

<b>Taxon:</b> <i>Cytisus proliferus</i> var. <i>palmensis</i>	<b>Family:</b> Fabaceae
<b>Common Name(s):</b> broom tagasaste tree-lucerne	<b>Synonym(s):</b> <i>Chamaecytisus palmensis</i> (Christ) F. <i>Chamaecytisus proliferus</i> subsp. <i>Chamaecytisus proliferus</i> var. <i>Cytisus palmensis</i> (Christ) Hutch.

<b>Assessor:</b> Chuck Chimera	<b>Status:</b> Assessor Approved	<b>End Date:</b> 9 Nov 2015
<b>WRA Score:</b> 14.0	<b>Designation:</b> H(HPWRA)	<b>Rating:</b> High Risk

**Keywords:** N-Fixing Shrub, Environmental Weed, Fodder, Self-Compatible, Seed Bank

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	n
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	y
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic	y=1, n=0	n
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals		
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans		
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n

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	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	y
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	y
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	y
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed		
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut		
801	Prolific seed production (>1000/m <sup>2</sup> )		
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
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
	Hanelt, P. (ed.). 2001. Mansfeld's Encyclopedia of Agricultural and Horticultural Crops, Volume 2. Springer-Verlag, Berlin, Heidelberg, New York	No evidence of domestication

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2015. 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
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to La Palma Island, Canary Islands," [Latitude 28.6667° N; La Palma has a mild and consistent subtropical semi-arid climate]
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed 6 Nov 2015]	"Native: AFRICA Macaronesia: Spain - Canary Islands [La Palma]"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed ]	

Qsn #	Question	Answer
203	<b>Broad climate suitability (environmental versatility)</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	HerbiGuide. (2015). Tagasaste - <i>Chamaecytisus palmensis</i> . <a href="http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm">http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm</a> . [Accessed 9 Nov 2015]	"Climate: Temperate. Mediterranean. It is more invasive in the high rainfall areas with more than 500 mm rainfall."
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i cultivated as a fodder plant and naturalized primarily in pastures, 640- 1,525 m, at least on Maui."

204	<b>Native or naturalized in regions with tropical or subtropical climates</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i cultivated as a fodder plant and naturalized primarily in pastures, 640- 1,525 m, at least on Maui."

205	<b>Does the species have a history of repeated introductions outside its natural range?</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Francisco-Ortega, J., Jackson, M. T., Santos-Guerra, A., & Fernández-Galván, M. (1991). Historical aspects of the origin and distribution of tagasaste ( <i>Chamaecytisus proliferus</i> (L. fil.) Link ssp. <i>palmensis</i> (Christ) Kunkel), a fodder tree from the Canary Islands. <i>Journal of the Adelaide Botanic Garden</i> , 14(1): 67-76	"Tagasaste is the only form which is broadly cultivated in the Canary Islands, and since the late 19th century in New Zealand and Australia. It has also become naturalized in Australia (South Australia, New South Wales, Victoria and Tasmania), Java, the Hawaiian Islands, California, Portugal, North Africa, Kenya, Tanzania and South Africa."

301	<b>Naturalized beyond native range</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Francisco-Ortega, J., Jackson, M. T., Santos-Guerra, A., & Fernández-Galván, M. (1991). Historical aspects of the origin and distribution of tagasaste ( <i>Chamaecytisus proliferus</i> (L. fil.) Link ssp. <i>palmensis</i> (Christ) Kunkel), a fodder tree from the Canary Islands. <i>Journal of the Adelaide Botanic Garden</i> , 14(1): 67-76	" <i>Chamaecytisus proliferus</i> (L. fil.) Link (Fabaceae: Genisteae) forms a taxonomic complex which is endemic to El Hierro, La Palma, La Gomera, Tenerife and Gran Canaria in the Canary Island archipelago. Forms from La Palma are popularly known as "tagasaste" whereas those from the rest of the archipelago are commonly called "escobón". Tagasaste is the only form which is broadly cultivated in the Canary Islands, and since the late 19th century in New Zealand and Australia. It has also become naturalized in Australia (South Australia, New South Wales, Victoria and Tasmania), Java, the Hawaiian Islands, California, Portugal, North Africa, Kenya, Tanzania and South Africa."
	Wagner, W.L. & Herbst, D.R. Supplement to the Manual of the flowering plants of Hawaii. Smithsonian Institution, Washington, D.C.	" <i>Cytisus palmensis</i> - new island (Hawai'i) - Staples et al., 2002"

Qsn #	Question	Answer
	Waring, G. H., Loope, L. L., & Medeiros, A. C. (1993). Study on use of alien versus native plants by nectarivorous forest birds on Maui, Hawaii. <i>The Auk</i> , 110(4): 917-920	" <i>Cytisus palmensis</i> is native to La Palma of the Canary Islands in the eastern Atlantic Ocean (Wagner et al. 1990). It was first noted ("a few large shrubs ... in a pasture in Kula") and collected on Maui in 1927, probably introduced during 1910-1912 with packages of seeds of alien species in an attempt to improve forage for cattle (Degener 1936); its elevational range on Maui was given as 640 to 1,525 m by Wagner et al. (1990). It is sparse yet flourishing on East Maui and Hawai'i. Several trees occurring near the upper limit of rain forest in Waikamoi Preserve have attracted management attention because of visitation by native forest birds."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to La Palma Island, Canary Islands, introduced to several tropical countries as a fodder plant; in Hawai'i cultivated as a fodder plant and naturalized primarily in pastures, 640- 1,525 m, at least on Maui. First collected in 1927 (Degener 2280, BISH)."
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed 6 Nov 2015]	"Naturalized: AFRICA East Tropical Africa: Kenya; Tanzania ASIA-TROPICAL Indian Subcontinent: India - Tamil Nadu AUSTRALASIA Australia: Australia New Zealand: New Zealand NORTHERN AMERICA Southwestern U.S.A.: United States - California PACIFIC North-Central Pacific: United States - Hawaii SOUTHERN AMERICA Southern South America: Chile"

302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Queensland Government. (2011). Weeds of Australia. Tree Lucerne. <i>Chamaecytisus palmensis</i> . <a href="http://keyserver.lucidcentral.org">http://keyserver.lucidcentral.org</a> . [Accessed 9 Nov 2015]	[Disturbance adapted environmental weed] "In south-western Western Australia it grows in disturbed natural vegetation on lateritic soils in higher rainfall areas it is a serious invader of disturbed bushland."

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Queensland Government. (2011). Weeds of Australia. Tree Lucerne. <i>Chamaecytisus palmensis</i> . <a href="http://keyserver.lucidcentral.org">http://keyserver.lucidcentral.org</a> . [Accessed 9 Nov 2015]	"Impacts Tree lucerne ( <i>Chamaecytisus palmensis</i> ) is regarded as an environmental weed..."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[A desirable fodder plant] "in Hawai'i cultivated as a fodder plant and naturalized primarily in pastures"

304	Environmental weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Queensland Government. (2011). Weeds of Australia. Tree Lucerne. <i>Chamaecytisus palmensis</i> . <a href="http://keyserver.lucidcentral.org">http://keyserver.lucidcentral.org</a> . [Accessed 6 Nov 2015]	"Impacts: Tree lucerne ( <i>Chamaecytisus palmensis</i> ) is regarded as an environmental weed in New South Wales (particularly in central and southern regions), Victoria, South Australia, Western Australia and Tasmania. It is particularly invasive in the non-arid inland areas of south-eastern Australia and has become naturalised in almost all areas where it has been planted as a fodder plant. This species is actively managed by community groups in South Australia and Western Australia and is currently listed as a priority environmental weed in at least one Natural Resource Management region. Tree lucerne ( <i>Chamaecytisus palmensis</i> ) also appears on numerous local environmental weed lists in the Sydney and Blue Mountains region, throughout Victoria, in south-eastern South Australia and in Tasmania. In south-western Western Australia it grows in disturbed natural vegetation on lateritic soils in higher rainfall areas it is a serious invader of disturbed bushland. In all regions where it is found, it readily invades roadsides, creek banks and other disturbed sites and spreads from these areas into native bushland and grasslands. Tree lucerne ( <i>Chamaecytisus palmensis</i> ) accumulates large quantities of long-lived seeds in the soil seed bank and readily germinates after fire or other disturbance, forming dense infestations that can smother native vegetation and prevent regeneration. Its nitrogen-fixing ability also increases soil fertility, helping other weeds to colonise invaded sites and out compete the native species."
	Adair, R.J. & Groves, R.H. (1998). Impact of environmental weeds on biodiversity : a review and development of a methodology. Biodiversity Group, Environment Australia, Canberra ACT	"Tagasaste ( <i>Cytisus palmensis</i> ), a nitrogen-fixing shrub used as a perennial fodder plant. Invasions occur in bushland and increased nitrogen levels may promote the incursion of other weeds. A similar situation could occur for other nitrogen-fixing weeds."

305	Congeneric weed	y
	Source(s)	Notes
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	" <i>Cytisus multiflorus</i> " ... "Where invasive, the shrub forms extensive thickets that crowd out native species and prevent natural forest regeneration."
	Parsons, W.T. & Cuthbertson, E.G. 2001. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	"Once established, English broom fixes nitrogen in the soil and dominates the vegetation of an area, smothering quite large shrubs and preventing re-establishment of native species, as well as providing harbour for pest animals including feral pigs." [ <i>Cytisus scoparius</i> ]

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Shrubs up to 4(-10) m tall; branches long, leafy, tomentose. Leaflets narrowly elliptic, 15-40 mm long, 5-13 mm wide."

402	Allelopathic	n
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	HerbiGuide. (2015). Tagasaste - <i>Chamaecytisus palmensis</i> . <a href="http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm">http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm</a> . [Accessed 9 Nov 2015]	[No evidence] "Increases soil nitrogen levels which may affect the persistence of some native species or encourage invasion by grasse."

403	Parasitic	n
	<b>Source(s)</b>	<b>Notes</b>
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Shrubs up to 4(-10) m tall;" [No evidence. Fabaceae]

404	Unpalatable to grazing animals	n
	<b>Source(s)</b>	<b>Notes</b>
	Francisco-Ortega, J., Jackson, M. T., Santos-Guerra, A., & Fernández-Galván, M. (1991). Historical aspects of the origin and distribution of tagasaste ( <i>Chamaecytisus proliferus</i> (L. fil.) Link ssp. <i>palmensis</i> (Christ) Kunkel), a fodder tree from the Canary Islands. <i>Journal of the Adelaide Botanic Garden</i> , 14(1): 67-76	"broadly cultivated as a fodder tree in the Canary Islands, except on Fuerteventura and Lanzarote which are too dry. It is also the only endemic species from the archipelago which has achieved importance in agriculture around the world, particularly in parts of Australia and New Zealand. Even so, tagasaste is an under-exploited plant although it has proved to be an outstanding fodder species for arid areas (Logan, 1982)."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"introduced to several tropical countries as a fodder plant; in Hawai'i cultivated as a fodder plant and naturalized primarily in pastures"
	New Zealand Tree Crops Association. (2015). Tree Crops - Tagasaste. <a href="http://www.treecrops.org.nz/crops/shelter/tagasaste/">http://www.treecrops.org.nz/crops/shelter/tagasaste/</a> . [Accessed 6 Nov 2015]	"Where rabbits and hares are a problem plants should be treated with a proprietary repellent. Possums will also eat the tender growth."

405	Toxic to animals	
	<b>Source(s)</b>	<b>Notes</b>
	Queensland Government. (2011). Weeds of Australia. Tree Lucerne. <i>Chamaecytisus palmensis</i> . <a href="http://keyserver.lucidcentral.org">http://keyserver.lucidcentral.org</a> . [Accessed 6 Nov 2015]	"The seeds of this species are poisonous."
	New Zealand Tree Crops Association. (2015). Tree Crops - Tagasaste. <a href="http://www.treecrops.org.nz/crops/shelter/tagasaste/">http://www.treecrops.org.nz/crops/shelter/tagasaste/</a> . [Accessed 6 Nov 2015]	[No evidence] "Uses: Green fodder – sheep, cattle, goats, pigs, horses deer, ostrich, emu, and rabbits?"
	HerbiGuide. (2015). Tagasaste - <i>Chamaecytisus palmensis</i> . <a href="http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm">http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm</a> . [Accessed 9 Nov 2015]	[Potentially] "Toxicity: Contains alkaloids. No cases have been recorded in Australia. Toxicity would only be suspected where large quantities were eaten. Symptoms: Nausea, convulsions, respiratory failure and death."

406	Host for recognized pests and pathogens	
	<b>Source(s)</b>	<b>Notes</b>

Qsn #	Question	Answer
	Cook, B.G., Pengelly, B.C., Brown, S.D., Donnelly, J.L., Eagles, D.A., Franco, M.A., Hanson, J., Mullen, B.F., Partridge, I.J., Peters, M., & Schultze-Kraft, R. 2005. Tropical Forages: an interactive selection tool., [CD-ROM], SIRO, DPI&F(Qld), CIAT and ILRI. <a href="http://www.tropicalforages.info/index.htm">http://www.tropicalforages.info/index.htm</a> . [Accessed 9 Nov 2015]	"Pests and diseases: It is very sensitive to root rot caused by Phytophthora and also damping off caused by Fusarium . These are the major limitations to its use in humid areas or on vertisols. It has few insect pest problems but is susceptible to the tree lucerne moth ( <i>Uresiphita ornithopteralis</i> ) and slugs, cutworms and grasshoppers eat emerging seedlings."
	New Zealand Tree Crops Association. (2015). Tree Crops - Tagasaste. <a href="http://www.treecrops.org.nz/crops/shelter/tagasaste/">http://www.treecrops.org.nz/crops/shelter/tagasaste/</a> . [Accessed 6 Nov 2015]	"Pests and Diseases: Tagasaste is subject to root rots in poorly drained soils. Stem boring insects such as the lemon tree borer <i>Oemona hirta</i> and Puriri moth <i>Aenetus virescens</i> contribute to reducing the shrub's average life span to 10-12 years in the North Island. Puriri moth is not found in the South Island so plants should live to 20 years. "

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	Notes
	Queensland Government. (2011). Weeds of Australia. Tree Lucerne. <i>Chamaecytisus palmensis</i> . <a href="http://keyserver.lucidcentral.org">http://keyserver.lucidcentral.org</a> . [Accessed 9 Nov 2015]	[Unlikely to be consumed by people] "The seeds of this species are poisonous."
	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	n
	Source(s)	Notes
	Cook, B.G., Pengelly, B.C., Brown, S.D., Donnelly, J.L., Eagles, D.A., Franco, M.A., Hanson, J., Mullen, B.F., Partridge, I.J., Peters, M., & Schultze-Kraft, R. 2005. Tropical Forages: an interactive selection tool., [CD-ROM], SIRO, DPI&F(Qld), CIAT and ILRI. <a href="http://www.tropicalforages.info/index.htm">http://www.tropicalforages.info/index.htm</a> . [Accessed 9 Nov 2015]	"Fire: Tagasaste does not burn readily because it stays green during the dry season."

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	HerbiGuide. (2015). Tagasaste - <i>Chamaecytisus palmensis</i> . <a href="http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm">http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm</a> . [Accessed 9 Nov 2015]	"It prefers full sun but will grow in partly shaded areas." ... "Replant to native species at least 12 months after the last spray to reduce light levels because very few Tagasaste seedling will establish in dense shade."
	Cook, B.G., Pengelly, B.C., Brown, S.D., Donnelly, J.L., Eagles, D.A., Franco, M.A., Hanson, J., Mullen, B.F., Partridge, I.J., Peters, M., & Schultze-Kraft, R. 2005. Tropical Forages: an interactive selection tool., [CD-ROM], SIRO, DPI&F(Qld), CIAT and ILRI. <a href="http://www.tropicalforages.info/index.htm">http://www.tropicalforages.info/index.htm</a> . [Accessed 9 Nov 2015]	"Light: No information available."



Qsn #	Question	Answer
	Dave's Garden. (2015). Tree Lucerne, Tagasaste - <i>Cytisus palmensis</i> . <a href="http://davesgarden.com/guides/pf/go/176636/">http://davesgarden.com/guides/pf/go/176636/</a> . [Accessed 9 Nov 2015]	"Sun Exposure: Full Sun Sun to Partial Shade Light Shade"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Cook, B.G., Pengelly, B.C., Brown, S.D., Donnelly, J.L., Eagles, D.A., Franco, M.A., Hanson, J., Mullen, B.F., Partridge, I.J., Peters, M., & Schultze-Kraft, R. 2005. Tropical Forages: an interactive selection tool., [CD-ROM], SIRO, DPI&F(Qld), CIAT and ILRI. <a href="http://www.tropicalforages.info/index.htm">http://www.tropicalforages.info/index.htm</a> . [Accessed 9 Nov 2015]	"Soil requirements: Tagasaste prefers light well-drained sandy soils on slopes and hillsides, but thrives on gravels, loams, limestones and laterites. Slag heaps and mining dumps can also reportedly be planted with the tree. It has wide adaptability to a range of soil pH and although growing better on acid soils as low as pH 4.0, it can also survive on sandy, alkaline soils with pH 8.5. It is not tolerant of saline soils."
	HerbiGuide. (2015). Tagasaste - <i>Chamaecytisus palmensis</i> . <a href="http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm">http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm</a> . [Accessed 9 Nov 2015]	"Soil: Grows on a wide range of soils. Appears to be more invasive on gravel soils."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Shrubs up to 4(-10) m tall; branches long, leafy, tomentose. Leaflets narrowly elliptic, 15-40 mm long, 5-13 mm wide."

412	Forms dense thickets	y
	Source(s)	Notes
	Csurhes, S. & Edwards, R. 1998. Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	"In Victoria, it exists as medium to large naturalised stands in heathland and heathy woodland, lowland grassland and grassy woodland, dry sclerophyll forest/woodland, damp sclerophyll forest and riparian vegetation (Carr et al. 1992)."
	HerbiGuide. (2015). Tagasaste - <i>Chamaecytisus palmensis</i> . <a href="http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm">http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm</a> . [Accessed 9 Nov 2015]	"It can form fairly dense stands exuding most other species and reducing regeneration of overstorey species especially on gravel soils in the high rainfall areas."
	Queensland Government. (2011). Weeds of Australia. Tree Lucerne. <i>Chamaecytisus palmensis</i> . <a href="http://keyserver.lucidcentral.org">http://keyserver.lucidcentral.org</a> . [Accessed 9 Nov 2015]	"Tree lucerne ( <i>Chamaecytisus palmensis</i> ) accumulates large quantities of long-lived seeds in the soil seed bank and readily germinates after fire or other disturbance, forming dense infestations that can smother native vegetation and prevent regeneration."

501	Aquatic	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Terrestrial shrub] "Shrubs up to 4(-10) m tall" ... "in Hawai'i cultivated as a fodder plant and naturalized primarily in pastures, 640- 1,525 m, at least on Maui."

Qsn #	Question	Answer
502	Grass	n
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed 6 Nov 2015]	"Family: Fabaceae (alt. Leguminosae) subfamily: Faboideae tribe: Genisteae. Also placed in: Papilionaceae"

503	Nitrogen fixing woody plant	y
	Source(s)	Notes
	New Zealand Tree Crops Association. (2015). Tree Crops - Tagasaste. <a href="http://www.treecrops.org.nz/crops/shelter/tagasaste/">http://www.treecrops.org.nz/crops/shelter/tagasaste/</a> . [Accessed 6 Nov 2015]	"As a member of the legume family it is a nitrogen fixer." ... "The bacteria which forms nodules on the plants and fix nitrogen may not be present in all soils. Inoculation of the seed either with soil rhisobia obtained from parent trees or cultured inoculum (same as used for Lotus Maku) watered on at the seedling stage is of major importance when introducing plants to new sites and soil types. When you buy seeds from some suppliers the dust on the seeds is soil from around old trees. "

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Shrubs up to 4(-10) m tall; branches long, leafy, tomentose. Leaflets narrowly elliptic, 15-40 mm long, 5-13 mm wide."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Hanelt, P. (ed.). 2001. Mansfeld's Encyclopedia of Agricultural and Horticultural Crops, Volume 2. Springer-Verlag, Berlin, Heidelberg, New York	[No evidence] "Endemic to La Palma. naturalized in various African countries, Australia. Java,Hawaii etc. Cultivated on the western and central islands of the Canaries, since the late 19th cent. also in Australia. New Zealand, sporadically grown also in Kenya and Java."

Qsn #	Question	Answer
602	<b>Produces viable seed</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Pods linear-falcate, 4-7 cm long, 1.5-2 cm wide, brown pubescent. Seeds 3-8, oblong-ellipsoid, slightly laterally flattened, 10-12 mm long, ca. 8 mm wide."
	New Zealand Tree Crops Association. (2015). Tree Crops - Tagasaste. <a href="http://www.treecrops.org.nz/crops/shelter/tagasaste/">http://www.treecrops.org.nz/crops/shelter/tagasaste/</a> . [Accessed 6 Nov 2015]	"Propagation There are three main establishment methods commonly used: Container grown seedlings transplanted into cultivated strips 40-50 cm wide, between August and November Bare rooted nursery prepared stock transplanted into cultivated strips 40-50 cm wide between August and November. Direct seeding into cultivated sites with inoculated seed (Rhizobium bacteria) in spring."

603	<b>Hybridizes naturally</b>	
	<b>Source(s)</b>	<b>Notes</b>
	HerbiGuide. (2015). Tagasaste - <i>Chamaecytisus palmensis</i> . <a href="http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm">http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm</a> . [Accessed 9 Nov 2015]	Unknown

604	<b>Self-compatible or apomictic</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Francisco-Ortega, J., Jackson, M. T., Santos-Guerra, A., & Fernández-Galván, M. (1991). Historical aspects of the origin and distribution of tagasaste ( <i>Chamaecytisus proliferus</i> (L. fil.) Link ssp. <i>palmensis</i> (Christ) Kunkel), a fodder tree from the Canary Islands. <i>Journal of the Adelaide Botanic Garden</i> , 14(1): 67-76	"Results of this study, and of the reproductive biology of the plant obtained by Webb & Shand (1985) suggested that although tagasaste is self-compatible, allogamy plays an important role in its breeding system. They found that the species has a long flowering period and produces a large number of flowers."

605	<b>Requires specialist pollinators</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Flowers in axillary pseudoracemes, these in groups of 2-4, apex vegetatively continuing; calyx ca. 10 mm long, brown pubescent; corolla white or pale yellow, standard 15-20 mm long."
	McFadyen, R. E., & Lloyd, S. G. (2006). Bumblebees, implications of a new super-pollinator in mainland Australia. In 15th Australian Weeds Conference, Papers and Proceedings, Adelaide, South Australia: Managing weeds in a changing climate (pp. 227-230).	"Studies should be undertaken on some species which are already major weeds (such as broom, gorse, and Paterson's curse) but also on currently minor species such as tree lupin, tree lucerne/tagasaste ( <i>Chamaecytisus palmensis</i> (H.Christ) Bisby & Nicholls) and plants in the Boraginaceae and Lamiaceae. Tree lupin is pollinated by bumblebees and is increasing in New Zealand. Tree lucerne/tagasaste, native to the Canary Isles where it is presumably also pollinated by <i>Bombus</i> species, is widely naturalised in NSW and is already a weed of bushland in south-west Western Australia."

Qsn #	Question	Answer
	Waring, G. H., Loope, L. L., & Medeiros, A. C. (1993). Study on use of alien versus native plants by nectarivorous forest birds on Maui, Hawaii. <i>The Auk</i> , 110(4): 917-920	[Potentially pollinated by visiting birds] "Baldwin (1953) noted that while the native trees <i>Metrosideros</i> and <i>Sophora</i> are the major dietary nectar sources for the Hawaiian honeycreepers, there are other locally significant sources including "the introduced tree alfalfa <i>Cytisus proliferus</i> [ <i>C. palmensis</i> ] growing in certain upland pastures on Maui and to which <i>Vestitaria</i> and <i>Himatione</i> come in large numbers to feed."
<b>606</b>	<b>Reproduction by vegetative fragmentation</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Queensland Government. (2011). Weeds of Australia. Tree Lucerne. <i>Chamaecytisus palmensis</i> . <a href="http://keyserver.lucidcentral.org">http://keyserver.lucidcentral.org</a> . [Accessed 6 Nov 2015]	"This species reproduces mainly by seed, which are thought to be spread by ants, birds and slashing."
<b>607</b>	<b>Minimum generative time (years)</b>	<b>3</b>
	<b>Source(s)</b>	<b>Notes</b>
	HerbiGuide. (2015). Tagasaste - <i>Chamaecytisus palmensis</i> . <a href="http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm">http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm</a> . [Accessed 9 Nov 2015]	"Life cycle: Perennial, fast growing shrub or tree. Seeds or seedlings are normally planted in autumn. It reaches sexual maturity in 3 years."
<b>701</b>	<b>Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Queensland Government. (2011). Weeds of Australia. Tree Lucerne. <i>Chamaecytisus palmensis</i> . <a href="http://keyserver.lucidcentral.org">http://keyserver.lucidcentral.org</a> . [Accessed 6 Nov 2015]	"They are dispersed longer distances by deliberate plantings, in dumped garden waste, by machinery, and in contaminated soil."
	Pyrenees Shire. (2007). Weeds of the Pyrenees Region. Identification Guide for the Weeds of the Pyrenees Region and Beyond 2007. Pyrenees Shire Council, Beaufort Vic	"Weed of bushlands, grasslands, wastelands & roadsides. Often spreads through garden waste dumping."
<b>702</b>	<b>Propagules dispersed intentionally by people</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Csurhes, S. & Edwards, R. 1998. Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	"Introduced for stock forage, as a hedge plant and for use as a garden ornamental it is now naturalised in Victoria, South Australia and Western Australia." ... "It is available from nurseries and still promoted as a fodder plant for cattle."
<b>703</b>	<b>Propagules likely to disperse as a produce contaminant</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Queensland Government. (2011). Weeds of Australia. Tree Lucerne. <i>Chamaecytisus palmensis</i> . <a href="http://keyserver.lucidcentral.org">http://keyserver.lucidcentral.org</a> . [Accessed 6 Nov 2015]	"This species reproduces mainly by seed, which are thought to be spread by ants, birds and slashing. They can also be dispersed short distances when they are explosively released from the mature fruit. They are dispersed longer distances by deliberate plantings, in dumped garden waste, by machinery, and in contaminated soil."

Qsn #	Question	Answer
704	<b>Propagules adapted to wind dispersal</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	HerbiGuide. (2015). Tagasaste - <i>Chamaecytisus palmensis</i> . <a href="http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm">http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm</a> . [Accessed 9 Nov 2015]	"Fruit: Stalkless, green brown, flattened, oblong, slightly curved, 2 valved pod, 40-50 mm long by 8-12 mm wide, hairy. Not constricted between the seeds. Contains around 10 seeds, which are released explosively when ripe."
	Queensland Government. (2011). Weeds of Australia. Tree Lucerne. <i>Chamaecytisus palmensis</i> . <a href="http://keyserver.lucidcentral.org">http://keyserver.lucidcentral.org</a> . [Accessed 6 Nov 2015]	"This species reproduces mainly by seed, which are thought to be spread by ants, birds and slashing. They can also be dispersed short distances when they are explosively released from the mature fruit."
705	<b>Propagules water dispersed</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Csurhes, S. & Edwards, R. 1998. Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	" <i>Cytisus palmensis</i> ... A large shrub or tree to c. 5 m, native to the Canary Islands. Most reproduction occurs from water-dispersed seeds."
706	<b>Propagules bird dispersed</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Queensland Government. (2011). Weeds of Australia. Tree Lucerne. <i>Chamaecytisus palmensis</i> . <a href="http://keyserver.lucidcentral.org">http://keyserver.lucidcentral.org</a> . [Accessed 6 Nov 2015]	"This species reproduces mainly by seed, which are thought to be spread by ants, birds and slashing." [Potentially, although not fleshy-fruited]
707	<b>Propagules dispersed by other animals (externally)</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Pemberton, R. W., & Irving, D. W. (1990). Elaiosomes on weed seeds and the potential for myrmecochory in naturalized plants. <i>Weed Science</i> , 38(6): 615-619	[Possibly ant-dispersed] "Seeds of plants naturalized in the United States were examined for the presence of elaiosomes. Seeds of 47 species belonging to 13 families (Asteraceae, Boraginaceae, Dipsacaceae, Euphorbiaceae, Fabaceae, Fumariaceae, Lamiaceae, Liliaceae, Poaceae, Polygonaceae, Resedaceae, Rosaceae, and Solanaceae) were found to have elaiosomes, indicating that these species are probably myrmecochorous, i.e., dispersed by ants."
	Queensland Government. (2011). Weeds of Australia. Tree Lucerne. <i>Chamaecytisus palmensis</i> . <a href="http://keyserver.lucidcentral.org">http://keyserver.lucidcentral.org</a> . [Accessed 6 Nov 2015]	[Possibly spread by ants] "This species reproduces mainly by seed, which are thought to be spread by ants, birds and slashing."
708	<b>Propagules survive passage through the gut</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Queensland Government. (2011). Weeds of Australia. Tree Lucerne. <i>Chamaecytisus palmensis</i> . <a href="http://keyserver.lucidcentral.org">http://keyserver.lucidcentral.org</a> . [Accessed 9 Nov 2015]	"This species reproduces mainly by seed, which are thought to be spread by ants, birds and slashing." [Unknown. Possible that hard seeds are excreted by birds or other animals consuming plants as fodder]
801	<b>Prolific seed production (&gt;1000/m2)</b>	

Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Queensland Government. (2011). Weeds of Australia. Tree Lucerne. <i>Chamaecytisus palmensis</i> . <a href="http://keyserver.lucidcentral.org">http://keyserver.lucidcentral.org</a> . [Accessed 9 Nov 2015]	"Each pod contains about 5-10 hard seeds (about 5 mm long and 3 mm wide). The seeds are flattened (i.e. compressed), oval-shaped (i.e. elliptic), shiny in appearance, and brown or black in colour."
	HerbiGuide. (2015). Tagasaste - <i>Chamaecytisus palmensis</i> . <a href="http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm">http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm</a> . [Accessed 9 Nov 2015]	"Produces large quantities of seed but the germinability is often less than 50%."

802	<b>Evidence that a persistent propagule bank is formed (&gt;1 yr)</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	HerbiGuide. (2015). Tagasaste - <i>Chamaecytisus palmensis</i> . <a href="http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm">http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm</a> . [Accessed 9 Nov 2015]	"Seed may remain viable in the soil for more than 10 years but seedlings rarely establish in dense shade."
	Queensland Government. (2011). Weeds of Australia. Tree Lucerne. <i>Chamaecytisus palmensis</i> . <a href="http://keyserver.lucidcentral.org">http://keyserver.lucidcentral.org</a> . [Accessed 6 Nov 2015]	"Tree lucerne ( <i>Chamaecytisus palmensis</i> ) accumulates large quantities of long-lived seeds in the soil seed bank and readily germinates after fire or other disturbance, forming dense infestations that can smother native vegetation and prevent regeneration. Its nitrogen-fixing ability also increases soil fertility, helping other weeds to colonise invaded sites and out-compete the native species."

803	<b>Well controlled by herbicides</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	HerbiGuide. (2015). Tagasaste - <i>Chamaecytisus palmensis</i> . <a href="http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm">http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm</a> . [Accessed 9 Nov 2015]	"Chain or bull dose trees, burn, then spray regrowth and seedlings. Heavy grazing can be used to provide control by ring barking the trees and consuming the seedlings. A mixture of 1 L of Access® in 60 L of diesel applied to the lower 50 cm of trunks can be used for individual trees. Seedlings (and trees) can be sprayed with a mixture of 0.5 g metsulfuro (600g/kg) plus 25 mL Pulse® in 10 L water in spring or autumn. Repeat annually until no more seedling appear. This may take several years. 2 L/ha Tordon®75-D or 10 kg/ha Tordon® granules provide control of existing plants and residual control of seedlings but may affect other trees and scrub. Metsulfuron and Tordon® will kill many native species it contacts at these rates. 800 g/ha Lontrel®750 is preferred for use near Eucalypts." ... "Glyphosate is relatively ineffective."

804	<b>Tolerates, or benefits from, mutilation, cultivation, or fire</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	HerbiGuide. (2015). Tagasaste - <i>Chamaecytisus palmensis</i> . <a href="http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm">http://www.herbiguide.com.au/Descriptions/hg_Tagasaste.htm</a> . [Accessed 9 Nov 2015]	[Will resprout if not treated with herbicides] "It will take several years to achieve control. Chain or bull dose trees, burn, then spray regrowth and seedlings. Heavy grazing can be used to provide control by ring barking the trees and consuming the seedlings." ... "Seedlings can be hand pulled but larger plants tend to break off and regrow from the base."

Qsn #	Question	Answer
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Unknown. No evidence] "introduced to several tropical countries as a fodder plant; in Hawai'i cultivated as a fodder plant and naturalized primarily in pastures, 640- 1,525 m, at least on Maui. First collected in 1927 (Degener 2280, BISH)."

**Summary of Risk Traits:**

High Risk / Undesirable Traits

- Grows in regions with Mediterranean to subtropical climates
- Naturalized on Maui & Hawaii islands, and elsewhere
- Environmental weed in Australia
- Other *Cytisus* species are invasive
- Seeds reported to be toxic
- Tolerates many soil types
- Reported to form dense stands in Australia
- Nitrogen fixing (may allow invasion by other weeds)
- Reproduces by seeds
- Self-compatible
- Reaches maturity in 3 years
- Seeds explosively released from pods
- Seeds also may be dispersed by ants, birds, dumped garden waste
- Forms a long-lived seed bank
- Able to resprout after cutting & browsing, tolerates fire

Low Risk Traits

- Unarmed (no spines, thorns or burrs)
- Provides fodder for livestock (palatable despite reports of possible toxicity)
- Not reported to spread vegetatively
- Herbicides may provide effective control