

Taxon: Prumnopitys taxifolia	Family: Podocarpaceae
Common Name(s): black pine matai	Synonym(s): Dacrydium taxifolium Sol. ex D. Don Podocarpus spicatus R. Br. ex Hook.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 16 Dec 2014
WRA Score: -5.0	Designation: L	Rating: Low Risk

Keywords: Dioecious Tree, Slow-Growing, Shade-tolerant, Wind-Pollinated, Bird-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)	Intermediate
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	n
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	n
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	?
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	n
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	n
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	y=1, n=-1	n
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	y=1, n=0	y

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		
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	y=1, n=-1	n
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)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m ²)	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides		
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	n
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
	Farjon, A. 2010. A Handbook of the World's Conifers. Volume 2. Koninklijke Brill NV, Leiden, The Netherlands	[No evidence] "It is rare in cultivation and only suitable for regions with mild winters that rarely experience light frosts and have plentiful and evenly distributed rainfall."
102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	NA
103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2014. 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"	Intermediate
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 15 Dec 2014]	"Native: AUSTRALASIA New Zealand: New Zealand - North Island"
202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 15 Dec 2014]	
203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Earle, C.J. 2014. The Gymnosperm Database - <i>Prumnopitys taxifolia</i> . http://www.conifers.org/po/Prumnopitys_taxifolia.php . [Accessed 12 Dec 2014]	"Based on data from 209 collection localities, its climate preferences include a mean annual temperature of 12°C, with an average minimum in the coldest month of 3°C, and a mean annual precipitation of 1570 mm (Biffin et al. 2011, Table S5). Zone 9 (cold hardiness limit between -6.6°C and -1.1°C) (Bannister and Neuner 2001)."

Qsn #	Question	Answer
	Farjon, A. 2010. A Handbook of the World's Conifers. Volume 2. Koninklijke Brill NV, Leiden, The Netherlands	"It is rare in cultivation and only suitable for regions with mild winters that rarely experience light frosts and have plentiful and evenly distributed rainfall."
	Plants for a Future. 2014. <i>Prumnopitys taxifolia</i> . http://www.pfaf.org/user/Plant.aspx LatinName=Prumnopitys+taxifolia. [Accessed 12 Dec 2014]	"USDA hardiness zone : 8-11"

204	Native or naturalized in regions with tropical or subtropical climates	n
	Source(s)	Notes
	Earle, C.J. 2014. The Gymnosperm Database - <i>Prumnopitys taxifolia</i> . http://www.conifers.org/po/Prumnopitys_taxifolia.php . [Accessed 15 Dec 2014]	"New Zealand: North and South Islands (Allan 1961). Based on data from 209 collection localities, its climate preferences include a mean annual temperature of 12°C, with an average minimum in the coldest month of 3°C, and a mean annual precipitation of 1570 mm (Biffin et al. 2011, Table S5). Zone 9 (cold hardiness limit between -6.6°C and -1.1°C) (Bannister and Neuner 2001)."

205	Does the species have a history of repeated introductions outside its natural range?	?
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 15 Dec 2014]	[Unknown how widely cultivated or distributed outside native range] "Cultivated: also cultivated "

301	Naturalized beyond native range	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence
	Wagner, W.L., Herbst, D.R. & Lorence, D.H. 2014. Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/index.htm . [Accessed 15 Dec 2014]	No evidence

302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

303	Agricultural/forestry/horticultural weed	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

304	Environmental weed	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

305	Congeneric weed	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Allan, H.H. 1982. Flora of New Zealand, Volume I: Indigenous Tracheophyta - Psilopsida, Lycopside, Filicopsida, Gymnospermae, Dicotyledons. First electronic edition. Landcare Research, Lincoln, New Zealand. http://FloraSeries.LandcareResearch.co.nz . [Accessed]	[Description under synonym Podocarpus spicatus] "Tree up to 25 m., trunk up to 1-25 m. diam., bark dark, falling in thick flakes. Juveniles with slender, flexuous, divaricating branchlets, lvs brownish, 5-10 × 1-2 mm., acute. Adults with lvs 1-1.5 cm. × 1-2 mm., subdistichous, linear, straight to subfalcate, obtuse, often apiculate, coriaceous, dark green, ± glaucous below. Male strobili in spikes, 3-5 cm. long, 10-30 per spike, ♀ axis; apiculus subacute. Ovules 3-10 per spike c. 4 cm. long, on short axillary branchlets; peduncle not swollen. Seeds 5-9 mm. long, subglobose, apiculus obtuse; black, drupaceous. "

402	Allelopathic	n
	Source(s)	Notes
	Perry, N. B., Foster, L., & Jameson, P. E. 1995. Effects of podocarp extracts on lettuce seed germination and seedling growth. New Zealand Journal of Botany, 33(4): 565-568	[Concentrated extracts are allelopathic. Unknown under field conditions] "Extracts were tested for their effects on germination of lettuce seeds, in addition to effects on the subsequent elongation of the hypocotyl, because inhibition of germination could be relevant to allelopathic potential. Molloy et al. (1978) showed allelopathic potential for aqueous extracts of Dacrydium dacrydioides, Prumnopitys taxifolia, and Podocarpus totara against D. dacrydioides seedlings." ... "Apart from the quantified effects on hypocotyl elongation, several of the undiluted extracts caused changes in the appearance of the radicles. All three Phyllocladus extracts, and the Halocarpus biformis and Prumnopitys taxifolia extracts, gave similar effects. Radicles were stained brown where they touched the filter paper and root hair growth was inhibited."

Qsn #	Question	Answer
	Molloy, B. P. J.; Ferguson, J. D.; Fletcher, P. J. 1978: The allelopathic potential of kahikatea. A progress report. New Zealand Journal of Ecology 1:183-184	[Podocarpus spicatus = Synonym of Prumnopitys taxifolia] "In a further line of experiments, kahikatea seedlings were grown in water-soluble extracts of fresh green leaves, bark, roots, litter and soil associated with mature trees of matai or black pine (Podocarpus spicatus) and totara (Podocarpus totara). Once again the leaf extracts proved to be highly toxic and most of the seedlings died."

403	Parasitic	n
	Source(s)	Notes
	Allan, H.H. 1982. Flora of New Zealand, Volume I: Indigenous Tracheophyta - Psilopsida, Lycopsidea, Filicopsida, Gymnospermae, Dicotyledons. First electronic edition. Landcare Research, Lincoln, New Zealand. http://FloraSeries.LandcareResearch.co.nz . [Accessed]	"Tree up to 25 m." [No evidence. Podocarpaceae]

Qsn #	Question	Answer
404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Nugent, G., & Challies, C. N. 1988. Diet and food preferences of white-tailed deer in north-eastern Stewart Island. <i>New Zealand Journal of Ecology</i> , 11: 61-71	"Table 3: Comparison of the frequencies of occurrence of the 48 most common fern and woody species present on vegetation plots with those observed in the diet." [Podocarpus spicatus = Prumnopitys taxifolia not recorded in the diet and given an Index of Preference = 0.0, i.e. not preferred and presumably unpalatable to white-tailed deer]
	Clout, M. N., & Hay, J. R. 1989. The importance of birds as browsers, pollinators and seed dispersers in New Zealand forests. <i>New Zealand Journal of Ecology</i> , 12(Supplement): 27-33	[Foliage browsed by the kokako, and endemic New Zealand bird] "Prominent among these forest browsers are the kereru, or New Zealand pigeon (<i>Hemiphaga novaeseelandiae</i>), and the kokako (<i>Callaeas cinerea</i>), both of which feed at all levels in the forest and are capable of significantly defoliating their favoured food plants." ... "In the central North Island, Hay (1981) found that kokako took leaf material from about 50 plant species (Table 1). Foliage comprised 30% of their total diet, measured as percentage of time spent feeding. Important species (those comprising more than 10% of the diet in anyone season) included moss, houndstongue fern (<i>Phymatosorus diversifolium</i>), <i>Asplenium flaccidum</i> , <i>Prumnopitys taxifolia</i> , <i>Dacrydium cupressinum</i> , <i>Pennantia corymbosa</i> , epiphytic orchids, <i>Muehlenbeckia</i> , <i>Tetrapathaea tetrandra</i> , <i>Melicytus ramiflorus</i> , <i>Hedycarya arborea</i> and <i>Laurelia novaeseelandiae</i> ."
	Leathwick, J. R., Hay, J. R., & Fitzgerald, A. E. 1983. The influence of browsing by introduced mammals on the decline of North Island kokako. <i>New Zealand Journal of Ecology</i> , 6: 55-70	[Leaves consumed by kokako and goats. Fruit consumed by kokako and possums] "TABLE 1: Foods contributing more than 5 % of the observed kokako diet in any one season at Pureora, Mapara or Rotoehu, and those which have been recorded as being eaten by possum, deer, and goats. Food categories are leaf (L), bud (B), flower (F), fruit (D) and invertebrate (I). For sources of information on possum and deer diets see appendices I and II respectively."
	Forsyth, D. M., Coomes, D. A., & Nugent, G. 2003. Framework for assessing the susceptibility of management areas to deer impacts. Department of Conservation, Wellington, New Zealand	[Possibly palatable to, but not preferred browse of deer. May be browsed by goats, sheep etc. in the Hawaiian Islands] "Browse-tolerant. Unpalatable or browse-tolerant species that are relatively abundant. Not eaten when more preferred foods are abundant, but, when preferred foods are scarce and ungulate densities are high, this component is affected by deer. Examples are <i>Prumnopitys taxifolia</i> , <i>P. ferruginea</i> and <i>Nothofagus menziesii</i> ."

405	Toxic to animals	n
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	No evidence of toxicity. Browsed, but not preferred, by introduced mammals in New Zealand
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No reports from genus or family

406	Host for recognized pests and pathogens	
	Source(s)	Notes

Qsn #	Question	Answer
	Brockerhoff, E. G., & Bain, J. 2000. Biosecurity implications of exotic beetles attacking trees and shrubs in New Zealand. <i>New Zealand Plant Protection</i> 53: 321-327	"TABLE 2: Exotic beetles that have been recorded feeding on indigenous trees or shrubs in New Zealand, and their host range." ... "Amasa truncatus (Scolytinae) - polyphagous wood borer of dead exotics and natives, also in live eucalypts" [Host species include <i>Prumnopitys taxifolia</i>]

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	New Zealand Plant Conservation Network. 2014. Flora Details - <i>Prumnopitys taxifolia</i> . http://www.nzpcn.org.nz/flora_details.aspx ID=1193 . [Accessed 12 Dec 2014]	[No evidence] "Gum from the trunk is the basis for "Matai Beer", a deep, rich brew still made in some parts of the country. The dark, hard, durable timber is much sought after for floors and furniture."
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes
	Perry, G. L., Wilmshurst, J. M., & McGlone, M. S. 2014. Ecology and long-term history of fire in New Zealand. <i>New Zealand Journal of Ecology</i> , 38(2): 157-176	[<i>Prumnopitys taxifolia</i> = Moderate flammability. Could potentially increase fire risk in areas where grown] "Table 2. Traits of selected indicative species falling into each of the three fire-response classes (arranged by life-form as per the Landcare Ecological Traits of New Zealand Flora database: http://ecotraits.landcareresearch.co.nz/). Flammability classes as per Fogarty (2001) where available, with the number in brackets the rank from among the 42 species Fogarty assessed (higher rank indicates higher flammability). Resprouting includes above-ground (e.g. epicormic buds) and belowground (e.g. rhizomes–corms) mechanisms (derived in part from Burrows 1994). Bark thickness values (1 = thin to 3 = thick) derived from 32 species measurements (made nationally) described in Lawes et al. (2014)."

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	O'Connor, S. J. 2012. Quantifying seed dispersal of matai (<i>Prumnopitys taxifolia</i>). PhD Dissertation. University of Canterbury, Christchurch, New Zealand	"Matai and the other canopy podocarps are characterised by being late successional, having juveniles tolerant of shade and root competition with slow growth to adulthood (Burrows, 2006). Burrows (2006) describes matai as being able to establish and grow slowly under dense canopy, having suppressed juvenile growth under canopy but growing vigorously in canopy gaps, and regenerating after disturbance."

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

Qsn #	Question	Answer
	Marden, M. & Phillips, C. 2010. Matai. <i>Prumnopitys taxifolia</i> . Landcare Research. http://icm.landcareresearch.co.nz/research/land/documents/Matai.pdf . [Accessed 16 Dec 2014]	"Preferred soils - Wide range of semi fertile soils such as alluvium and pumice"
	New Zealand Plant Conservation Network. 2014. Flora Details - <i>Prumnopitys taxifolia</i> . http://www.nzpcn.org.nz/flora_details.aspx ID=1193 . [Accessed 16 Dec 2014]	"Seems to prefer base-rich substrates and soils."
	Practical Plants. 2014. <i>Prumnopitys taxifolia</i> - Matai. http://practicalplants.org/wiki/Prumnopitys_taxifolia . [Accessed 16 Dec 2014]	"Thrives in any good soil, including chalk"

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Allan, H.H. 1982. Flora of New Zealand, Volume I: Indigenous Tracheophyta - Psilopsida, Lycopsidea, Filicopsida, Gymnospermae, Dicotyledons. First electronic edition. Landcare Research, Lincoln, New Zealand. http://FloraSeries.LandcareResearch.co.nz . [Accessed]	"Tree up to 25 m., trunk up to 1.25 m. diam., bark dark, falling in thick flakes. Juveniles with slender, flexuous, divaricating branchlets, lvs brownish, 5-10 × 1-2 mm., acute. Adults with lvs 1-1.5 cm. × 1-2 mm., subdistichous, linear, straight to subfalcate, obtuse, often apiculate, coriac., dark green, ± glaucous below."

412	Forms dense thickets	n
	Source(s)	Notes
	Farjon, A. 2010. A Handbook of the World's Conifers. Volume 2. Koninklijke Brill NV, Leiden, The Netherlands	" <i>Prumnopitys taxifolia</i> is a species that typically regenerates only after episodal disturbances such as fires caused by volcanic eruptions. It then competes with other invading podocarps as well as angiosperms for light and space, resulting in the long term survival of only a few individuals of this species in the forest."
	McGlone, M. S. 1978. Forest destruction by early Polynesians, Lake Poukawa, Hawkes Bay, New Zealand. <i>Journal of the Royal Society of New Zealand</i> , 8(3): 275-281	[A component of dense stands] "On the steeper ranges, in the foothills of the Ruahine Ranges, and to the south, large areas of dense forest remained. These forests had dense stands of matai (<i>Podocarpus spicatus</i>), totara (<i>Podocarpus totara</i>), and on poorly drained ground and swamp margins, kahikatea (<i>Dacrycarpus dacrydiodes</i>)."

501	Aquatic	n
	Source(s)	Notes
	Farjon, A. 2013. <i>Prumnopitys taxifolia</i> . The IUCN Red List of Threatened Species. Version 2014.3. www.iucnredlist.org	[Terrestrial] " <i>Prumnopitys taxifolia</i> is a constituent species of lowland to montane (20-800 m or even 1,000 m a.s.l.) podocarp (conifer) forest, dominated by <i>Podocarpus totara</i> , <i>Dacrycarpus dacrydioides</i> , or <i>Dacrydium cupressinum</i> , and with <i>Prumnopitys</i> spp., <i>Manoao colensoi</i> , <i>Halocarpus kirkii</i> , and <i>Phyllocladus trichomanoides</i> as frequent associated conifers."

502	Grass	n
	Source(s)	Notes

Qsn #	Question	Answer
	USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 12 Dec 2014]	Podocarpaceae

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 12 Dec 2014]	Podocarpaceae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Farjon, A. 2010. A Handbook of the World's Conifers. Volume 2. Koninklijke Brill NV, Leiden, The Netherlands	"Trees to 25 m tall; trunk to 1.3 m d.b.h, crown wide, domed or rounded."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Farjon, A. 2013. <i>Prumnopitys taxifolia</i> . The IUCN Red List of Threatened Species. Version 2014.3. www.iucnredlist.org	"The population of <i>Prumnopitys taxifolia</i> , after an historic low reached perhaps around 1970, is now increasing and no significant threats have been identified. Therefore it is assessed as Least Concern. "

602	Produces viable seed	y
	Source(s)	Notes
	Plants for a Future. 2014. <i>Prumnopitys taxifolia</i> . http://www.pfaf.org/user/Plant.aspx?LatinName=Prumnopitys+taxifolia . [Accessed 12 Dec 2014]	"Seed - it can be sown at any time of the year in a sandy soil in a greenhouse[1]. It can take 18 months to germinate[200]"

603	Hybridizes naturally	
	Source(s)	Notes
	Farjon, A. & Filer, D. 2013. An Atlas of the World's Conifers: An Analysis of their Distribution, Biogeography, Diversity and Conservation Status. Koninklijke Brill NV, Leiden, The Netherlands	[Unknown. No hybrids reported] "The genus <i>Prumnopitys</i> (Podocarpaceae) has nine species with an interesting, disjunct distribution of Gondwanan origin, currently with the highest diversity and greatest geographical range in Central and South America."

604	Self-compatible or apomictic	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Farjon, A. 2010. A Handbook of the World's Conifers. Volume 2. Koninklijke Brill NV, Leiden, The Netherlands	[Genus description] "Dioecious trees or shrubs ..."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Tomlinson, P. B., Braggins, J. E., & Rattenbury, J. A. 1991. Pollination drop in relation to cone morphology in Podocarpaceae: a novel reproductive mechanism. American Journal of Botany, 78(9): 1289-1303	"Pollen transfer in conifers is by wind but is evidently inefficient because it requires large amounts of pollen to be dispersed randomly to a very small target."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	New Zealand Plant Conservation Network. 2014. Flora Details - <i>Prumnopitys taxifolia</i> . http://www.nzpcn.org.nz/flora_details.aspx ID=1193 . [Accessed 12 Dec 2014]	[No evidence] "Easily grown from fresh seed. Seed may take up to 2 years to germinate Can be grown from hard wood cuttings but rather slow to strike."

607	Minimum generative time (years)	>3
	Source(s)	Notes
	Farjon, A. 2013. <i>Prumnopitys taxifolia</i> . The IUCN Red List of Threatened Species. Version 2014.3. www.iucnredlist.org	"Matai is a slow growing tree and produces dense, hard and heavy brown wood with exceptional strength and durability."
	O'Connor, S. J. 2012. Quantifying seed dispersal of matai (<i>Prumnopitys taxifolia</i>). PhD Dissertation. University of Canterbury, Christchurch, New Zealand	[Time to maturity unclear, but at least over 20 years] "Matai is a heteroblastic species, with juveniles forming a divaricating shrub with different leaf shape and branching pattern to that seen in adults (see Chapter 6, Figure 6.1 for an example) (Philipson and Molloy, 1990); this juvenile phase possibly persists for over 20 years. At a height of 4–6m and trunk diameter of approximately 10 cm, there is a gradual transition to adult form, although it is unclear when trees reach reproductive maturity (Salter, 2004)."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	New Zealand Plant Conservation Network. 2014. Flora Details - <i>Prumnopitys taxifolia</i> . http://www.nzpcn.org.nz/flora_details.aspx ID=1193 . [Accessed 12 Dec 2014]	[Unlikely. Seeds lack means of external attachment, and trees take a long time to reach maturity] "Fruit a fleshy, oily, aromatic, terpene-tasting, purple-black drupe with a glaucous bloom. Stone more or less circular (5.5-)6-8.5 mm diam., surface dull to semi-glossy, pale orange-yellow to light orange-yellow."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes

Qsn #	Question	Answer
	New Zealand Plant Conservation Network. 2014. Flora Details - <i>Prumnopitys taxifolia</i> . http://www.nzpcn.org.nz/flora_details.aspx ID=1193 . [Accessed 12 Dec 2014]	"Commonly cultivated and frequently sold by most commercial nurseries and outlets - usually from plants raised from seed, however some nurseries stock cutting grown plants raised from adult foliage, thus bypassing the filiramulate, divaricating juvenile growth-form. A very popular garden tree."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Farjon, A. 2010. A Handbook of the World's Conifers. Volume 2. Koninklijke Brill NV, Leiden, The Netherlands	[Zoochorous] "Seed cones several on stout branchlets with deciduous scale leaves, axillary to a scale leaf (bract) and consisting of an epimatium enclosing an ovoid, slightly flattened, rugose seed, growing in to a globose or nearly spherical, purplish black 'psedo-fruit" 8-10 mm diam. after most of the undeveloped, green seeds have fallen."
	WRA Specialist. 2014. Personal Communication	No evidence. Adaptations for bird dispersal, and long time to reproductive maturity make contamination of produce unlikely.

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Farjon, A. 2010. A Handbook of the World's Conifers. Volume 2. Koninklijke Brill NV, Leiden, The Netherlands	[Zoochorous] "Seed cones several on stout branchlets with deciduous scale leaves, axillary to a scale leaf (bract) and consisting of an epimatium enclosing an ovoid, slightly flattened, rugose seed, growing in to a globose or nearly spherical, purplish black 'psedo-fruit" 8-10 mm diam. after most of the undeveloped, green seeds have fallen."

705	Propagules water dispersed	n
	Source(s)	Notes
	O'Connor, S. J. 2012. Quantifying seed dispersal of matai (<i>Prumnopitys taxifolia</i>). PhD Dissertation. University of Canterbury, Christchurch, New Zealand	[Zoochorous. No evidence of bird dispersal] "Matai has drupaceous fruits, roughly circular with a single enclosed seed (mean diameter = 7 mm)."

706	Propagules bird dispersed	y
	Source(s)	Notes
	Williams, P. A., & Karl, B. J. 1996. Fleshy fruits of indigenous and adventive plants in the diet of birds in forest remnants, Nelson, New Zealand. <i>New Zealand Journal of Ecology</i> , 20(2): 127-145	"Table 2: Summary of all native and adventive fruiting plants present (P) at Eves, Marsden, and Faulkners, and recorded as being eaten by birds, either from faeces samples (F) or from observations (O)." [Includes <i>Prumnopitys taxifolia</i>]
	Farjon, A. 2010. A Handbook of the World's Conifers. Volume 2. Koninklijke Brill NV, Leiden, The Netherlands	[Genus description] "Seeds enclosed in a drupe-like, fleshy, yellow, red or black epimatium."

707	Propagules dispersed by other animals (externally)	
	Source(s)	Notes

Qsn #	Question	Answer
	O'Connor, S. J. 2012. Quantifying seed dispersal of matai (<i>Prumnopitys taxifolia</i>). PhD Dissertation. University of Canterbury, Christchurch, New Zealand	[Unknown. Possible that rats may scatter hoard seeds, some of which may escape predation] "If rats do move seeds away to husking stations, some of these seeds may escape predation; on Tiritiri Matangi Island, 38% of <i>Elaeocarpus dentatus</i> seeds found in husking stations were intact (Campbell et al., 1984)."

708	Propagules survive passage through the gut	Y
	Source(s)	Notes
	O'Connor, S. J., & Kelly, D. 2012. Seed dispersal of matai (<i>Prumnopitys taxifolia</i>) by feral pigs (<i>Sus scrofa</i>). <i>New Zealand Journal of Ecology</i> , 36(2), 228-231	"Abstract: Introduced feral pigs (<i>Sus scrofa</i>) include native fruit and seed in their diet, and thus may act as seed dispersers if seeds are passed intact. The aim of this study was to determine whether pigs consume, and subsequently disperse, intact seeds of the New Zealand native tree matai (<i>Prumnopitys taxifolia</i>). Two captive pigs were fed 100 ripe fruit of matai and their faeces checked for seeds for 4 days. Fourteen intact seeds (14%) were recovered and 57% of these germinated under glasshouse conditions, comparable with germination from hand-cleaned seeds. We collected 3.5 kg of feral pig faeces from matai-dominated forest in Isolated Hill Reserve, southern Marlborough. This sample contained over 450 intact matai seeds; these seeds readily germinated in the glasshouse, reaching 68% germination after 22 months. These results indicate that pigs are consuming native fruit and passing some viable seeds out – thus acting as occasional seed dispersers."
	Wood, J. R. 2007. Moa gizzard content analyses: further information on the diets of <i>Dinornis robustus</i> and <i>Emeus crassus</i> , and the first evidence for the diet of <i>Pachyornis elephantopus</i> (Aves: <i>Dinornithiformes</i>). <i>Records of the Canterbury Museum</i> , 21: 27-39	"An eastern moa (<i>Emeus crassus</i>) gizzard content sample from Pyramid Valley swamp, also examined by R Mason (in Falla 1941, p. 341), was found to contain seeds of <i>Prumnopitys taxifolia</i> , <i>Myoporum laetum</i> and <i>Nertera</i> sp.."
	Williams, P. A., & Karl, B. J. 1996. Fleshy fruits of indigenous and adventive plants in the diet of birds in forest remnants, Nelson, New Zealand. <i>New Zealand Journal of Ecology</i> , 20(2): 127-145	"Several fruits recorded in the faeces have a mean diameter almost twice the 5 mm gape of silvereyes (<i>Crataegus monogyna</i> , <i>L. formosa</i> , and <i>Prumnopitys taxifolia</i> , Table 3)." ... "exceptionally watery and soft, and are eaten either by pecking the drupes or swallowing them but only smaller fruits of <i>P. taxifolia</i> (9.5 mm ± 0.3) and <i>C. monogyna</i> (9.9 mm ± 0.3) could be swallowed by silvereyes."

801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes
	O'Connor, S. J. 2012. Quantifying seed dispersal of matai (<i>Prumnopitys taxifolia</i>). PhD Dissertation. University of Canterbury, Christchurch, New Zealand	[Prolific seed production, but not in excess of 1000 seeds/m2] "As matai is the most common emergent canopy tree in Ahuriri Summit (Appendix A), with an abundant fruit crop (mean 915 seeds/m2), it likely forms a large food resource for frugivorous birds in the area over autumn."

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

Qsn #	Question	Answer
	Moles, A. T., Hodson, D. W. & Webb, C. J. 2000, Seed size and shape and persistence in the soil in the New Zealand flora. <i>Oikos</i> , 89: 541–545	"Table 1. Seed mass and variance of diaspore dimensions (transformed so that length is unity) for all species used in this study, showing persistence category (persistent seeds persist in the soil for at least 2 yr; transient seeds persist less than 2 yr in the soil)." [<i>Prumnopitys taxifolia</i> with transient seeds. <2 years, but unknown if seeds persist for >1 year]
	Royal Botanic Gardens Kew. 2008. Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/ . [Accessed 12 Dec 2014]	[Data for <i>Podocarpus spicatus</i> = syn. <i>Prumnopitys taxifolia</i>] "Storage Behaviour: No data available for species. Of 6 known taxa of genus <i>Podocarpus</i> , 100.00% Recalcitrant(?)"

803	Well controlled by herbicides	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species. No evidence that herbicides have been used on this species.

804	Tolerates, or benefits from, mutilation, cultivation, or fire	n
	Source(s)	Notes
	Perry, G. L., Wilmshurst, J. M., & McGlone, M. S. 2014. Ecology and long-term history of fire in New Zealand. <i>New Zealand Journal of Ecology</i> , 38(2): 157-176	[<i>Prumnopitys taxifolia</i> described as Not Resprouting after fire] "Table 2. Traits of selected indicative species falling into each of the three fire-response classes" ... "Resprouting includes above-ground (e.g. epicormic buds) and belowground (e.g. rhizomes–corms) mechanisms (derived in part from Burrows 1994)."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	Unknown. No native Podocarpaceae in the Hawaiian Islands

Summary of Risk Traits:

High Risk / Undesirable Traits

- Potentially allelopathic
- Tolerates many soil types
- Juvenile trees are shade tolerant
- Moderately flammable & may increase fire risk where grown
- Seeds dispersed by birds & intentionally by people

Low Risk Traits

- No reports of invasiveness or naturalization, but no evidence of widespread introduction outside native range
- Unarmed (no spines, thorns or burrs)
- Non-toxic
- Palatable to goats, but not preferred browse of cattle, sheep or deer
- Ornamental
- Not reported to spread vegetatively
- Dioecious
- Long time to reproductive maturity (20+ years)
- Does not resprout after fires