

<b>Taxon:</b> <i>Ptilotus nobilis</i> (Lindl.) F. Muell.	<b>Family:</b> Amaranthaceae
<b>Common Name(s):</b> lamb's tail regal foxtail tall mulla mulla	<b>Synonym(s):</b> <i>Ptilotus exaltatus</i> Nees <i>Ptilotus nobilis</i> subsp. <i>nobilis</i> (Lindl.) <i>Trichinium exaltatum</i> Benth. <i>Trichinium nobile</i> Lindl.

<b>Assessor:</b> Chuck Chimera	<b>Status:</b> Assessor Approved	<b>End Date:</b> 7 Jan 2019
<b>WRA Score:</b> -2.0	<b>Designation:</b> L	<b>Rating:</b> Low Risk

**Keywords:** Annual, Perennial Shrub, Ornamental, Fodder, 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	?
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		
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	y=1, n=0	n
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems		

Qsn #	Question	Answer Option	Answer
409	Is a shade tolerant plant at some stage of its life cycle		
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		
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	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant		
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	n
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/m <sup>2</sup> )		
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
	Wrigley, J. W. & Fagg, M. 2013. Australian Native Plants. Sixth Edition. New Holland Publishers, Sydney	[Cultivars developed, but no indication that breeding has resulted in significant changes in biological or ecological traits] "P. nobilis 'Ozlotus Abell Star', bred for the cut flower trade and for landscaping, requires staking when used for cut flowers. It has been granted Plant Breeders Rights. Two other cultivars, P.'Joey' and P. 'Phoenix' are available."
	Palmer, J., Lally, T. R. & Miller, C. H. (2014). Amaranthaceae (version 2). In: Kellermann, J. (ed.), Flora of South Australia (ed. 5). 47 pp. State Herbarium of South Australia: Adelaide. www.flora.sa.gov.au/ed5	No evidence of domestication in genus

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
	USDA, ARS, Germplasm Resources Information Network. 2019. National Plant Germplasm System [Online Database]. <a href="http://www.ars-grin.gov/npgs/index.html">http://www.ars-grin.gov/npgs/index.html</a> . [Accessed 4 Jan 2019]	"Australasia AUSTRALIA: Australia [New South Wales, Queensland, South Australia, Western Australia, Northern Territory]"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2019. National Plant Germplasm System [Online Database]. <a href="http://www.ars-grin.gov/npgs/index.html">http://www.ars-grin.gov/npgs/index.html</a> . [Accessed 4 Jan 2019]	

Qsn #	Question	Answer
203	<b>Broad climate suitability (environmental versatility)</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Grow Plants. (2019). <i>Ptilotus nobilis</i> . <a href="https://www.growplants.org/growing/ptilotus-nobilis">https://www.growplants.org/growing/ptilotus-nobilis</a> . [Accessed 6 Jan 2019]	"can grow in Mediterranean, desert, subtropical, temperate or tropic climate and growing in hardiness zone 10b+ as perennial and 2-9 as annual."
	Cunningham, G.M., Mulham, W.E., Milthorpe, P.L. & Leigh, J.H. 2011. <i>Plants of Western New South Wales</i> . CSIRO Publishing, Collingwood, Australia	"Widely distributed, recorded from scattered locations throughout the region."

204	<b>Native or naturalized in regions with tropical or subtropical climates</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Grow Plants. (2019). <i>Ptilotus nobilis</i> . <a href="https://www.growplants.org/growing/ptilotus-nobilis">https://www.growplants.org/growing/ptilotus-nobilis</a> . [Accessed 4 Jan 2019]	"can grow in mediterranean, desert, subtropical, temperate or tropic climate and growing in hardiness zone 10b+ as perennial and 2-9 as annual."
	USDA, ARS, Germplasm Resources Information Network. 2019. National Plant Germplasm System [Online Database]. <a href="http://www.ars-grin.gov/npgs/index.html">http://www.ars-grin.gov/npgs/index.html</a> . [Accessed 4 Jan 2019]	"Native Australasia AUSTRALIA: Australia [New South Wales, Queensland, South Australia, Western Australia, Northern Territory]"

205	<b>Does the species have a history of repeated introductions outside its natural range?</b>	<b>?</b>
	<b>Source(s)</b>	<b>Notes</b>
	Grow Plants. (2019). <i>Ptilotus nobilis</i> . <a href="https://www.growplants.org/growing/ptilotus-nobilis">https://www.growplants.org/growing/ptilotus-nobilis</a> . [Accessed 6 Jan 2019]	"can grow in mediterranean, desert, subtropical, temperate or tropic climate and growing in hardiness zone 10b+ as perennial and 2-9 as annual."
	Dave's Garden. (2019). <i>Ptilotus</i> Species, Yellow Tails - <i>Ptilotus nobilis</i> . <a href="https://davesgarden.com/guides/pf/go/158880/">https://davesgarden.com/guides/pf/go/158880/</a> . [Accessed 6 Jan 2019]	Cultivated as an ornamental. Unknown if widely introduced outside native range
	WRA Specialist. (2019). Personal Communication	Several websites promote the cultivation of this species, but most are in Australia. Unknown if this species is widely cultivated outside its native range

301	<b>Naturalized beyond native range</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence to date
	Wagner, W.L., Herbst, D.R. & Lorence, D.H. (2019). <i>Flora of the Hawaiian Islands</i> . Smithsonian Institution, Washington, D.C. <a href="http://botany.si.edu/">http://botany.si.edu/</a> . [Accessed 6 Jan 2019]	No evidence to date

302	<b>Garden/amenity/disturbance weed</b>	<b>n</b>
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence to date
<b>303</b>	<b>Agricultural/forestry/horticultural weed</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence to date
<b>304</b>	<b>Environmental weed</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence to date
<b>305</b>	<b>Congeneric weed</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	<i>Ptilotus polystachyus</i> reported as naturalized. <i>Ptilotus spicatus</i> listed as a Casual Alien and a Weed elsewhere. An unidentified <i>Ptilotus</i> species is listed as a weed and a contaminant.
<b>401</b>	<b>Produces spines, thorns or burrs</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Palmer, J., Lally, T. R. & Miller, C. H. (2014). Amaranthaceae (version 2). In: Kellermann, J. (ed.), Flora of South Australia (ed. 5). 47 pp. State Herbarium of South Australia: Adelaide. <a href="http://www.flora.sa.gov.au/ed5">www.flora.sa.gov.au/ed5</a>	[No evidence] "Erect herbs or shrubs to 1 m high; stems and leaves sparsely hairy, glabrescent with age, often densely hairy when young; leaves obovate, narrowly obovate, narrowly elliptic or spatulate, basal leaves coriaceous, sometimes glaucous, to 110 × 34 mm, bases attenuate or long-attenuate, cauline leaves to 55 × 25 mm, bases cuneate or attenuate."
<b>402</b>	<b>Allelopathic</b>	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. (2019). Personal Communication	Unknown. No evidence found
<b>403</b>	<b>Parasitic</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Palmer, J., Lally, T. R. & Miller, C. H. (2014). Amaranthaceae (version 2). In: Kellermann, J. (ed.), Flora of South Australia (ed. 5). 47 pp. State Herbarium of South Australia: Adelaide. <a href="http://www.flora.sa.gov.au/ed5">www.flora.sa.gov.au/ed5</a>	"Erect herbs or shrubs to 1 m high" [Amaranthaceae. No evidence]
<b>404</b>	<b>Unpalatable to grazing animals</b>	<b>n</b>

Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Anderson, E. 2016. Plants of Central Queensland: Identification and Uses of Native and Introduced Species. CSIRO Publishing, Clayton South, Australia	"A showy plant which can become abundant in favourable years. It can provide some useful forage to stock during years when the winter herbage has withered early."
	Cunningham, G.M., Mulham, W.E., Milthorpe, P.L. & Leigh, J.H. 2011. Plants of Western New South Wales. CSIRO Publishing, Collingwood, Australia	"Although not keenly sought after by stock, the leaves are eaten readily enough; the flower-spikes are largely ignored, particularly when mature."

405	Toxic to animals	n
	<b>Source(s)</b>	<b>Notes</b>
	Anderson, E. 2016. Plants of Central Queensland: Identification and Uses of Native and Introduced Species. CSIRO Publishing, Clayton South, Australia	[No evidence of toxicity] "A showy plant which can become abundant in favourable years. It can provide some useful forage to stock during years when the winter herbage has withered early."
	Cunningham, G.M., Mulham, W.E., Milthorpe, P.L. & Leigh, J.H. 2011. Plants of Western New South Wales. CSIRO Publishing, Collingwood, Australia	[No evidence of toxicity] "Although not keenly sought after by stock, the leaves are eaten readily enough; the flower-spikes are largely ignored, particularly when mature."
	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 in genus

406	Host for recognized pests and pathogens	n
	<b>Source(s)</b>	<b>Notes</b>
	Abell, P. and Oates, J. (1996). Identification of <i>Ptilotus</i> species (Mulla Mulla) suitable for domestication and breeding for the cut and dried flower trade. University of Sydney	"Soil borne fungal disease is the biggest hurdle to overcome. The use of supplementary water and fertilizer certainly increases the growth rate, but this also increases the plant's susceptibility to fungal attack. Plants being grown in the glasshouse can be attacked by insect pests. Aphids and white fly have been observed causing damage to a number of species." [General pests and pathogens]

407	Causes allergies or is otherwise toxic to humans	n
	<b>Source(s)</b>	<b>Notes</b>
	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 in genus

Qsn #	Question	Answer
408	<b>Creates a fire hazard in natural ecosystems</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Northern Land Manager. (2004). Fire responses of <i>Ptilotus nobilis</i> var. <i>nobilis</i> . <a href="http://www.landmanager.org.au/fire-responses-ptilotus-nobilis-var-nobilis">http://www.landmanager.org.au/fire-responses-ptilotus-nobilis-var-nobilis</a> . [Accessed 6 Jan 2019]	"Adult fire response: Seeder (>70% mortality when subject to 100% leaf scorch)"
	Cunningham, G.M., Mulham, W.E., Milthorpe, P.L. & Leigh, J.H. 2011. Plants of Western New South Wales. CSIRO Publishing, Collingwood, Australia	" <i>Ptilotus nobilis</i> ... A striking plant which may occur as isolated individuals or in quite dense local patches." [Unknown. Dense patches may increase fuel load in fire prone areas]

Qsn #	Question	Answer
409	<b>Is a shade tolerant plant at some stage of its life cycle</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Bagust, P. and Tout-Smith, L. (2010). The Native Plants of Adelaide: Returning the Vanishing Natural Heritage of the Adelaide Plains to Your Garden. Wakefield Press, Kent Town, South Australia	"Plants grow in full sun or semi-shade."
	Dave's Garden. (2019). <i>Ptilotus</i> Species, Yellow Tails - <i>Ptilotus nobilis</i> . <a href="https://davesgarden.com/guides/pf/go/158880/">https://davesgarden.com/guides/pf/go/158880/</a> . [Accessed 6 Jan 2019]	"Sun Exposure: Full Sun"

Qsn #	Question	Answer
410	<b>Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Anderson, E. 2016. Plants of Central Queensland: Identification and Uses of Native and Introduced Species. CSIRO Publishing, Clayton South, Australia	"A variety of vegetation communities on shallow stony soils in hills to deep sands on plains."
	Cunningham, G.M., Mulham, W.E., Milthorpe, P.L. & Leigh, J.H. 2011. Plants of Western New South Wales. CSIRO Publishing, Collingwood, Australia	"On a wide range of soil types, generally more abundant on red earths and sandy red soils but also found on grey clays."

Qsn #	Question	Answer
411	<b>Climbing or smothering growth habit</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Palmer, J., Lally, T. R. & Miller, C. H. (2014). Amaranthaceae (version 2). In: Kellermann, J. (ed.), Flora of South Australia (ed. 5). 47 pp. State Herbarium of South Australia: Adelaide. <a href="http://www.flora.sa.gov.au/ed5">www.flora.sa.gov.au/ed5</a>	"Erect herbs or shrubs to 1 m high; stems and leaves sparsely hairy, glabrescent with age, often densely hairy when young; leaves obovate, narrowly obovate, narrowly elliptic or spatulate, basal leaves coriaceous, sometimes glaucous, to 110 × 34 mm, bases attenuate or long-attenuate, cauline leaves to 55 × 25 mm, bases cuneate or attenuate."

Qsn #	Question	Answer
412	<b>Forms dense thickets</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Cunningham, G.M., Mulham, W.E., Milthorpe, P.L. & Leigh, J.H. 2011. Plants of Western New South Wales. CSIRO Publishing, Collingwood, Australia	" <i>Ptilotus nobilis</i> ... A striking plant which may occur as isolated individuals or in quite dense local patches." [Unclear if dense patches can or will exclude other vegetation]

Qsn #	Question	Answer
	Anderson, E. 2016. Plants of Central Queensland: Identification and Uses of Native and Introduced Species. CSIRO Publishing, Clayton South, Australia	[Becomes abundant after competition is reduced. Unknown if it excludes other vegetation] "A showy plant which can become abundant in favourable years. It can provide some useful forage to stock during years when the winter herbage has withered early. Usually appears as an increaser where the competition from grasses has been reduced."
	Sweedman, L. & Merritt, D. 2006. Australian seeds: a guide to their collection, identification and biology. Csiro Publishing, Collingwood, Australia	[May become dominant following seasonal rains] "As a result, large tracts of the semi-arid parts of Australia have seasonal events dominated by groups of annuals such as <i>Rhodanthe</i> spp. and <i>Ptilotus</i> spp. Good years in the Pilbara can see <i>Ptilotus helipteroides</i> dominant at the expense of other species. In especially good seasons <i>Ptilotus exaltatus</i> and <i>Swainsona Formosa</i> can dominate together."

501	Aquatic	n
	Source(s)	Notes
	Palmer, J., Lally, T. R. & Miller, C. H. (2014). <i>Amaranthaceae</i> (version 2). In: Kellermann, J. (ed.), <i>Flora of South Australia</i> (ed. 5). 47 pp. State Herbarium of South Australia: Adelaide. <a href="http://www.flora.sa.gov.au/ed5">www.flora.sa.gov.au/ed5</a>	[Terrestrial herb or shrub] "Erect herbs or shrubs to 1 m high"

502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2019. National Plant Germplasm System [Online Database]. <a href="http://www.ars-grin.gov/npgs/index.html">http://www.ars-grin.gov/npgs/index.html</a> . [Accessed 4 Jan 2019]	<i>Amaranthaceae</i>

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2019. National Plant Germplasm System [Online Database]. <a href="http://www.ars-grin.gov/npgs/index.html">http://www.ars-grin.gov/npgs/index.html</a> . [Accessed 4 Jan 2019]	<i>Amaranthaceae</i>

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Palmer, J., Lally, T. R. & Miller, C. H. (2014). <i>Amaranthaceae</i> (version 2). In: Kellermann, J. (ed.), <i>Flora of South Australia</i> (ed. 5). 47 pp. State Herbarium of South Australia: Adelaide. <a href="http://www.flora.sa.gov.au/ed5">www.flora.sa.gov.au/ed5</a>	[No evidence] "Erect herbs or shrubs to 1 m high; stems and leaves sparsely hairy, glabrescent with age, often densely hairy when young; leaves obovate, narrowly obovate, narrowly elliptic or spatulate, basal leaves coriaceous, sometimes glaucous, to 110 × 34 mm, bases attenuate or long-attenuate, cauline leaves to 55 × 25 mm, bases cuneate or attenuate."

601	Evidence of substantial reproductive failure in native habitat	n



Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Western Australian Herbarium (1998–2019). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <a href="https://florabase.dpaw.wa.gov.au/">https://florabase.dpaw.wa.gov.au/</a> . [Accessed 4 Jan 2019]	"Ptilotus nobilis (Lindl.) F.Muell. Tall Mulla Mulla" ... "Conservation Code: Not threatened"
	Palmer, J., Lally, T. R. & Miller, C. H. (2014). Amaranthaceae (version 2). In: Kellermann, J. (ed.), Flora of South Australia (ed. 5). 47 pp. State Herbarium of South Australia: Adelaide. <a href="http://www.flora.sa.gov.au/ed5">www.flora.sa.gov.au/ed5</a>	"Ptilotus nobilis subsp. semilanatus ... Occurs on rocky hills or plains, in grey or black cracking clay or sandy loam. Associated with Eucalyptus or Allocasuarina spp. woodland, or grassland with herbs." ... "Endangered status in S.A." [Reasons for endangerment not attributed to substantial reproductive failure]
	Cunningham, G.M., Mulham, W.E., Milthorpe, P.L. & Leigh, J.H. 2011. Plants of Western New South Wales. CSIRO Publishing, Collingwood, Australia	"Widely distributed, recorded from scattered locations throughout the region."

602	Produces viable seed	y
	<b>Source(s)</b>	<b>Notes</b>
	Bagust, P. and Tout-Smith, L. (2010). The Native Plants of Adelaide: Returning the Vanishing Natural Heritage of the Adelaide Plains to Your Garden. Wakefield Press, Kent Town, South Australia	"Cultivation Can be grown from fresh seed or cuttings, may be slow."
	Ptilotus Study Group. (1998). Newsletter No.1, November 1998. <a href="http://anpsa.org.au/ptilotusSG/ptilotus1.pdf">http://anpsa.org.au/ptilotusSG/ptilotus1.pdf</a> . [Accessed ]	"It appears that although Ptilotus produce a large volume of flower heads, very little viable seed may be contained in the debris. It will be interesting to see if this can be improved in cultivated plants."
	Wrigley, J. W. & Fagg, M. 2013. Australian Native Plants. Sixth Edition. New Holland Publishers, Sydney	"Propagation From seed, but germination usually poor."

603	Hybridizes naturally	
	<b>Source(s)</b>	<b>Notes</b>
	Bean, A. R. (2008). A synopsis of <i>Ptilotus</i> (Amaranthaceae) in eastern Australia. <i>Telopea</i> , 12(2), 227-250	[Unknown. Hybridization may be possible in genus] "Benl erected another variety (var. <i>elongatus</i> ); the type of this name has rather short hairs, as in <i>P. obovatus</i> , but features the sessile or subsessile inflorescences that are a feature of <i>P. incanus</i> . It is possibly a hybrid between these two species."

604	Self-compatible or apomictic	
	<b>Source(s)</b>	<b>Notes</b>
	Perkins, M., & Johnston, M. (2009). Pollination biology of <i>Ptilotus axillaris</i> . Final Research Report Prepared for the Australian Flora Foundation. Centre for Native Floriculture School of Land, Crop and Food Sciences, University of Queensland, Gatton	[Unknown. Other species is self-incompatible] "P. axillaris is an out-crossing species, given that it exhibits gynomonocism and partial to complete self-incompatibility."

605	Requires specialist pollinators	n
	<b>Source(s)</b>	<b>Notes</b>

Qsn #	Question	Answer
	Palmer, J., Lally, T. R. & Miller, C. H. (2014). Amaranthaceae (version 2). In: Kellermann, J. (ed.), Flora of South Australia (ed. 5). 47 pp. State Herbarium of South Australia: Adelaide. www.flora.sa.gov.au/ed5	"Inflorescences terminal, conical, hemispherical, ovoid or cylindrical, to 12 cm long, to 200 flowered; bract 7.5–12 mm long, apex acute or acuminate; bracteoles 7.5–12.5 mm long, apices apiculate or aristulate; perianth 13–27 mm long, purple, pink, pale yellow, green, creamy-white or greenish-white; tepals with sparse to moderately dense, nodose to subverticillate hairs to 10 mm long on upper third, shortening near apex, dense, verticillate hairs to 1 mm long beneath and on remainder, apices minutely erose, obtuse; fertile stamens 2–4, filaments to 19 mm long, staminodes 1–3; ovary glabrous, or hairy apically; style 10.5–20 mm long, eccentric."
	Hammer, T. and Davis, R. (2017). Pollination biology in <i>Ptilotus</i> . Landscape 32(4): 45	[Floral morphology similar for <i>P. nobilis</i> ] "A common strategy used by flowers is called the 'generalist syndrome', where the flower has no obvious adaption towards a specific pollinator. Using this strategy, the flower can be accessed by a variety of pollinators and there is no selection pressure to evolve a specialised flower shape. One example of this within mulla mullas is <i>Ptilotus grandiflorus</i> , which has a dish-like flower that has all of its parts radially symmetrical. There's no obvious orientation, and its general pink color can be seen by many types of insect pollinators. The stamens are small and close to the location of the stigma, so it doesn't seem to matter where the pollen is placed on the pollinator. Flowers of <i>Ptilotus grandiflorus</i> are often visited by wasps, but multiple species of butterfly, and a bee fly have also been observed working the flowers."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Wrigley, J. W. & Fagg, M. 2013. Australian Native Plants. Sixth Edition. New Holland Publishers, Sydney	"Propagation From seed, but germination usually poor." [No evidence]

607	Minimum generative time (years)	1
	Source(s)	Notes
	Western Australian Herbarium (1998–2019). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <a href="https://florabase.dpaw.wa.gov.au/">https://florabase.dpaw.wa.gov.au/</a> . [Accessed 4 Jan 2019]	"Annual or perennial (short-lived), herb, 0.3-0.6(-2) m high."
	Anderson, E. 2016. Plants of Central Queensland: Identification and Uses of Native and Introduced Species. CSIRO Publishing, Clayton South, Australia	"erect annual or short-lived perennial herb, 50-80 cm tall."
	Ptilotus Study Group. (1999). Newsletter No.3, December, 1999. <a href="http://anpsa.org.au/ptilotusSG/ptilotus3.pdf">http://anpsa.org.au/ptilotusSG/ptilotus3.pdf</a> . [Accessed ]	[Generic description] "Ptilotus' main aim in life appears to be to grow and flower as fast and furious as possible! This is probably due to the fact that they originate from dry semi-arid/arid regions, and need to reproduce quickly after rain to survive. Rain seems to produce a burst of flowering that normal watering doesn't."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes

Qsn #	Question	Answer
	Jurado, E., Westoby, M., & Nelson, D. (1991). Diaspore weight, dispersal, growth form and perenniality of central Australian plants. <i>The Journal of Ecology</i> , 79(3): 811-828	[Wind-dispersed] "Seed mass, dispersal, perenniality and growth form of some species of the Central Australian flora" [ <i>Ptilotus exaltatus</i> - Dispersal = wind; Synonym of <i>Ptilotus nobilis</i> (Lindl.) F. Muell.]

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Wrigley, J. W. & Fagg, M. 2013. <i>Australian Native Plants</i> . Sixth Edition. New Holland Publishers, Sydney	"Spectacular rockery plant; excellent container plant." [Cultivated as an ornamental mostly within Australia, but also introduced outside native range]

703	Propagules likely to disperse as a produce contaminant	
	Source(s)	Notes
	Wrigley, J. W. & Fagg, M. 2013. <i>Australian Native Plants</i> . Sixth Edition. New Holland Publishers, Sydney	"Propagation From seed, but germination usually poor." [Unknown, but possibly not if seed germination is poor]

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Jurado, E., Westoby, M., & Nelson, D. (1991). Diaspore weight, dispersal, growth form and perenniality of central Australian plants. <i>The Journal of Ecology</i> , 79(3): 811-828	"Seed mass, dispersal, perenniality and growth form of some species of the Central Australian flora" [ <i>Ptilotus exaltatus</i> - Dispersal = wind; Synonym of <i>Ptilotus nobilis</i> (Lindl.) F. Muell.]

705	Propagules water dispersed	n
	Source(s)	Notes
	Jurado, E., Westoby, M., & Nelson, D. (1991). Diaspore weight, dispersal, growth form and perenniality of central Australian plants. <i>The Journal of Ecology</i> , 79(3): 811-828	[Wind-dispersed. Water may move seeds, but occurs primarily in arid areas] "Seed mass, dispersal, perenniality and growth form of some species of the Central Australian flora" [ <i>Ptilotus exaltatus</i> - Dispersal = wind; Synonym of <i>Ptilotus nobilis</i> (Lindl.) F. Muell.]

706	Propagules bird dispersed	n
	Source(s)	Notes
	Jurado, E., Westoby, M., & Nelson, D. (1991). Diaspore weight, dispersal, growth form and perenniality of central Australian plants. <i>The Journal of Ecology</i> , 79(3): 811-828	"Seed mass, dispersal, perenniality and growth form of some species of the Central Australian flora" [ <i>Ptilotus exaltatus</i> - Dispersal = wind; Synonym of <i>Ptilotus nobilis</i> (Lindl.) F. Muell.]

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Jurado, E., Westoby, M., & Nelson, D. (1991). Diaspore weight, dispersal, growth form and perenniality of central Australian plants. <i>The Journal of Ecology</i> , 79(3): 811-828	"Seed mass, dispersal, perenniality and growth form of some species of the Central Australian flora" [ <i>Ptilotus exaltatus</i> - Dispersal = wind; Synonym of <i>Ptilotus nobilis</i> (Lindl.) F. Muell.]

708	Propagules survive passage through the gut	n
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Palmer, J., Lally, T. R. & Miller, C. H. (2014). <i>Amaranthaceae</i> (version 2). In: Kellermann, J. (ed.), <i>Flora of South Australia</i> (ed. 5). 47 pp. State Herbarium of South Australia: Adelaide. <a href="http://www.flora.sa.gov.au/ed5">www.flora.sa.gov.au/ed5</a>	"Fruit single seeded, wall membranous; seed globose or ovoid, glabrous, dull or shiny, brown, golden-brown or black." [Generic description. Not fleshy-fruited and unlikely to be consumed]
	Cunningham, G.M., Mulham, W.E., Milthorpe, P.L. & Leigh, J.H. 2011. <i>Plants of Western New South Wales</i> . CSIRO Publishing, Collingwood, Australia	[No evidence. Flower-spikes avoided when plant is consumed by stock] "Although not keenly sought after by stock, the leaves are eaten readily enough; the flower-spikes are largely ignored, particularly when mature."

801	Prolific seed production (>1000/m2)	
	<b>Source(s)</b>	<b>Notes</b>
	Ptilotus Study Group. (1998). Newsletter No.1, November 1998. <a href="http://anpsa.org.au/ptilotusSG/ptilotus1.pdf">http://anpsa.org.au/ptilotusSG/ptilotus1.pdf</a> . [Accessed ]	"It appears that although Ptilotus produce a large volume of flower heads, very little viable seed may be contained in the debris. It will be interesting to see if this can be improved in cultivated plants." [Possibly No]
	Wrigley, J. W. & Fagg, M. 2013. <i>Australian Native Plants</i> . Sixth Edition. New Holland Publishers, Sydney	"Propagation From seed, but germination usually poor."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	<b>Source(s)</b>	<b>Notes</b>
	Royal Botanic Gardens Kew. (2019) Seed Information Database (SID). Version 7.1. Available from: <a href="http://data.kew.org/sid/">http://data.kew.org/sid/</a> . [Accessed 7 Jan 2019]	"Storage Behaviour: Orthodox p Storage Conditions: 90% viability following drying to mc's in equilibrium with 15% RH and freezing for 1 month at -20°C at RBG Kew, WP"
	Erickson, T. E. (2015). Seed dormancy and germination traits of 89 arid zone species targeted for mine-site restoration in the Pilbara region of Western Australia. PhD Dissertation. University of Western Australia, Crawley WA	"Table 2.1. Characteristics of the 89 species present in this study including the current nomenclature (Western_Australian_Herbarium 1998 -)," [Ptilotus nobilis - Dormancy Class = ND = non-dormant]
	WRA Specialist. (2019). Personal Communication	Soil seed longevity unspecified

803	Well controlled by herbicides	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. (2019). Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

804	Tolerates, or benefits from, mutilation, cultivation, or fire	n
	<b>Source(s)</b>	<b>Notes</b>
	Northern Land Manager. (2004). Fire responses of <i>Ptilotus nobilis</i> var. <i>nobilis</i> . <a href="http://www.landmanager.org.au/fire-responses-ptilotus-nobilis-var-nobilis">http://www.landmanager.org.au/fire-responses-ptilotus-nobilis-var-nobilis</a> . [Accessed 6 Jan 2019]	"Adult fire response: Seeder (>70% mortality when subject to 100% leaf scorch) Resprouting type: None Stems and leaves: Short-lived plant"

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	

Qsn #	Question	Answer
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	Unknown

**Summary of Risk Traits:**

High Risk / Undesirable Traits

- Broad climate suitability
- Grows in tropical climates
- Tolerates many soil types
- May form dense stands within native range (unknown if able to exclude other vegetation)
- Reproduces by seeds
- Able to reach maturity in <1 year
- Seeds dispersed by wind & intentionally by people
- Gaps in biological and ecological information may reduce accuracy or risk prediction

Low Risk Traits

- No reports of invasiveness or naturalization, but unclear if widely introduced outside native range
- Unarmed (no spines, thorns or burrs)
- Provides fodder for livestock
- Ornamental
- Not reported to spread vegetatively
- Seed viability may be low