

Taxon: <i>Melaleuca bracteata</i> F. Muell.	Family: Myrtaceae
Common Name(s): black teatree bracteate honey myrtle mock olive prickly-leaf teatree river teatree white cloudtree	Synonym(s): <i>Melaleuca genistifolia</i> auct. <i>Melaleuca monticola</i> J. M. Black

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 4 Dec 2019
WRA Score: 9.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Tropical Tree, Ornamental, Dense Stands, Wind-Dispersed, Coppices

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		
302	Garden/amenity/disturbance weed		
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		
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		

Qsn #	Question	Answer Option	Answer
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	y=1, n=0	n
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	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)		
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	y=1, n=-1	n
801	Prolific seed production (>1000/m2)	y=1, n=-1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[No evidence] "There are at least four chemical varieties in terms of the foliar essential oil produced. The two eugenol (methyl- and isomethyl-) chemotypes are of possible interest for commercial production. Its free-seeding and suckering habit combined with its tolerance of a wide range of soil conditions make it a potential weed species. Provenance testing will be needed to determine optimal seed sources."
102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	NA
103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2019). 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
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"M. bracteata is typically a large shrub or small bushy tree 5-10 m tall. In particularly favourable situations in eastern Queensland it may reach over 20 m tall but in the harsh environment of the arid zone it may be only 2-3 m tall and of very bushy habit. It has one of the widest distributions of the genus in Australia and occurs in several climatic zones including warm sub-humid and warm humid in the south east and hot semi-arid and warm arid in the northern and central part."
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 3 Dec 2019]	"Native Australasia AUSTRALIA: Australia [New South Wales (n.), Queensland, South Australia, Western Australia (n.), Northern Territory]"

Qsn #	Question	Answer
202	Quality of climate match data	High
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 3 Dec 2019]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"M. bracteata is typically a large shrub or small bushy tree 5-10 m tall. In particularly favourable situations in eastern Queensland it may reach over 20 m tall but in the harsh environment of the arid zone it may be only 2-3 m tall and of very bushy habit. It has one of the widest distributions of the genus in Australia and occurs in several climatic zones including warm sub-humid and warm humid in the south east and hot semi-arid and warm arid in the northern and central part. "

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"M. bracteata is typically a large shrub or small bushy tree 5-10 m tall. In particularly favourable situations in eastern Queensland it may reach over 20 m tall but in the harsh environment of the arid zone it may be only 2-3 m tall and of very bushy habit. It has one of the widest distributions of the genus in Australia and occurs in several climatic zones including warm sub-humid and warm humid in the south east and hot semi-arid and warm arid in the northern and central part."

Qsn #	Question	Answer
205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"China planted India planted Andhra Pradesh planted Gujarat planted Haryana planted Karnataka planted Uttar Pradesh planted Israel planted Laos planted Malaysia planted Sarawak planted Pakistan planted Philippines planted Sri Lanka planted Thailand planted Vietnam planted Africa Ethiopia planted Kenya planted Sudan planted Zambia planted Zimbabwe planted Central America & Caribbean Cuba planted Oceania [Australia] Australian Northern Territory natural and planted New South Wales natural and planted Queensland natural and planted South Australia natural Western Australia natural and planted Vanuatu planted"
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 3 Dec 2019]	"Cultivated Asia-Tropical MALESIA: Indonesia [Jawa] Northern America SOUTHWESTERN U.S.A.: United States [California]"

301	Naturalized beyond native range	
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Its free-seeding and suckering habit combined with its tolerance of a wide range of soil conditions make it a potential weed species." [Unclear whether species has naturalized outside of native range, or if acting as a weed within native or introduced range (See 3.02)]
	Mulvaney, M. J. (1991). Far from the Garden Path: An Identikit Picture of Woody Ornamental Plants Invading South-Eastern Australian Bushland. PhD Dissertation. Dept. Australian National University, Canberra ACT	Listed as a weed in Australia with no information about impacts found.

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Paten Park Native Nursery. (2019). <i>Melaleuca bracteata</i> "Black Tea Tree". https://ppnn.org.au/plantlist/melaleuca-bracteata/ . [Accessed 3 Dec 2019]	"Invasive Root Species List" [Plants which can cause drainage problems if planted too close to drains or foundations]
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Its free-seeding and suckering habit combined with its tolerance of a wide range of soil conditions make it a potential weed species."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"References: Australia-E-380, United States of America-Q-1197, India-W-1977."
	Mulvaney, M. J. (1991). Far from the Garden Path: An Identikit Picture of Woody Ornamental Plants Invading South-Eastern Australian Bushland. PhD Dissertation. Dept. Australian National University, Canberra ACT	Listed as a weed in Australia with no information about impacts found

Qsn #	Question	Answer
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	No evidence

304	Environmental weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

305	Congeneric weed	y
	Source(s)	Notes
	Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"Melaleuca quinquenervia ... In Florida, melaleuca invades pine flatwoods, sawgrass marshes, cypress swamps and disturbed wet sites. It is considered as a transformer species and is especially threatening the sawgrass marshes of the Florida Everglades (Dray et al., 2006). Native plants are crowded out and the tree diminishes habitat for wildlife; the tree provides little food for birds and mammals (Langeland and Craddock Burks, 1998; Julian et al., 2012). Once established, tree islands are built and it transforms sawgrass marshes into forest habitats with a strongly impoverished species diversity of plants and animals (Center et al., 2012). The same mechanisms lead to reduced species richness in wetlands of Puerto Rico and the Bahamas (Pratt et al., 2005, 2007)."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"M. bracteata is typically a large shrub or small bushy tree 5-10 m tall." [No evidence]

402	Allelopathic	
	Source(s)	Notes
	Yatagai, M., Ohira, T., & Nakashima, K. (1998). Composition, miticidal activity and growth regulation effect on radish seeds of extracts from Melaleuca species. Biochemical Systematics and Ecology, 26(7), 713-722	"Abstract The leaf oil components of six Melaleuca species were analyzed. M. symphyocarpa had a higher content of 1,8-cineole and M. bracteata contained large amounts of phenyl propanoids, while the other species had oils which contained complex mixture of mono- and sesquiterpenes. The leaf oil of M. bracteata exhibited the strongest miticidal activity against European house-dust mites (Dermatophagoides pteronyssinus). It also had the strongest germination and growth-inhibition activity against radish seeds." [No evidence found from field settings]

Qsn #	Question	Answer
	Ojha, S., & Bhattacharjee, A. (2013). Evaluation of allelopathic potential of an aromatic exotic tree, <i>Melaleuca leucadendron</i> L. African Journal of Plant Science, 7(11), 558-560	[Unknown. Allelopathy documented in genus] "An attempt was made to evaluate the allelopathic potential of an exotic tree species, <i>Melaleuca leucadendron</i> L. using mung bean (<i>Vigna radiata</i> L.) seeds as responsive bioassay material. This was recorded in terms of the plant extract and plant leachate-induced changes of seed germination behaviour, the levels of DNA and RNA as well as amylase activity in the seed kernels. The results of the present investigation clearly revealed that pretreatment of mung bean seeds with various concentrations [1:1 and 1:2 (w/v)] of <i>M. leucadendron</i> bark extract, leaf extract and leaf leachates for 24 h duration, significantly reduced percentage seed germination and increased the T50 hours. Levels of DNA and RNA were also significantly reduced with concomitant increase of amylase activity in mung bean seed samples pretreated with the bark extract, leaf extract and leaf leachates of <i>M. leucadendron</i> . Tender bark extract and leaf extract showed more inhibitory action on mung bean seed than leaf leachates. Putative allelochemical induced inhibitory effect, that is, reduction of seed germinability along with stimulation of amylase activity in seeds, being the important allelopathic indices, it can be concluded that <i>M. leucadendron</i> can potentially render allelopathic action on the experimental bioassay material."

403	Parasitic	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	" <i>M. bracteata</i> is typically a large shrub or small bushy tree 5-10 m tall." [Myrtaceae. No evidence]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Knight, A. 2007. A Guide to Poisonous House and Garden Plants. CRC Press, Boca Raton, FL	[Generic description. Probably unpalatable] "Animals are unlikely to eat the leaves of the plant because of the strong pungent odor of the leaves. Most animal poisoning from <i>Melaleuca</i> arises from the application of the oil to the skin and hair coat as a means of cleaning the hair or as a treatment for various dermatologic diseases including ectoparasites."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[Palatability unknown. Fodder & forage not listed among uses] "Land use, environmental and service aspects Descriptors: land reclamation; erosion control; shelterbelts; windbreaks; hedges; amenity; ornamental Products 1. Wood Descriptors: round wood; posts; building poles 2. Non-wood Descriptors: oils"

405	Toxic to animals	n
	Source(s)	Notes
	Plants for a Future. (2019). <i>Melaleuca bracteata</i> . https://pfaf.org . [Accessed 3 Dec 2019]	"Known Hazards - None known"

Qsn #	Question	Answer
	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
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	Not listed as toxic to animals

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Forsberg, L. I. (1985). Phytophthora species on ornamental plants in Queensland. Australasian Plant Pathology, 14(1), 18-20	"Abstract Recordings of ornamentals infected by <i>P. cinnamomi</i> , <i>P. nicotianae</i> var. <i>parasitica</i> , <i>P. palmivora</i> , <i>P. megasperma</i> var. <i>megasperma</i> and undetermined <i>P. spp.</i> are tabulated. Most are from nursery stock but field records are also included. Results of pathogenicity tests are indicated for some isolates" [Not listed as an important alternate host]
	San Luis Obispo Botanical Garden. (2019). <i>Melaleuca bracteata</i> . https://www.slobg.org/melaleuca-bracteata# . [Accessed 4 Dec 2019]	"Pests & Diseases: Pest and disease free."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Pests recorded Insects: <i>Lophrotoma</i> "

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Plants for a Future. (2019). <i>Melaleuca bracteata</i> . https://pfaf.org . [Accessed 4 Dec 2019]	"Known Hazards - None known"
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	No evidence
	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

Qsn #	Question	Answer
408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes
	Tran, D. B., Dargusch, P., Moss, P., & Hoang, T. V. (2013). An assessment of potential responses of Melaleuca genus to global climate change. <i>Mitigation and Adaptation Strategies for Global Change</i> , 18(6), 851-867	"All species of the Melaleuca genus possess thick and layered bark." ... "These types of bark confer a remarkable ability to adapt to fire. As global climate progresses, fire may be one of the increasing hazards." [No specific details provided for Melaleuca bracteata]
	Doran, J. C. & Turnbull, J. W. 1997. <i>Australian Trees and Shrubs: species for land rehabilitation and farm planting in the tropics</i> . ACIAR Monograph No. 24. Canberra, Australia	"Fuelwood: Its burning properties have not been reported."
	ACT Government. (2015). <i>Design Standards for Urban Infrastructure. Plant Species for Urban Landscape Projects in Canberra - Botanical Name: Melaleuca bracteata (Mba)</i> . http://www.tccs.act.gov.au/ . [Accessed 4 Dec 2019]	"Low flammability" [Contradicts other reference reporting medium flammability]
	Trinity Software. (2000). <i>Bush Fire Hazard Mapping. Analysis of bushfire susceptibility based on vegetation type and slope</i> . Trinity Software, Cairns	Flammable vegetation (Medium Risk)

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	Llamas, K.A. 2003. <i>Tropical Flowering Plants</i> . Timber Press, Portland, OR	"Full sun"
	Engel, D. H. & Phummai, S. (2002). <i>A Field Guide to Tropical Plants of Asia</i> . Timber Press, Portland, OR	"Needs full, day sunlight."
	Plants for a Future. (2019). <i>Melaleuca bracteata</i> . https://pfaf.org . [Accessed 4 Dec 2019]	"Requires a fertile, well-drained moisture retentive lime-free soil in full sun"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	CAB International, 2005. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	"It is drought and frost tolerant and will grow in a range of soil types including those affected by salinity and alkalinity." ... "Soil descriptors - Soil texture: medium; heavy - Soil drainage: seasonally waterlogged - Soil reaction: acid; neutral; alkaline - Special soil tolerances: saline"
	Doran, J. C. & Turnbull, J. W. 1997. <i>Australian Trees and Shrubs: species for land rehabilitation and farm planting in the tropics</i> . ACIAR Monograph No. 24. Canberra, Australia	"Physiography and soils. Occurs mainly in the Eastern Uplands and Western Plateau physiographic divisions. The overall topography varies from rugged to undulating and moderately hilly. In some areas it extends to the plains. <i>M. bracteata</i> is frequently found growing around waterholes and along watercourses, and may be confined to them in arid areas. Grows on soils derived from basalt, granite, granodiorite, quartz, sandstone and serpentine. In general the soils are rather heavy-textured deep clays, krasnozems, and fine alluviums and have a wide range of fertility. It tolerates sites with high pH and salinity."

Qsn #	Question	Answer
411	Climbing or smothering growth habit	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"M. bracteata is typically a large shrub or small bushy tree 5-10 m tall."
412	Forms dense thickets	y
	Source(s)	Notes
	Rio Tinto Coal Australia, & Sinclair Knight Merz. (2004). Clermont Coal Mine Project : Environmental Impact Statement / Rio Tinto Coal Australia, Brisbane, Qld	"Black Tea-Tree Woodland with a Grassy Understorey... The dominant canopy species of this community is black tea-tree (<i>Melaleuca bracteata</i>) which is moderate to very dense. ... The understorey of the community varies in density depending on the density of canopy cover provided by the black tea-tree. Within the dense stands of black tea-tree, the understorey growth is restricted and consequently the ground layer is very sparse." [Forms dense stands that reduce understory growth in native range]
	Doran, J. C. & Turnbull, J. W. 1997. Australian Trees and Shrubs: species for land rehabilitation and farm planting in the tropics. ACIAR Monograph No. 24. Canberra, Australia	"M. bracteata may occur in the lower storey of eucalypt open-forest or woodland. It is often dominant or prominent in groves, thickets or narrow belts amongst other vegetation types."
501	Aquatic	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[Terrestrial] "M. bracteata is typically a large shrub or small bushy tree 5-10 m tall. In particularly favourable situations in eastern Queensland it may reach over 20 m tall but in the harsh environment of the arid zone it may be only 2-3 m tall and of very bushy habit."
502	Grass	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 4 Dec 2019]	Family: Myrtaceae Subfamily: Myrtoideae Tribe: Melaleuceae
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 4 Dec 2019]	Family: Myrtaceae Subfamily: Myrtoideae Tribe: Melaleuceae
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n

Qsn #	Question	Answer
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"M. bracteata is typically a large shrub or small bushy tree 5-10 m tall."
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"It has one of the widest distributions of the genus in Australia and occurs in several climatic zones including warm sub-humid and warm humid in the south east and hot semi-arid and warm arid in the northern and central part." [No evidence]
602	Produces viable seed	y
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Its free-seeding and suckering habit combined with its tolerance of a wide range of soil conditions make it a potential weed species."
	Plants for a Future. (2019). <i>Melaleuca bracteata</i> . https://pfaf.org . [Accessed 4 Dec 2019]	"Seed - surface sow in spring or autumn onto a pot of permanently moist soil in a warm greenhouse. Emmerse in 5cm of water and do not water from overhead. Grow on until the seedlings are 0.5cm tall then remove from the water and pot up a week later. Seedlings are liable to damp off when grown this way, sowing the seed thinly, good ventilation and hygiene are essential for success[200]."
603	Hybridizes naturally	
	Source(s)	Notes
	Plants for a Future. (2019). <i>Melaleuca bracteata</i> . https://pfaf.org . [Accessed 4 Dec 2019]	"Hybridizes freely with other members of this genus[200]." [No other credible references confirm hybridization of this species]
	Byrnes, N. B. (1986). A revision of <i>Melaleuca</i> L. (Myrtaceae) in northern and eastern Australia, <i>Austrobaileya</i> , 2(3), 254-273	" <i>Melaleuca styphelioides</i> var. <i>squamophloia</i> ... This variety in many respects is intermediate between <i>M. styphelioides</i> var. <i>styphelioides</i> and <i>M. bracteata</i> and may be a hybrid."
604	Self-compatible or apomictic	
	Source(s)	Notes
	Rayamajhi, M. B., Van, T. K., Center, T. D., Goolsby, J. A., Pratt, P. D., & Racelis, A. (2002). Biological attributes of the canopy-held melaleuca seeds in Australia and Florida, US. <i>Journal of Aquatic Plant Management</i> , 40, 87-91	" <i>Melaleuca</i> trees are self-compatible and autogamous, but also are capable of outcrossing" [Info. on <i>M. quinquenervia</i> , but no information found for <i>M. bracteata</i>]
	Brophy J.J., Craven L.A. and Doran J.C. (2013). <i>Melaleucas</i> : their botany, essential oils and uses. ACIAR Monograph No. 156. Australian Centre for International Agricultural Research, Canberra	" <i>Melaleucas</i> are largely outbreeding, often with heritable and highly variable commercial traits (e.g. foliar oil concentrations and various growth characteristics, including inflorescence shape and flower colour)."
605	Requires specialist pollinators	n

Qsn #	Question	Answer
	Source(s)	Notes
	Doran, J. C. & Turnbull, J. W. 1997. Australian Trees and Shrubs: species for land rehabilitation and farm planting in the tropics. ACIAR Monograph No. 24. Canberra, Australia	"It produces large amounts of pollen but is of minor importance for honey, which has poor flavor and light density (Blake and Roff 1958)."
	Brophy J.J., Craven L.A. and Doran J.C. (2013). Melaleucas: their botany, essential oils and uses. ACIAR Monograph No. 156. Australian Centre for International Agricultural Research, Canberra	"Melaleucas are mostly insect-pollinated. Hawkeswood (1980), for example, showed that jewel beetles (<i>Diadoxus</i> spp.) were the main pollinators of <i>M. pauperiflora</i> in Western Australia and South Australia. Baskorowati et al. (2010a, b) observed a wide variety of insects visiting the flowers of <i>M. alternifolia</i> in New South Wales, including large flying insects like honey bees (<i>Apis mellifera</i>), flies and wasps (Figure 6). These authors also found that small insects like thrips (<i>Thrips imaginis</i> and <i>T. tabacci</i>) were the dominant visitors to the flowers of <i>M. alternifolia</i> and are important pollinators, as confirmed by exclusion experiments. Pollination is probably also effected by birds, notably lorikeets and honeyeaters, which are often seen visiting the flowers of bottlebrushes and broad-leaved paperbarks. Fruit bats (family Pteropodidae) also feed on flowering broad-leaved paperbarks and may be pollinators for these species."
	Plants for a Future. (2019). <i>Melaleuca bracteata</i> . https://pfaf.org . [Accessed 4 Dec 2019]	"The species is hermaphrodite (has both male and female organs) and is pollinated by Insects."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Its free-seeding and suckering habit combined with its tolerance of a wide range of soil conditions make it a potential weed species."

607	Minimum generative time (years)	1
	Source(s)	Notes
	Engel, D. H. & Phummai, S. (2002). A Field Guide to Tropical Plants of Asia. Timber Press, Portland, OR	"Fast grower"
	Doran, J. C. & Turnbull, J. W. 1997. Australian Trees and Shrubs: species for land rehabilitation and farm planting in the tropics. ACIAR Monograph No. 24. Canberra, Australia	"Flower buds have been observed as early as 7 months in this species (Ryan and Bell 1989)."
	Plants for a Future. (2019). <i>Melaleuca bracteata</i> . https://pfaf.org . [Accessed 4 Dec 2019]	"Seed takes about 12 months to develop on the plant, the woody seed capsules persist for 3 or more years[200]." [Fast growing woody tree, and seeds take a long time to mature]

Qsn #	Question	Answer
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	Notes
	Save Our Waterways Now. (2019). <i>Solanum seafortianum</i> (Solanaceae) Brazilian nightshade. http://www.saveourwaterwaysnow.com.au . [Accessed 4 Dec 2019]	"Fruit sub- (or nearly) globose, 2-3 mm in diameter, orifice around 2 mm in diameter, with sepals persistent." [Small seeds in muddy habitats could possibly be spread unintentionally]
	Eddie, C. 2012. Field Guide to Trees and Shrubs of Eastern Queensland Oil and Gas Fields Second Edition. Santos Ltd, Adelaide	"HABITAT Occurs in the northern part of the coverage area along watercourses, on floodplains, swampy areas, gilgais and open grassy downs, usually on heavy clay soils, but also on sandy and gravelly soils."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 4 Dec 2019]	"Cultivated Asia-Tropical MALESIA: Indonesia [Jawa] Northern America SOUTHWESTERN U.S.A.: United States [California]"
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Land use, environmental and service aspects Descriptors: land reclamation; erosion control; shelterbelts; windbreaks; hedges; amenity; ornamental"

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	No evidence found, although wind-dispersed seeds could potentially become a contaminant if grown in proximity to other plants or crops.

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Tran, D. B., Dargusch, P., Moss, P., & Hoang, T. V. (2013). An assessment of potential responses of <i>Melaleuca</i> genus to global climate change. <i>Mitigation and Adaptation Strategies for Global Change</i> , 18(6), 851-867	"In Australia, the species with largest seed (<i>Melaleuca argentea</i>) comprises 788,000 capsules kg ⁻¹ , and the smallest (<i>Melaleuca bracteata</i>) comprises 10,500,000 capsules kg ⁻¹ "
	Schmidt, L. H. (2007). <i>Tropical Forest Seed</i> . Springer-Verlag, Berlin Heidelberg	"Small size and high air resistance help reduce falling speed and thus increase the time for horizontal displacement by wind. Very small and light seed may be more or less suspended in air (van der Pijl 1982). Tiny seeded species are, for example, <i>Anthocephalus chinensis</i> , <i>Octomeles sumatrana</i> and most eucalypts and melaleuca species."

705	Propagules water dispersed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Eddie, C. 2012. Field Guide to Trees and Shrubs of Eastern Queensland Oil and Gas Fields Second Edition. Santos Ltd, Adelaide	"HABITAT Occurs in the northern part of the coverage area along watercourses, on floodplains, swampy areas, gilgais and open grassy downs, usually on heavy clay soils, but also on sandy and gravelly soils." [Seeds likely dispersed by water in addition to wind]
	Doran, J. C. & Turnbull, J. W. 1997. Australian Trees and Shrubs: species for land rehabilitation and farm planting in the tropics. ACIAR Monograph No. 24. Canberra, Australia	" <i>M. bracteata</i> is frequently found growing around waterholes and along watercourses, and may be confined to them in arid areas." [Distribution suggests seeds would be secondarily dispersed by water]

706	Propagules bird dispersed	n
	Source(s)	Notes
	Doran, J. C. & Turnbull, J. W. 1997. Australian Trees and Shrubs: species for land rehabilitation and farm planting in the tropics. ACIAR Monograph No. 24. Canberra, Australia	"The fruit is a capsule, cup-shaped, 2–3 mm long. Mature seed has been collected January–March and in September in northern Queensland" [Not fleshy fruited]

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Doran, J. C. & Turnbull, J. W. 1997. Australian Trees and Shrubs: species for land rehabilitation and farm planting in the tropics. ACIAR Monograph No. 24. Canberra, Australia	"The fruit is a capsule, cup-shaped, 2–3 mm long. Mature seed has been collected January–March and in September in northern Queensland" [Seeds are small but lack means of external attachment. They could hypothetically be transported in soil attached to animals, but evidence is lacking at this time]

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Doran, J. C. & Turnbull, J. W. 1997. Australian Trees and Shrubs: species for land rehabilitation and farm planting in the tropics. ACIAR Monograph No. 24. Canberra, Australia	"The fruit is a capsule, cup-shaped, 2–3 mm long. Mature seed has been collected January–March and in September in northern Queensland" ... "Fodder: Not a fodder species." [No evidence of ingestion by animals]

801	Prolific seed production (>1000/m ²)	y
	Source(s)	Notes
	Price, P. & Lovett, S. (eds). (1999). Riparian Land Management Technical Guidelines, Volume Two: On-ground Management Tools and Techniques, LWRRDC, Canberra	"Direct seeding is relatively cheap—1 kilogram of seed can contain up to 2 million seeds for small-seeded species such as <i>Melaleuca bracteata</i> ."
	Tran, D. B., Dargusch, P., Moss, P., & Hoang, T. V. (2013). An assessment of potential responses of <i>Melaleuca</i> genus to global climate change. Mitigation and Adaptation Strategies for Global Change, 18(6), 851-867	"In Australia, the species with largest seed (<i>Melaleuca argentea</i>) comprises 788,000 capsules kg ⁻¹ , and the smallest (<i>Melaleuca bracteata</i>) comprises 10,500,000 capsules kg ⁻¹ (AgroForestry Tree Database n.d.; Australian Tropical Rainforest Plants 2010; Blake 1968; Doran and Turnbull 1997; Turnbull 1986; Victorian Resources Online 2011)."

802	Evidence that a persistent propagule bank is formed (>1 yr)	

Qsn #	Question	Answer
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Seed storage orthodox" [Unknown from natural settings]

803	Well controlled by herbicides	y
	Source(s)	Notes
	Munger, G. T. (2005). <i>Melaleuca quinquenervia</i> . In: Fire Effects Information System, [Online]. USDA, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/tree/maggra/all.html . [Accessed]	[<i>Melaleuca quinquenervia</i> effectively controlled by herbicides] "Chemical: Herbicides are among the most effective and widely used tools for controlling melaleuca in peninsular Florida [40]. Herbicides are most effective when integrated within a suite of control measures and strategies. Cost and logistics can make chemical control difficult to implement over large areas of infestation. As Myers and Belles [54] explained, "for small administrative units, like Corkscrew Swamp Sanctuary, portions of Sanibel Island, and some state parks, existing control technologies focusing on herbicides have worked well. For larger units, like Loxahatchee National Wildlife Refuge, the Conservation Area, and Big Cypress Preserve, the sheer scale of the problem has limited control success" [54]."
	WRA Specialist. (2019). Personal Communication	No information on herbicide efficacy and chemical control of this species. However, methods to control the invasive <i>Melaleuca quinquenervia</i> would presumably be effective for controlling <i>Melaleuca bracteata</i> if required

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Ability to sucker; coppice"
	Doran, J. C. & Turnbull, J. W. 1997. Australian Trees and Shrubs: species for land rehabilitation and farm planting in the tropics. ACIAR Monograph No. 24. Canberra, Australia	"It coppices readily and suckers from the roots."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	Unknown. <i>Austropuccinia psidii</i> is present in the Hawaiian Islands, and may affect <i>Melaleuca bracteata</i> , as it does other <i>Melaleuca</i> species

Summary of Risk Traits:

High Risk / Undesirable Traits

- Broad climate suitability
- Thrives in tropical climates
- Described as a potential weed because of its seeding and suckering habit
- Other *Melaleuca* species are invasive
- Tolerates many soil types
- Forms dense stands in native range
- Reproduces by seeds and vegetatively by suckering
- Able to reach maturity rapidly (within 7 months)
- Seeds dispersed by wind, water and intentionally by people
- Prolific seed production
- Able to coppice after cutting

Low Risk Traits

- Despite potential weediness, no confirmed reports of naturalization or invasiveness outside native range
- Unarmed (no spines, thorns, or burrs)
- Non-toxic
- Requires full sun (and shade may limit or inhibit spread)
- Herbicides may provide effective control