

Assessment date: 4/6/2023 Prepared by E. Williams Edited by C. Wanamaker (6/30/23)

Genus species (common name)		Answer	Score
1.01	Is the species highly domesticated?	y	-3
1.02	Has the species become naturalised where grown?	y	1
1.03	Does the species have weedy races?	0	
2.01	Species suited to Florida's USDA climate zones (0-low; 1-intermediate; 2-high) North Zone: suited to Zones 8, 9 Central Zone: suited to Zones 9, 10 South Zone: suited to Zone 10	3	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	3	
2.03	Broad climate suitability (environmental versatility)	y	1
2.04	Native or naturalized in habitats with periodic inundation North Zone: mean annual precipitation 50-70 inches Central Zone: mean annual precipitation 40-60 inches South Zone: mean annual precipitation 40-60 inches	?	
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range	y	2
3.02	Garden/amenity/disturbance weed	y	2
3.03	Weed of agriculture	y	4
3.04	Environmental weed	?	
3.05	Congeneric weed	y	2
4.01	Produces spines, thorns or burrs	n	0
4.02	Allelopathic	?	
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals	n	-1
4.05	Toxic to animals	?	
4.06	Host for recognised pests and pathogens	y	1
4.07	Causes allergies or is otherwise toxic to humans	n	0
4.08	Creates a fire hazard in natural ecosystems	?	
4.09	Is a shade tolerant plant at some stage of its life cycle	n	0
4.10	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols.	y	1
4.11	Climbing or smothering growth habit	n	0
4.12	Forms dense thickets	?	
5.01	Aquatic	n	0
5.02	Grass	n	0
5.03	Nitrogen fixing woody plant	y	1
5.04	Geophyte	n	0
6.01	Evidence of substantial reproductive failure in native habitat	n	0
6.02	Produces viable seed	y	1

6.03	Hybridizes naturally	n	-1
6.04	Self-compatible or apomictic	y	1
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative propagation	n	-1
6.07	Minimum generative time (years)	1 or fewer	1
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y	1
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant	n	-1
7.04	Propagules adapted to wind dispersal	n	-1
7.05	Propagules water dispersed	y	1
7.06	Propagules bird dispersed	?	
7.07	Propagules dispersed by other animals (externally)	n	-1
7.08	Propagules dispersed by other animals (internally)	?	
8.01	Prolific seed production	?	
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	y	1
8.03	Well controlled by herbicides	y	-1
8.04	Tolerates, or benefits from, mutilation or cultivation	n	-1
8.05	Effective natural enemies present in U.S.	y	-1
Total Score		10	
Implemented Pacific Second Screening		no	
Risk Assessment Results		reject	

section	# questions answered	satisfy minimum?
A		10 yes
B		8 yes
C		20 yes
total		38 yes

	Evidence	Reference
1.01	<p>1. Lupin has been cultivated as a crop species for at least 3,000 years, and <i>L. angustifolius</i> is one of 5 cultivated <i>Lupinus</i> species 2. Lupin was "independently domesticated in both the Old and New World" and <i>L. angustifolius</i> was introduced in Australia in the 1960s as a drought resistant crop 3. <i>L. angustifolius</i> was first used as an agricultural crop in 19th century Europe, and domestication via systematic breeding focusing on "reducing alkaloid levels, pod dehiscence, and hard-seededness" started in Central Europe in the early 20th century 4. <i>L. angustifolius</i> was domesticated in the early 20th century and is an important crop, particularly in Australia. 5. Center of origin is somewhere in the Mediterranean region. Modern breeding efforts seem to have initiated in the 1930s or 40s. Traits modified by domestication include the absence of alkaloids, nonshattering pods, early flowering, seed coat permeability, seed/flower color, and yield. There are some 27 cultivars of <i>L. angustifolia</i> from Russia alone.</p>	<p>1. Kettel, K., Tuck, B., Payne, W. A., Chen, C., Machado, S., & Karow, R. (2003, June). Narrow-leaf Lupin. Oregon State University. https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/em8834.pdf 2. Gross, R. 1986. Lupins in the old and new world--a biological-cultural co-evolution, p. 244-277. In: Proc. Fourth Int. Lupin Conf. Aug. 15-22, 1986. Geraldton, W. Australia. Int. Lupin Assoc as cited in Putnam, D.H. 1993. An interdisciplinary approach to the development of lupin as an alternative crop. p. 266-277. In: J. Janick and J.E. Simon (eds.), <i>New crops</i>. Wiley, New York. 3. Berger, J.D., Buirchell, B.J., Luckett, D.J. et al. Domestication bottlenecks limit genetic diversity and constrain adaptation in narrow-leaved lupin (<i>Lupinus angustifolius</i> L.). <i>Theor Appl Genet</i> 124, 637–652 (2012). https://doi.org/10.1007/s00122-011-1736-z 4. Talhinhos, P., Leitão, J. & Neves-Martins, J. Collection of <i>Lupinus angustifolius</i> L. Germplasm and Characterisation of Morphological and Molecular Diversity. <i>Genet Resour Crop Evol</i> 53, 563–578 (2006). https://doi.org/10.1007/s10722-004-2684-0</p>
1.02	<p>1. Naturalized in southern and eastern Australia, often found growing in eucalypt woodlands 2. Naturalized in parts of Australia, South Africa, and North America</p>	<p>1. <i>Lupinus angustifolius</i>. (n.d.). Weeds of Australia. https://keyserver.lucidcentral.org/weeds/data/media/html/lupinus_angustifolius.htm 2. Lim, T.K. (2012). <i>Lupinus angustifolius</i>. In: <i>Edible Medicinal And Non-Medicinal Plants</i>. Springer, Dordrecht. https://doi.org/10.1007/978-94-007-1764-0_88</p>
1.03	Skip	0
2.01	1. <i>L. angustifolius</i> is present in USDA climate zones 3a through 12b	1. Climate match performed using data from GBIF and SERNEC through R and ArcGISPro
2.02		max score per guidelines for use of computer model for habitat suitability
2.03	<p>1. <i>L. angustifolius</i> is present in 15 Köppen-Geiger zones; Aw, BWk, BWk, BSk, BSh, Cfa, Csc, Cwa, Dfa, Dsd, Dwa, Dwb, and Ef. 2. "<i>L. angustifolius</i> L. is a very polymorphic</p>	<p>1. Climate match performed using data from GBIF and SERNEC through R and ArcGISPro 2. Vishnyakova, M. A., E. V. Vlasova, and G. P.</p>

2.04	<p>1. High rainfall seed set will be delayed considerably 2. Native in areas with 451-531 mm of annual rainfall in the Iberian Peninsula 3. Rainfall tolerances listed as 400 to 840 mm. 4. Annual precipitation in the areas where representatives of this species naturally occur is 200 to 1500 mm</p>	<p>1. Lupinus angustifolius L. (2019, August 26). Florabase. Retrieved January 30, 2023, from https://florabase.dpaw.wa.gov.au/browse/profile/4065 2. Matesanz, S., Ramos-Muñoz, M., Moncalvillo, B., Teso, M. L. R., De Dionisio, S. L. G., Romero, J. L., & Iriondo, J. M. (2020). Plasticity to drought and ecotypic differentiation in populations of a crop wild relative. <i>Aob Plants</i>, 12(2). https://doi.org/10.1093/aobpla/plaa006 3. Rojas-Sandoval, J. (2022) 'Lupinus angustifolius (narrow-leaf lupin)', CABI Compendium. CABI International. doi: 10.1079/cabicompendium.31706.</p>
2.05	<p>1. 1. "Currently, narrow-leaved lupine (<i>L. angustifolius</i> L.), also known as blue lupine, is the world's leader in the area of cultivation among other cultivated <i>Lupinus</i> spp. It is the earliest and most plastic cultivated species and the only one adapted to relatively northern latitudes. Uses of this crop are very diverse." 2. Introduced into "Algeria, Argentina Northeast, Austria, Azores, Baltic States, Belarus, Canary Is., Cape Provinces, Central European Rus, Chile Central, China North-Central, China Southeast, Czechoslovakia, Dominican Republic, East European Russia, Florida, Guatemala, Hawaii, Hungary, India, Jamaica, Kirgizstan, Korea, Madeira, Mongolia, New South Wales, New Zealand North, New Zealand South, North European Russi, Northwest European R, Poland,</p>	<p>1. Vishnyakova, M. A., E. V. Vlasova, and G. P. Egorova. "Genetic Resources of Narrow-Leaved Lupine (<i>Lupinus Angustifolius</i> L.) and Their Role in Its Domestication and Breeding." <i>Vavilov Journal of Genetics and Breeding</i> 25, no. 6 (October 2021): 620. https://doi.org/10.18699/VJ21.070. 2. <i>Lupinus angustifolius</i> L. Plants of the World Online Kew Science. (n.d.). Plants of the World Online. https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:504124-1 3. Rojas-Sandoval, J. (2022) 'Lupinus angustifolius (narrow-leaf lupin)', CABI Compendium. CABI International. doi: 10.1079/cabicompendium.31706.</p>
3.01	<p>1. Naturalized in southern and eastern Australia, often found growing in eucalypt woodlands 2. Naturalized in parts of Australia, South Africa, and North America</p>	<p>1. <i>Lupinus angustifolius</i>. (n.d.). Weeds of Australia. https://keyserver.lucidcentral.org/weeds/data/media/Html/lupinus_angustifolius.htm 2. Lim, T.K. (2012). <i>Lupinus angustifolius</i>. In: <i>Edible Medicinal And Non-Medicinal Plants</i>. Springer, Dordrecht. https://doi.org/10.1007/978-94-007-1764-0_88</p>

3.02	<p>1. present as an unwanted weed in parks and roadsides 2. disturbance is listed as a pathway cause; listed as a weed in disturbed sites. 3. "Nowadays narrow-leaved lupine is mainly grown in Finland as an ornamental that occasionally escapes and might grow on various kinds of waste ground." 4. Several herbarium specimens from the southeast US indicate the plant was collected in waste areas/ditches/roadsides near where the plant was cultivated, indicating escape from cultivation.</p>	<p>1. <i>Lupinus angustifolius</i>. (n.d.). Weeds of Australia. https://keyserver.lucidcentral.org/weeds/data/media/Html/lupinus_angustifolius.htm</p> <p>2. Australian Government, 2013. The Biology of <i>Lupinus L.</i> (lupin or lupine). Australia: Department of Health and Ageing, Office of the Gene Technology Regulator. http://www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/biologylupin2013-toc/\$FILE/biologylupin2013-2.pdf as cited in Rojas-Sandoval, J. (2022). <i>Lupinus angustifolius</i> (narrow-leaf lupin). CABI Compendium, CABI Compendium. https://doi.org/10.1079/cabicompendium.31706</p> <p>3. "Narrow-Leaved Lupine, <i>Lupinus Angustifolius</i> - Flowers - NatureGate." Accessed June 27, 2023. https://luontoportti.com/en/t/2310/narrow-leaved-lupine.</p>
3.03	<p>1. Weed of croplands 2. listed as an agricultural weed. 3. Wild germplasm collections within the native range include a majority of accessions from roadsides/areas of mild disturbance, with two accessions representing weeds in a wheatfield.</p>	<p>1. <i>Lupinus angustifolius</i>. (n.d.). Weeds of Australia. https://keyserver.lucidcentral.org/weeds/data/media/Html/lupinus_angustifolius.htm</p> <p>2. Randall RP (2017) 'Global compendium of weeds' (No. Ed. 3) as cited in Moore, G., & Nazeri, N. (2022). Environmental weed risk assessment: Narrowleaf lupins (<i>Lupinus angustifolius</i>). In Environmental Weed Risk Assessments. Department of Primary Industries and Regional Development, Government of Western Australia. Retrieved December 2, 2022, from https://www.agric.wa.gov.au/sites/gateway/files/DPIRD%20Environmental%20WRA%20Lupinus%20angu</p>
3.04	<p>1. listed as an environmental weed in Australia 2. Listed as an environmental weed. Likely a minor weed, no evidence of control efforts or documented impacts.</p>	<p>1. Randall RP (2017) 'Global compendium of weeds' (No. Ed. 3) as cited in Moore, G., & Nazeri, N. (2022). Environmental weed risk assessment: Narrowleaf lupins (<i>Lupinus angustifolius</i>). In Environmental Weed Risk Assessments. Department of Primary Industries and Regional Development, Government of Western Australia. Retrieved December 2, 2022, from https://www.agric.wa.gov.au/sites/gateway/files/DPIRD%20Environmental%20WRA%20Lupinus%20angustifolius.pdf 2. Rojas-Sandoval, J. (2022) '<i>Lupinus angustifolius</i> (narrow-leaf lupin)', CABI Compendium. CABI International. doi: 10.1079/cabicompendium.31706.</p>

3.05	<p>1. <i>Lupinus polyphyllus</i> is an invasive weed in grasslands in southern Finland 2. <i>Lupinus cosentinii</i> is an invasive weed in Australia. 3. <i>L. polyphyllus</i> and <i>L. arboreus</i> are widespread, recognized invasive species.</p>	<p>1. Prass, M., Ramula, S., Jauni, M. et al. The invasive herb <i>Lupinus polyphyllus</i> can reduce plant species richness independently of local invasion age. <i>Biol Invasions</i> 24, 425–436 (2022). https://doi.org/10.1007/s10530-021-02652-y 2. <i>Lupinus cosentinii</i>. (n.d.). Fact Sheet Fusion V2. https://keyserver.lucidcentral.org/weeds/data/media/Html/lupinus_cosentinii.htm 3. Lambers, Hans, Jon C. Clements, and Matthew N. Nelson. "How a Phosphorus-Acquisition Strategy Based on Carboxylate Exudation Powers the Success and Agronomic Potential of Lupines (<i>Lupinus</i>, Fabaceae)." <i>American Journal of Botany</i> 100, no. 2 (2013): 263–88.</p>
4.01	<p>1. does not produce spines, thorns, or burrs 2. plant description and morphology does not include spines, thorns, or burrs</p>	<p>1. Narrow-leaved Lupine, <i>Lupinus angustifolius</i> - Flowers - NatureGate. (n.d.). https://luontoportti.com/en/t/2310/narrow-leaved-lupine 2. Narrow-leaved Lupin. (n.d.). http://www.herbiguide.com.au/Descriptions/hg_Narrowleaved_Lupin.htm</p>
4.02	<p>1-2. <i>Lupinus</i> plants have alkaloids which are implicated in allelopathic affects during germination. Generic information with no direct evidence for <i>L. angustifolius</i>.</p>	<p>1. Lambers, H., Clements, J.C. and Nelson, M.N. (2013), How a phosphorus-acquisition strategy based on carboxylate exudation powers the success and agronomic potential of lupines (<i>Lupinus</i>, Fabaceae). <i>American Journal of Botany</i>, 100: 263-288. https://doi.org/10.3732/ajb.1200474 2. Vishnyakova MA, Kushnareva AV, Shelenga TV, Egorova GP. Alkaloids of narrow-leaved lupine as a factor determining alternative ways of the crop's utilization and breeding. <i>Vavilovskii Zhurnal Genet Selektcii</i>. 2020 Oct;24(6):625-635. doi: 10.18699/VJ20.656. PMID: 33659848; PMCID: PMC7716546.</p>
4.03	lack of positive evidence	0
4.04	<p>1. seed can be fed directly to poultry or livestock 2. grown as a fodder crop</p>	<p>1. Kettel K, Tuck B, Payne WA, Chen C, Machado S, Karow R (2003) Narrow leaf lupin. <i>Dryland Cropping Systems</i>, Oregon State University Extension Service, Corvallis, OR, USA. 2. <i>Lupinus angustifolius</i>. (n.d.). <i>Weeds of Australia</i>. https://keyserver.lucidcentral.org/weeds/data/media/Html/lupinus_angustifolius.htm</p>

4.05	<p>1. seed can be fed directly to poultry or livestock 2. grown as a fodder crop 3. <i>L. angustifolius</i> is a "sweet" lupin with permeable seeds meaning they are safe for consumption. 3. Wild types have alkaloids and are not recommended for animal feed without soaking treatment to remove alkaloids. Most cultivars are bred to be 'sweet' varieties with minimal alkaloids and are safe for animal consumption.</p>	<p>1.Kettel K, Tuck B, Payne WA, Chen C, Machado S, Karow R (2003) Narrow leaf lupin. Dryland Cropping Systems, Oregon State University Extension Service, Corvallis, OR, USA. 2.Lupinus angustifolius. (n.d.). Weeds of Australia. https://keyserver.lucidcentral.org/weeds/data/media/Html/lupinus_angustifolius.htm 3.The Biology of Lupinus L. (lupin or lupine). (2013). In Australian Government Department of Health and Ageing Australian Government Office of the Gene Technology Regulator. Australian Government. https://www.ogtr.gov.au/resources/publications/biology-lupinus-l-lupin-or-lupine</p>
4.06	<p>1. major host of bean yellow mosaic virus, cucumber mosaic virus, European earwig, redlegged earth mite, native budworm, Italian ryegrass, and soybean dwarf virus 2. host to the fungal diseases Pleiochaeta, Rhizoctonia, Anthracnose, as well as cucumber mosaic, bean yellow mosaic, and red-legged earth mite</p>	<p>1. Rojas-Sandoval, J. (2022) 'Lupinus angustifolius (narrow-leaf lupin)', CABI Compendium. CABI International. doi: 10.1079/cabicompendium.31706. 2.Kettel K, Tuck B, Payne WA, Chen C, Machado S, Karow R (2003) Narrow leaf lupin. Dryland Cropping Systems, Oregon State University Extension Service, Corvallis, OR, USA</p>
4.07	<p>1. "is a grain legume crop that is gaining recognition as a potential human health food" 2. grown for use as a human food 3. <i>L. angustifolius</i> is a "sweet" lupin with permeable seeds meaning they are safe for consumption</p>	<p>1. Foley, R.C., Gao, LL., Spriggs, A. et al. Identification and characterisation of seed storage protein transcripts from <i>Lupinus angustifolius</i>. BMC Plant Biol 11, 59 (2011). https://doi.org/10.1186/1471-2229-11-59 2.Rojas-Sandoval, J. (2022). <i>Lupinus angustifolius</i> (narrow-leaf lupin). CABI Compendium, CABI Compendium. https://doi.org/10.1079/cabicompendium.31706 3.The Biology of <i>Lupinus L.</i> (lupin or lupine). (2013). In Australian Government Department of Health and Ageing Australian Government Office of the Gene Technology Regulator. Australian Government. https://www.ogtr.gov.au/resources/publications/biology-lupinus-l-lupin-or-lupine</p>
4.08	Unknown	0
4.09	<p>1-2. should be grown in full sun or partial shade</p>	<p>1. D. (2022b, April 25). Narrow-leaved lupin (<i>Lupinus angustifolius</i>). Dear Plants. https://www.dearplants.com/narrow-leaved-lupin-lupinus-angustifolius/#Sunlight 2.Lupin Blue seeds (<i>Lupinus Angustifolius</i>) Happy Green Shop. (n.d.). Happy Green Shop. https://www.happygreenshop.com/flower-seeds/perennials/lupin-blue</p>

4.10	<p>1. well suited to "deep, acid sandy soils" 2. sensitive to soil pH, prefer acidic soils (4.5-7.5) over neutral soils; will tolerate slightly alkaline soils (up to a pH of 8.0) if the calcium or free lime content of the soil is low. Grow very well on sandy soils, deep sandy loams, and gravelly soils overlaying clay subsoils and prefer good soil drainage 3. performs poorly on fine-textured or alkaline soils, restricted to acid to neutral coarse-textured soils in Australia 4. inhabits well-drained, acid or neutral soils. 5. "Lupinus angustifolius is less tolerant of infertile soils than are other lupins". 6. "Narrow-leaved lupine plants are capable of growing on soils deficient in nitrogen and phosphorus."</p>	<p>1. Moore, G., & Nazeri, N. (2022). Environmental weed risk assessment: Narrowleaf lupins (<i>Lupinus angustifolius</i>). In Environmental Weed Risk Assessments. Department of Primary Industries and Regional Development, Government of Western Australia. Retrieved December 2, 2022, from https://www.agric.wa.gov.au/sites/gateway/files/DP-IRD%20Environmental%20WRA%20Lupinus%20angustifolius.pdf 2. Kettel K, Tuck B, Payne WA, Chen C, Machado S, Karow R (2003) Narrow leaf lupin. Dryland Cropping Systems, Oregon State University Extension 3. Clements JC, White PF, Buirchell BJ (1993) The root morphology of <i>Lupinus angustifolius</i> in relation to other <i>Lupinus</i> species. Australian Journal of Agricultural Research 44, 1367-1375. https://doi.org/10.1071/AR9931367 4. Matesanz, S., Ramos-Muñoz, M., Moncalvillo, B., Teso, M. L. R., De Dionisio, S. L. G., Romero, J. L., & Iriondo, J. M. (2020). Plasticity to drought and ecotypic differentiation in populations of a crop wild relative. <i>Aob Plants</i>, 12(2). https://doi.org/10.1093/aobpla/plaa006</p>
4.11	1-2. non vining shrub	<p>1. The Biology of <i>Lupinus L.</i> (lupin or lupine). (2013). In Australian Government Department of Health and Ageing Australian Government Office of the Gene Technology Regulator. Australian Government. https://www.ogtr.gov.au/resources/publications/biology-lupinus-l-lupin-or-lupine 2. <i>Lupinus angustifolius L.</i> (n.d.). Plants for a Future. https://pfaf.org/Admin/PlantImages/LupinusAngustifolius.jpg</p>
4.12	Unknown	0
5.01	Plant is terrestrial	0
5.02	1-2. Family: Fabaceae	<p>1. Retrieved 12-2-2022 from the Integrated Taxonomic Information System (ITIS) on-line database, www.itis.gov, CC0 https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=25937#null 2. <i>Lupinus angustifolius</i>. (n.d.). Weeds of Australia. https://keyserver.lucidcentral.org/weeds/data/media/Html/lupinus_angustifolius.htm</p>

5.03	1-2. Family: Fabaceae 3. "as the [lupin] taproot grows, it develops nitrogen-fixing nodules and lateral roots"	1.Retrieved 12-2-2022 from the Integrated Taxonomic Information System (ITIS) on-line database, www.itis.gov , CCO https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=25937#null 2.Lupinus angustifolius. (n.d.). Weeds of Australia. https://keyserver.lucidcentral.org/weeds/data/media/Html/lupinus_angustifolius.htm 3.Kettel K, Tuck B, Payne WA, Chen C, Machado S, Karow R (2003) Narrow leaf lupin. Dryland Cropping Systems, Oregon State University Extension Service, Corvallis, OR, USA
5.04	1. not a geophyte, has a dominant taproot, a number of primary lateral roots, and few secondary or tertiary lateral roots 2. not a geophyte	1. The Biology of Lupinus L. (lupin or lupine). (2013). In Australian Government Department of Health and Ageing Australian Government Office of the Gene Technology Regulator. Australian Government. https://www.ogtr.gov.au/resources/publications/biology-lupinus-l-lupin-or-lupine 2.Clements, J. E., White, P. R., & Buirchell, B. (1993b). The root morphology of Lupinus angustifolius in relation to other Lupinus species. Australian Journal of Agricultural Research, 44(6), 1367. https://doi.org/10.1071/ar9931367
6.01	1. Ranked Least Concern by the IUCN	1. Nigel Maxted (Crop Wild Relatives Specialist Group). (2014, February 28). IUCN Red List of Threatened Species: Lupinus angustifolius. IUCN Red List of Threatened Species. https://www.iucnredlist.org/species/174707/19404942
6.02	1. spreads via seed 2. seed successfully germinates	1. Rojas-Sandoval, J. (2022). Lupinus angustifolius (narrow-leaf lupin). CABI Compendium, CABI Compendium. https://doi.org/10.1079/cabicompendium.31706 2.The Biology of Lupinus L. (lupin or lupine). (2013). In Australian Government Department of Health and Ageing Australian Government Office of the Gene Technology Regulator. Australian Government. https://www.ogtr.gov.au/resources/publications/biology-lupinus-l-lupin-or-lupine
6.03	1. "species within the genus Lupinus have cytogenetic barriers which prevent interspecific hybridization"	1. The Biology of Lupinus L. (lupin or lupine). (2013). In Australian Government Department of Health and Ageing Australian Government Office of the Gene Technology Regulator. Australian Government. https://www.ogtr.gov.au/resources/publications/biology-lupinus-l-lupin-or-lupine

6.04	1-2. largely self pollinates and is self-compatible	1. The Biology of Lupinus L. (lupin or lupine). (2013). In Australian Government Department of Health and Ageing Australian Government Office of the Gene Technology Regulator. Australian Government. https://www.ogtr.gov.au/resources/publications/biology-lupinus-l-lupin-or-lupine 2.Rojas-Sandoval, J. (2022) 'Lupinus angustifolius (narrow-leaf lupin)', CABI Compendium. CABI International. doi: 10.1079/cabicompendium.31706.
6.05	1-2. L. angustifolius largely self pollinates but also relies on bees and other insects	1. The Biology of Lupinus L. (lupin or lupine). (2013). In Australian Government Department of Health and Ageing Australian Government Office of the Gene Technology Regulator. Australian Government. https://www.ogtr.gov.au/resources/publications/biology-lupinus-l-lupin-or-lupine 2.Rojas-Sandoval, J. (2022) 'Lupinus angustifolius (narrow-leaf lupin)', CABI Compendium. CABI International. doi: 10.1079/cabicompendium.31706.
6.06	1. reproduces by seed, does not have vegetative propagules 2. no vegetative reproduction has been reported in lupin species commonly used in agricultural practices	1.Narrow-leaved Lupin. (n.d.). http://www.herbiguide.com.au/Descriptions/hg_Narrowleaved_Lupin.htm 2.The Biology of Lupinus L. (lupin or lupine). (2013). In Australian Government Department of Health and Ageing Australian Government Office of the Gene Technology Regulator. Australian Government. https://www.ogtr.gov.au/resources/publications/biology-lupinus-l-lupin-or-lupine
6.07	1. "In 14 to 20 weeks [after generating], flowering ceases and maximum dry matter is reached. All of the plant's nutrients are redirected from growth to seed filling. The crop is physiologically mature when the moisture content of the seeds fall to about 40 percent." 2. Reaches maturity in 105-150 days and flowers after 80-120 days	1.Kettel K, Tuck B, Payne WA, Chen C, Machado S, Karow R (2003) Narrow leaf lupin. Dryland Cropping Systems, Oregon State University Extension Service, Corvallis, OR, USA 2.Rojas-Sandoval, J. (2022) 'Lupinus angustifolius (narrow-leaf lupin)', CABI Compendium. CABI International. doi: 10.1079/cabicompendium.31706.

7.01	1. Land vehicles is listed as a pathway vector 2. Spread unintentionally through gravel and on vehicles	1. USDA-ARS, 2017. Germplasm Resources Information Network (GRIN). Online Database. Beltsville, USA: National Germplasm Resources Laboratory. http://www.ars-grin.gov/cgi-bin/npgs/html/tax_search.pl as cited in Rojas-Sandoval, J. (2022). <i>Lupinus angustifolius</i> (narrow-leaf lupin). CABI Compendium, CABI Compendium. https://doi.org/10.1079/cabicompendium.31706 2. The Biology of <i>Lupinus</i> L. (lupin or lupine). (2013). In Australian Government Department of Health and Ageing Australian Government Office of the Gene Technology Regulator. Australian Government. https://www.ogtr.gov.au/resources/publications/biology-lupinus-l-lupin-or-lupine
7.02	1. "has been widely introduced by humans outside its native distribution range, primarily for use as a forage/fodder crop" 2. seeds for sale online	1. Rojas-Sandoval, J. (2022). <i>Lupinus angustifolius</i> (narrow-leaf lupin). CABI Compendium, CABI Compendium. https://doi.org/10.1079/cabicompendium.31706 2. https://www.happygreenshop.com/flower-seeds/perennials/lupin-blue
7.03	lack of positive evidence	0
7.04	1. Lupin seeds are dense and do not have appendages adapted to wind dispersal 2. Seeds do not have adaptations for wind dispersal	1. The Biology of <i>Lupinus</i> L. (lupin or lupine). (2013). In Australian Government Department of Health and Ageing Australian Government Office of the Gene Technology Regulator. Australian Government. https://www.ogtr.gov.au/resources/publications/biology-lupinus-l-lupin-or-lupine 2. Hurst, S. (2007). <i>Lupinus angustifolius</i> . USDA-NRCS PLANTS Database. https://www.feedipedia.org/sites/default/files/styles/standard__640x480_/public/images/blue_lupin_seeds.jpg?itok=7XNEZuKY
7.05	1. "Spreads via seed that is dispersed by waterways" 2. dispersed by water	1. USDA-ARS, 2017. Germplasm Resources Information Network (GRIN). Online Database. Beltsville, USA: National Germplasm Resources Laboratory. http://www.ars-grin.gov/cgi-bin/npgs/html/tax_search.pl as cited in Rojas-Sandoval, J. (2022). <i>Lupinus angustifolius</i> (narrow-leaf lupin). CABI Compendium, CABI Compendium. https://doi.org/10.1079/cabicompendium.31706 2. The Biology of <i>Lupinus</i> L. (lupin or lupine). (2013). In Australian Government Department of Health and Ageing Australian Government Office of the Gene Technology Regulator. Australian Government. https://www.ogtr.gov.au/resources/publications/biology-lupinus-l-lupin-or-lupine
7.06	No evidence for successful bird dispersal or that seeds can survive being eaten by birds	0

7.07	1. "Lupin seeds do not have structures allowing attachment to animal fur or feather for long distance dispersal" 2. Seeds do not have adaptation for external distribution	1. The Biology of Lupinus L. (lupin or lupine). (2013). In Australian Government Department of Health and Ageing Australian Government Office of the Gene Technology Regulator. Australian Government. https://www.ogtr.gov.au/resources/publications/biology-lupinus-l-lupin-or-lupine 2. Hurst, S. (2007). Lupinus angustifolius. USDA-NRCS PLANTS Database. https://www.feedipedia.org/sites/default/files/styles/standard__640x480_/public/images/blue_lupin_seeds.jpg?itok=7XNEZuKY
7.08	1. Lupinus arboreus seed can survive ingestion by deer 2. seeds larger than 2 mg are unlikely to survive in large numbers after ingestion by sheep; lupin seeds weight over 20 mg	1. Robinson, K. (2010). The long distance dispersal of yellow tree lupin (Lupinus arboreus) by deer in Mason Bay, Steward Island. University of Otago. 2. The Biology of Lupinus L. (lupin or lupine). (2013). In Australian Government Department of Health and Ageing Australian Government Office of the Gene Technology Regulator. Australian Government. https://www.ogtr.gov.au/resources/publications/biology-lupinus-l-lupin-or-lupine
8.01	1. Can produce as many as 70 flowers on the main stem. The flowers turn into pods after fertilization, and each pod can yield 4 to 5 seeds. Cannot find information on seed set under natural conditions, or plant density under natural conditions.	1. Kettel K, Tuck B, Payne WA, Chen C, Machado S, Karow R (2003) Narrow leaf lupin. Dryland Cropping Systems, Oregon State University Extension Service, Corvallis, OR, USA
8.02	Seed can be stored for up to 2 years without any loss of viability (Duke, 1981) -- unknown if this is under field conditions or ideal storage. 2. " The seeds are hardcoated, and they can remain viable in the soil for up to 20 years. This means that it is almost impossible to eradicate blue lupins from a	1. Duke 1981 2. "Blue lupin (Lupinus angustifolius) seeds". Feedipedia.org/node/23099 accessed 6/26/2023
8.03	1. Metsulfuron methyl and Lontrel are suggested herbicidal methods of control 2. fertilizers with clopyralid, triasulfuron, and florasulam and isoxaben as an active ingredient are recommended	1. Lupinus angustifolius L. (2019, August 26). Florabase. Retrieved January 30, 2023, from https://florabase.dpaw.wa.gov.au/browse/profile/4065 2. The Biology of Lupinus L. (lupin or lupine). (2013). In Australian Government Department of Health and Ageing Australian Government Office of the Gene Technology Regulator. Australian Government. https://www.ogtr.gov.au/resources/publications/biology-lupinus-l-lupin-or-lupine

8.04	<p>1. small infestations can be controlled by mowing or grazing prior to going to seed 2. threatened by overgrazing</p>	<p>1. Rojas-Sandoval, J. (2022) 'Lupinus angustifolius (narrow-leaf lupin)', CABI Compendium. CABI International. doi: 10.1079/cabicompendium.31706. 2. Nigel Maxted (Crop Wild Relatives Specialist Group). (2014, February 28). IUCN Red List of Threatened Species: Lupinus angustifolius. IUCN Red List of Threatened Species. https://www.iucnredlist.org/species/174707/19404942</p>
8.05	<p>1-2. Cucumber mosaic virus and bean yellow mosaic virus are diseases of the plant and are both present in the US</p>	<p>1. Kettel K, Tuck B, Payne WA, Chen C, Machado S, Karow R (2003) Narrow leaf lupin. Dryland Cropping Systems, Oregon State University Extension Service, Corvallis, OR, USA 2. Rojas-Sandoval, J. (2022) 'Lupinus angustifolius (narrow-leaf lupin)', CABI Compendium. CABI International. doi: 10.1079/cabicompendium.31706.</p>