</i> may increase fire risk within invaded habitat] "Where this species has naturalized it forms dense stands crowding out native plants"
	Watson, P. J. (2005). Fire frequencies for western Sydney's woodlands: indications from vegetation dynamics. PhD Dissertation. University of Western Sydney, Australia	[Resprouts after fire. Adapted to fire prone habitats. Suggests possible increased fire risk in introduced range] "Table A4.1. Regeneration modes of Cumberland Plain shrub species." [<i>Leptospermum polygalifolium</i> ssp. <i>polygalifolium</i> - R, resprouter]

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Australian Native Plants. (2018). <i>Leptospermum polygalifolium</i> . https://www.australianplants.com/plants.aspx?id=1107 . [Accessed 6 Aug 2018]	"Exposure: Full Sun to Partial Shade"
	Gardening With Angus. 2018. <i>Leptospermum polygalifolium</i> 'Copper Glow' - Tea Tree. https://www.gardeningwithangus.com.au . [Accessed 3 Aug 2018]	"Light: Sunny, Light shade"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
-----	--	---

Qsn #	Question	Answer
	Source(s)	Notes
	Gardening With Angus. 2018. <i>Leptospermum polygalifolium</i> 'Copper Glow' - Tea Tree. https://www.gardeningwithangus.com.au . [Accessed 3 Aug 2018]	"It does well in a range of soil types, from light to clay. Withstands frost and dry spells once established." ... "Soil Type: Sandy, Clay, Loamy, Sandy loam, Clay loam, Saline, Poor soil"
	Florabank. (2018). <i>Leptospermum polygalifolium</i> . http://www.florabank.org.au/ . [Accessed 3 Aug 2018]	"Subsp. <i>polygalifolium</i> ... Soil factors Texture: loam, sandy loam, sandy clay loam or sand Soil depth: skeletal to shallow (less than 30 cm) or moderate to deep (30-100 cm or greater)"
	Plants for a Future. (2018). <i>Leptospermum polygalifolium</i> . https://pfaf.org . [Accessed 6 Aug 2018]	"Succeed in almost any neutral or acid soil of good or reasonable quality, preferring a light sandy loam and full sun"

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Thompson, J. (1989). A revision of the genus <i>Leptospermum</i> (Myrtaceae). <i>Telopea</i> 3(3): 301-449	"Rather slender shrub 1-3 m or more in height, occasionally a small tree to 5 m or more."

412	Forms dense thickets	y
	Source(s)	Notes
	Hawaii Invasive Species Council. 2018. FY18 Funded Projects - Ko'olau Mountains Watershed Partnership – <i>Leptospermum polygalifolium</i> Survey & Control. https://dlnr.hawaii.gov/hisc/projects/fy18/ . [Accessed 6 Aug 2018]	"Where this species has naturalized it forms dense stands crowding out native plants"

501	Aquatic	n
	Source(s)	Notes
	Thompson, J. (1989). A revision of the genus <i>Leptospermum</i> (Myrtaceae). <i>Telopea</i> 3(3): 301-449	"Rather slender shrub 1-3 m or more in height, occasionally a small tree to 5 m or more." ... "Widespread on the tablelands and coast of central eastern New South Wales, extending southward along the coast (Map 7). In heath or dry sclerophyll forest, usually on sandstone, in deep sand or skeletal soils, often in moist depressions or along rocky watercourses."
	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.	[Terrestrial] "in Hawai'i cultivated and naturalized at least in O'ahu arboreta and along Wai'alaie Nui Ridge, Ko'olau Mountains, O'ahu."

502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 3 Aug 2018]	Family: Myrtaceae Subfamily: Myrtoideae Tribe: Leptospermeae

503	Nitrogen fixing woody plant	n
------------	------------------------------------	----------

Qsn #	Question	Answer
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 3 Aug 2018]	Family: Myrtaceae Subfamily: Myrtoideae Tribe: Leptospermeae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	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.	"Large shrubs or small trees to 4-7 m tall."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Thompson, J. (1989). A revision of the genus <i>Leptospermum</i> (Myrtaceae). <i>Telopea</i> 3(3): 301-449	"From Cape York in Queensland to the central South Coast district of New South Wales, extending inland beyond the ranges and to Lord Howe Island" [No evidence]

602	Produces viable seed	y
	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.	"Capsules usually 5-valved, ca. 6-8 mm in diameter, exerted ca. 1/2 from hypanthium. [2n = 22.] Native to northeastern Australia; in Hawai'i cultivated and naturalized at least in O'ahu arboreta and along Wai'alaie Nui Ridge, Ko'olau Mountains, O'ahu."
	Thompson, J. (1989). A revision of the genus <i>Leptospermum</i> (Myrtaceae). <i>Telopea</i> 3(3): 301-449	"Mature seeds 1.5-2.5 (-3) mm long, irregularly narrowly linear-cuneiform, curved, and striate with the surface fibres tending to loosen and diverge."
	Australian National Botanic Gardens and Centre for Australian National Biodiversity Research. 2018. Growing Native Plants. <i>Leptospermum polygalifolium</i> . https://www.anbg.gov.au . [Accessed 3 Aug 2018]	"Propagation From seed or cuttings. Propagate from good forms."
	Florabank. (2018). <i>Leptospermum polygalifolium</i> . http://www.florabank.org.au/ . [Accessed 3 Aug 2018]	"The main flowering is in spring – early summer. Seed is periodically released from fruits over time." ... " <i>Leptospermum polygalifolium</i> germinates easily from seed [10] with no pre-treatment, at an optimum temperature of 20°C [90]."

603	Hybridizes naturally	y
	Source(s)	Notes
	Thompson, J. (1989). A revision of the genus <i>Leptospermum</i> (Myrtaceae). <i>Telopea</i> 3(3): 301-449	"As well, natural hybrids have been found between <i>L. laevigatum</i> and <i>L. myrsinoides</i> , <i>L. parvifolium</i> and <i>L. squarrosus</i> , <i>L. arachnoides</i> and <i>L. squarrosus</i> , <i>L. juniperinum</i> and <i>L. polygalifolium</i> , <i>L. grandifolium</i> and <i>L. sphaerocarpum</i> , and <i>L. nitidum</i> and <i>L. lanigerum</i> . <i>L. emarginatum</i> and <i>L. petersonii</i> have been found to hybridise in cultivation."

Qsn #	Question	Answer
	Dawson, M. (2013). Australian <i>Leptospermum</i> in cultivation: Interspecific hybrids. <i>New Zealand Garden Journal</i> , 16(1): 2-13	"In Australia, natural interspecific hybrids in <i>Leptospermum</i> occur where their distributions and flowering periods overlap. Botanist Dr Joy Thompson listed the following natural hybrids in her 1989 taxonomic treatment:" [Includes <i>L. juniperinum</i> Sm. × <i>L. polygalifolium</i> Salisb., <i>L. minutifolium</i> (Benth.) C.T.White × <i>L. polygalifolium</i>]

604	Self-compatible or apomictic	
	Source(s)	Notes
	O'Brien, S. P., & Calder, D. M. (1993). Reproductive biology and floral phenologies of the sympatric species <i>Leptospermum myrsinoides</i> and <i>L. continentale</i> (Myrtaceae). <i>Australian Journal of Botany</i> , 41(5), 527-539	[Related species are self-compatible] "The reproductive biology and floral phenologies of co-occurring <i>Leptospermum myrsinoides</i> and <i>L. continentale</i> were investigated. Both species have similar floral structure and both are protandrous. Anther dehiscence is staggered over approximately 6 days and pollen viability remains high for at least 3 days. The styles of both species are short at anthesis but extend during the next 6 days to approximately the same height as the anthers. The stigmas of these species do not achieve maximum receptivity until at least 4 days after anthesis. Both species are self compatible. At the three sites studied, <i>L. myrsinoides</i> and <i>L. continentale</i> have separate flowering times with <i>L. myrsinoides</i> always flowering first. Within populations of each species, plants reached first flower and peak flower in the same order in 1989 and 1990, implying genetic control over flowering time. It is suggested that protandry in these species enhances the likelihood of outcrossing and the staggered release of pollen coupled with the degree of overlap within flowering populations increases the number of potential mates available to each flower."
	Thompson, J. (1989). A revision of the genus <i>Leptospermum</i> (Myrtaceae). <i>Telopea</i> 3(3): 301-449	[Unknown, but other taxa are self-compatible] "That plants are self-compatible has been shown for <i>L. scoparium</i> in New Zealand (Burrell 1965)." ... "subsp. <i>polygalifolium</i> ... Flowers (10—)12(—15) mm in diameter, greenish or creamy white. H ypanthium 2.5-3.5 mm long. Sepals 2-2.5 mm long, usually scarious only near the margin. Ovary 5-locular with c. 50-100 ovules in each loculus."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Plants for a Future. (2018). <i>Leptospermum polygalifolium</i> . https://pfaf.org . [Accessed 7 Aug 2018]	"The species is hermaphrodite (has both male and female organs) and is pollinated by Insects."
	Thompson, J. (1989). A revision of the genus <i>Leptospermum</i> (Myrtaceae). <i>Telopea</i> 3(3): 301-449	[Flowers unspecialized] "Flowers (10—)12(—15) mm in diameter, greenish or creamy white. H ypanthium 2.5-3.5 mm long. Sepals 2-2.5 mm long, usually scarious only near the margin. Ovary 5-locular with c. 50-100 ovules in each loculus."

Qsn #	Question	Answer
606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Australian National Botanic Gardens and Centre for Australian National Biodiversity Research. 2018. Growing Native Plants. <i>Leptospermum polygalifolium</i> . https://www.anbg.gov.au . [Accessed 7 Aug 2018]	[Resprouts from lignotuber, but no evidence of vegetative spread] "Propagation is easy from both seed and cuttings and cultivars must be reproduced by vegetative means if clonal properties are to be retained."

607	Minimum generative time (years)	3
	Source(s)	Notes
	Watson, P. J. (2005). Fire frequencies for western Sydney's woodlands: indications from vegetation dynamics. PhD Dissertation. University of Western Sydney, Australia	[Fruits about 2 years after fire. Time to first flowering unknown] "Table A4.1. Regeneration modes of Cumberland Plain shrub species" [<i>Leptospermum polygalifolium</i> ssp. <i>polygalifolium</i> - Secondary juvenile period = 2 - 3 years. Primary juvenile period - unknown]

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	Notes
	Western Australian Herbarium. (2010). FloraBase - The Western Australian Flora - <i>Leptospermum laevigatum</i> . Department of Environment and Conservation. http://florabase.calm.wa.gov.au . [Accessed 7 Aug 2018]	"Dispersal. Wind, vehicles, soil movement, water, garden refuse." [Seeds of related taxon dispersed unintentionally by vehicles and disposal of garden refuse. Possible that <i>Leptospermum polygalifolium</i> could be dispersed in a similar manner, but evidence is currently lacking]

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Florabank. (2018). <i>Leptospermum polygalifolium</i> . http://www.florabank.org.au/ . [Accessed 3 Aug 2018]	"This plant is a valuable river stabiliser as it lies down in a flood, of high wildlife value and widely used as an ornamental."
	Australian National Botanic Gardens and Centre for Australian National Biodiversity Research. 2018. Growing Native Plants. <i>Leptospermum polygalifolium</i> . https://www.anbg.gov.au . [Accessed 3 Aug 2018]	[Cultivated as an ornamental] "Frost-hardy. (Plants given an this rating will tolerate frosts to -7°C in conditions of normal rainfall.). Some forms suitable for rockery plants that reach more than 50 cm high. May be used as features. Useful as cut flowers, foliage or fruits. Suitable hedge or screen plants. Suitable for use in tropical areas."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Hunter, J. T. (1999). Vegetation and floristics of the Bald rock and Boonoo Boonoo National Parks. A report to the NSW National parks and Wildlife Service. NPWS, Glen Innes, NSW	[No evidence of dispersal as a produce contaminant] "Table 4: Known fire responses and traits of taxa found in the Bald Rock and Boonoo Boonoo." [<i>Leptospermum polygalifolium</i> - Dispersed locally by gravity and wind.]

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes

Qsn #	Question	Answer
	Hunter, J. T. (1999). Vegetation and floristics of the Bald rock and Boonoo Boonoo National Parks. A report to the NSW National parks and Wildlife Service. NPWS, Glen Innes, NSW	"Table 4: Known fire responses and traits of taxa found in the Bald Rock and Boonoo Boonoo." [Leptospermum polygalifolium - Dispersed locally by gravity and wind.]

705	Propagules water dispersed	y
	Source(s)	Notes
	Thompson, J. (1989). A revision of the genus <i>Leptospermum</i> (Myrtaceae). <i>Telopea</i> 3(3): 301-449	"In heath or dry sclerophyll forest, usually on sandstone, in deep sand or skeletal soils, often in moist depressions or along rocky watercourses."
	Hunter, J. T. (1999). Vegetation and floristics of the Bald rock and Boonoo Boonoo National Parks. A report to the NSW National parks and Wildlife Service. NPWS, Glen Innes, NSW	"Table 4: Known fire responses and traits of taxa found in the Bald Rock and Boonoo Boonoo." [Leptospermum polygalifolium - Dispersed locally by gravity and wind.]
	Florabank. (2018). <i>Leptospermum polygalifolium</i> . http://www.florabank.org.au/ . [Accessed 3 Aug 2018]	"This plant is a valuable river stabiliser as it lies down in a flood" [Presence along rivers suggests wind & gravity-dispersed seeds would also likely be moved by water]

706	Propagules bird dispersed	n
	Source(s)	Notes
	Hunter, J. T. (1999). Vegetation and floristics of the Bald rock and Boonoo Boonoo National Parks. A report to the NSW National parks and Wildlife Service. NPWS, Glen Innes, NSW	"Table 4: Known fire responses and traits of taxa found in the Bald Rock and Boonoo Boonoo." [Leptospermum polygalifolium - Dispersed locally by gravity and wind.]
	Thompson, J. (1989). A revision of the genus <i>Leptospermum</i> (Myrtaceae). <i>Telopea</i> 3(3): 301-449	[Not adapted for frugivory] "Fruit persistent but not long-persistent and enlarging, 5-8 (-c. 10) mm in diameter, widest at a narrowly extended rim and usually rounded below to the base or to a short stalk, the valves exerted, before opening with a high or broad dome rather symmetrical with the almost spherical to broad and shallow wide part of the fruit, later often but not always opening so wide as to exceed the rim and reduced the depth of the base. Mature seeds 1.5-2.5 (-3) mm long, irregularly narrowly linear-cuneiform, curved, and striate with the surface fibres tending to loosen and diverge."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Thompson, J. (1989). A revision of the genus <i>Leptospermum</i> (Myrtaceae). <i>Telopea</i> 3(3): 301-449	[Possible that seeds could be moved by adhering to animals, but probably unlikely as they lack means of external attachment] "Fruit persistent but not long-persistent and enlarging, 5-8 (-c. 10) mm in diameter, widest at a narrowly extended rim and usually rounded below to the base or to a short stalk, the valves exerted, before opening with a high or broad dome rather symmetrical with the almost spherical to broad and shallow wide part of the fruit, later often but not always opening so wide as to exceed the rim and reduced the depth of the base. Mature seeds 1.5-2.5 (-3) mm long, irregularly narrowly linear-cuneiform, curved, and striate with the surface fibres tending to loosen and diverge."

Qsn #	Question	Answer
708	Propagules survive passage through the gut	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	Unknown if propagules survive passage through gut. Evidence that some animals may browse plants & could incidentally ingest capsules & seeds

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	Thompson, J. (1989). A revision of the genus <i>Leptospermum</i> (Myrtaceae). <i>Telopea</i> 3(3): 301-449	[Possibly. Densities unspecified] "In all species seeds are produced in great abundance." ... "Mature seeds 1.5-2.5 (-3) mm long, irregularly narrowly linear-cuneiform, curved, and striate with the surface fibres tending to loosen and diverge."

802	Evidence that a persistent propagule bank is formed (>1 yr)	y
	Source(s)	Notes
	Plants for a Future. (2018). <i>Leptospermum polygalifolium</i> . https://pfaf.org . [Accessed 6 Aug 2018]	"The seed remains viable for many years."
	Myerscough, P. J. (1998). Ecology of Myrtaceae with special reference to the Sydney region. <i>Cunninghamia</i> , 5, 787-807	[Forms a persistent "canopy" seed bank] "In other <i>Leptospermoideae</i> occurring in these habitats, the fruits open and seeds are dispersed onto the soil. In some of these species, the fruits are bradysporous; that is the opening of the mature fruit held on the plant is normally delayed for some time, often years, before it is heated usually by fire or extremely hot weather, or the stem bearing it senesces, and the fruit opens and seeds are shed. Bradysporous fruits are usually fairly tough and woody." ... "In infertile, fire prone areas of the Sydney region, there are both bradysporous species of <i>Leptospermum</i> , such as <i>Leptospermum polygalifolium</i> and <i>Leptospermum squarrosum</i> , and non-bradysporous species, such as <i>Leptospermum trinervium</i> ."

803	Well controlled by herbicides	
	Source(s)	Notes
	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	" <i>Leptospermum scoparium</i> ... Reported to be sensitive to triclopyr" [Related invasive taxon controlled by herbicides. Efficacy on <i>L. polygalifolium</i> unknown]

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Kubiak, P. J. 2009. Fire responses of bushland plants after the January 1994 wildfires in northern Sydney. <i>Cunninghamia</i> , 11(1): 131-165	"Appendix 1. Observations on fire responses (after 100% leaf scorch) of vascular plants in the Lane Cove River (LCR) (observations mainly Jan 1994 – Oct 1999) and Narrabeen Lagoon (NL) (Mar – Oct 1994) catchments, following the fires of January 1994." [<i>Leptospermum polygalifolium</i> = R = majority of adult plants resprouted after the fires]

Qsn #	Question	Answer
	de Lange, P. J., de Lange, T. J. P., & de Lang, F. J. T. (2005). New exotic plant records, and range in the northern North. Auckland Botanical Society Journal, December: 130-147	"Leptospermum polygalifolium Salisb. subsp. polygalifolium ... This species is now locally common in parts of Auckland, seed germinates readily, and once plants have established their lignotuber renders them very hard to remove from the soil. At the Auckland Domain the further spread of this species is controlled only by frequent lawn mowing, which periodically removes the young branchlets of seedlings and saplings. These then re-sprout from the lignotuber in time for the next mowing."
	Williams, P., Kemp, J., Parsons, M., Devlin, T., Collins, E., & Williams, S. (2005). Post-fire plant regeneration in montane heath of the Wet Tropics, north-eastern Queensland. Proceedings of the Royal Society of Queensland 112: 63-70	"TABLE1. Post-fire regeneration and seed bank type of heath plants on Bishop's Peak." [Leptospermum polygalifolium - Post-fire regeneration = 5 = survives fire by resprouting from base of stem]

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	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.	[Unknown] "in Hawai'i cultivated and naturalized at least in O'ahu arboreta and along Wai'ala'e Nui Ridge, Ko'olau Mountains, O'ahu."

Summary of Risk Traits:

High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Naturalized in regions with tropical climates
- Naturalized on Oahu, (Hawaiian Islands), escaped in New Zealand
- An environmental weed on Oahu, Hawaiian Islands, & targeted for control
- Other *Leptospermum* species are invasive
- May be unpalatable relative to other plants
- Tolerates many soil types
- Forms dense stands
- Reproduces by seeds
- Hybridizes with other *Leptospermum* species
- Possibly self-compatible
- Seeds dispersed by wind, water & intentionally by people
- Prolific seed production (numbers unknown)
- Seeds form a persistent canopy seed bank
- Able to resprout from lignotuber after cutting or fire

Low Risk Traits

- Unarmed (no spines, thorns, or burrs)
- Non-toxic
- Ornamental
- Grows best in full sun (may limit spread into densely shaded forest understory)
- Not reported to spread vegetatively