

<b>Taxon:</b> <i>Arctium lappa L.</i>	<b>Family:</b> Asteraceae
<b>Common Name(s):</b> bat weed gobo great burdock	<b>Synonym(s):</b> <i>Arctium adhaereus</i> Gilib. <i>Arctium chaorum</i> Klokov <i>Arctium edule</i> Beger

<b>Assessor:</b> Chuck Chimera	<b>Status:</b> Assessor Approved	<b>End Date:</b> 14 May 2019
<b>WRA Score:</b> 9.0	<b>Designation:</b> H(HPWRA)	<b>Rating:</b> High Risk

**Keywords:** Biennial Herb, Crop Weed, Spiny Burrs, Edible Root, Externally Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	y
102	Has the species become naturalized where grown?	y=1, n=-1	y
103	Does the species have weedy races?	y=1, n=-1	y
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)	Low
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed		
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	y
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	y
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	y
407	Causes allergies or is otherwise toxic to humans		
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	n
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	y
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	y=1, n=-1	y
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	2
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	y
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	y
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m2)	y=1, n=-1	n
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		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

**Supporting Data:**

Qsn #	Question	Answer
101	Is the species highly domesticated?	y
	Source(s)	Notes
	Simoons, F. J. (1991). Food in China: A Cultural and Historical Inquiry. CRC Press, Boca Raton, FL	"The general term "burdock" is applied to a group of troublesome weeds ( <i>Arctium</i> spp.) native to temperate regions of Europe and Asia. One species, great burdock ( <i>Arctium lappa</i> ... came to be cultivated in China and Japan for its leaves and roots. Its place of domestication, according to both Vavilov (1949-50: 21, 24) and Harlan (1975: 74), is temperate China, with Yavilov including it in a list of traditional Chinese food plants."
	Lim, T.K. 2015. Edible Medicinal And Non-Medicinal Plants. Volume 9, Modified Stems, Roots, Bulbs. Springer, Dordrecht	[Long history of cultivation, but not highly domesticated] "Burdock is reported to be native to northern Europe to northeast Asia including northern India. It has become naturalised in many parts of the world, growing wild throughout Europe and North America where it is used as folk medicine. The Japanese developed it as an edible vegetable when it was introduced into Japan a thousand years ago. Today, burdock is widely cultivated in Japan, Taiwan and China and also some Southeast Asian countries (in the highlands) mainly for export to Japan."

102	Has the species become naturalized where grown?	y
	Source(s)	Notes
	Lim, T.K. 2015. Edible Medicinal And Non-Medicinal Plants. Volume 9, Modified Stems, Roots, Bulbs. Springer, Dordrecht	"Burdock is reported to be native to northern Europe to northeast Asia including northern India. It has become naturalised in many parts of the world, growing wild throughout Europe and North America where it is used as folk medicine."
	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 Eurasia; in Hawai'i sparingly naturalized on O'ahu, Lana'i, and Hawai'i. First collected on Lana'i in 1910 (Rock 8042, BISH)."

103	Does the species have weedy races?	y
	Source(s)	Notes
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. Canadian Journal of Plant Science, 60(2), 621-634	" <i>Arctium minus</i> (Hill) Bernh., common burdock, and <i>A. lappa</i> L., great burdock, are introduced weeds of abandoned fields, roadsides, pastures and streambanks. The species are naturalized throughout much of southern Canada, especially in the eastern provinces, and the U.S.A."

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	Low
	Source(s)	Notes

Qsn #	Question	Answer
	Lim, T.K. 2015. Edible Medicinal And Non-Medicinal Plants. Volume 9, Modified Stems, Roots, Bulbs. Springer, Dordrecht	"Burdock is reported to be native to northern Europe to northeast Asia including northern India. It has become naturalised in many parts of the world, growing wild throughout Europe and North America where it is used as folk medicine." ... "Burdock is a cool climate, temperate crop flourishing best at temperatures of 18–28 °C in full sun and is frost sensitive."
	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 Eurasia; in Hawai'i sparingly naturalized on O'ahu, Lana'i, and Hawai'i."

202	Quality of climate match data	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.	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Lim, T.K. 2015. Edible Medicinal And Non-Medicinal Plants. Volume 9, Modified Stems, Roots, Bulbs. Springer, Dordrecht	"Burdock is a cool climate, temperate crop flourishing best at temperatures of 18–28 °C in full sun and is frost sensitive."
	PlantUse English contributors. (2019). <i>Arctium lappa</i> (PROSEA). <a href="https://uses.plantnet-project.org/en/Arctium_lappa_(PROSEA)">https://uses.plantnet-project.org/en/Arctium_lappa_(PROSEA)</a> . [Accessed 14 May 2019]	"It tolerates a wide range of climates, and grows from sea-level up to 3200 m altitude. It grows in light to heavy, dry to moist soils, in full sunshine or in the shade."
	Flora of North America. (2019). <i>Arctium lappa</i> . <a href="http://www.efloras.org">http://www.efloras.org</a> . [Accessed 14 May 2019]	[Elevation range of 2200 m, demonstrating environmental versatility] "Waste places, roadsides, fields, forest clearings; 0–2200 m; introduced; Alta., B.C., Man., N.B., Ont., Que., Sask.; Ala., Ariz., Calif., Colo., Conn., Ill., Maine, Mass., Mich., Minn., Nev., N.H., N.Y., N.Dak., Pa., R.I., Utah, Vt., Wash., Wis.; Eurasia."
	Wu, Z. Y., Raven, P. H. & Hong, D. Y., (eds.). 2011. Flora of China Volume 20-21 (Asteraceae). Science Press, Beijing & Missouri Botanical Garden Press, St. Louis	[Elevation range of 2800 m, demonstrating environmental versatility] "Near villages, roadsides, near rivers, wet and waste places, forest margins, thickets, valleys, slopes; 700–3500 m. Throughout China except for Hainan, Taiwan, and Xizang [Afghanistan, Bhutan, India, Japan, Nepal, Pakistan; SW Asia, Europe]."

Qsn #	Question	Answer
204	Native or naturalized in regions with tropical or subtropical climates	y
	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 Eurasia; in Hawai'i sparingly naturalized on O'ahu, Lana'i, and Hawai'i. First collected on Lana'i in 1910 (Rock 8042, BISH)."
	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 14 May 2019]	"Naturalized Australasia AUSTRALIA: Australia (s.e.) Northern America Canada, United States"

Qsn #	Question	Answer
205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Lim, T.K. 2015. Edible Medicinal And Non-Medicinal Plants. Volume 9, Modified Stems, Roots, Bulbs. Springer, Dordrecht	"Burdock is reported to be native to northern Europe to northeast Asia including northern India. It has become naturalised in many parts of the world, growing wild throughout Europe and North America where it is used as folk medicine. The Japanese developed it as an edible vegetable when it was introduced into Japan a thousand years ago. Today, burdock is widely cultivated in Japan, Taiwan and China and also some Southeast Asian countries (in the highlands) mainly for export to Japan."

Qsn #	Question	Answer
301	Naturalized beyond native range	y
	Source(s)	Notes
	Lim, T.K. 2015. Edible Medicinal And Non-Medicinal Plants. Volume 9, Modified Stems, Roots, Bulbs. Springer, Dordrecht	"Burdock is reported to be native to northern Europe to northeast Asia including northern India. It has become naturalised in many parts of the world, growing wild throughout Europe and North America where it is used as folk medicine."
	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 Eurasia; in Hawai'i sparingly naturalized on O'ahu, Lana'i, and Hawai'i. First collected on Lana'i in 1910 (Rock 8042, BISH)."
	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 14 May 2019]	"Naturalized Australasia AUSTRALIA: Australia (s.e.) Northern America Canada, United States"

Qsn #	Question	Answer
302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	PlantUse English contributors. (2019). <i>Arctium lappa</i> (PROSEA). <a href="https://uses.plantnet-project.org/en/Arctium_lappa_(PROSEA)">https://uses.plantnet-project.org/en/Arctium_lappa_(PROSEA)</a> . [Accessed 14 May 2019]	"A. lappa is found in ruderal, neglected locations, along roads and in fields as a weed, along streams and ditches, forest edges and marshlands."

Qsn #	Question	Answer
	Flora of North America. (2019). <i>Arctium lappa</i> . <a href="http://www.efloras.org">http://www.efloras.org</a> . [Accessed 14 May 2019]	"Waste places, roadsides, fields, forest clearings; 0–2200 m"
	WRA Specialist. (2019). Personal Communication	A weed of disturbed areas that may impact agriculture. Also intentionally cultivated for edible roots

303	Agricultural/forestry/horticultural weed	y
	Source(s)	Notes
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. Canadian Journal of Plant Science, 60(2), 621-634	"Although <i>A. minus</i> and <i>A. lappa</i> are both considered unsightly weeds, only <i>A. minus</i> occurs frequently enough to be a serious pest (Moore and Frankton 1974). Neither species is a serious weed in crops since they are controlled by cultivation (Frankton and Mulligan 1970). However, the dry heads cling to the coats of animals and may reduce the value of wool (Steiermark 1963)."
	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 sparingly naturalized on O'ahu, Lana'i, and Hawai'i. First collected on Lana'i in 1910 (Rock 8042, BISH)."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Weed of: Cereals, Grapevines, Orchards & Plantations, Pastures, Vegetables"
	WRA Specialist. (2019). Personal Communication	Minor crop weed in other parts of the world. In the Hawaiian Islands, an intentionally cultivated food crop

304	Environmental weed	n
	Source(s)	Notes
	PlantUse English contributors. (2019). <i>Arctium lappa</i> (PROSEA). <a href="https://uses.plantnet-project.org/en/Arctium_lappa_(PROSEA)">https://uses.plantnet-project.org/en/Arctium_lappa_(PROSEA)</a> . [Accessed 14 May 2019]	" <i>A. lappa</i> is found in ruderal, neglected locations, along roads and in fields as a weed, along streams and ditches, forest edges and marshlands."
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. Canadian Journal of Plant Science, 60(2), 621-634	"Although <i>A. minus</i> and <i>A. lappa</i> are both considered unsightly weeds, only <i>A. minus</i> occurs frequently enough to be a serious pest (Moore and Frankton 1974). Neither species is a serious weed in crops since they are controlled by cultivation (Frankton and Mulligan 1970). However, the dry heads cling to the coats of animals and may reduce the value of wool (Steiermark 1963). Georgia (1931) states that cows are fond of <i>A. minus</i> and the foliage imparts a bitter taste to the milk if eaten in large quantities."
	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 sparingly naturalized on O'ahu, Lana'i, and Hawai'i." [Not an environmental weed in the Hawaiian Islands]
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Weed of: Cereals, Grapevines, Orchards & Plantations, Pastures, Vegetables"

305	Congeneric weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. Canadian Journal of Plant Science, 60(2), 621-634	"Although <i>A. minus</i> and <i>A. lappa</i> are both considered unsightly weeds, only <i>A. minus</i> occurs frequently enough to be a serious pest (Moore and Frankton 1974). Neither species is a serious weed in crops since they are controlled by cultivation (Frankton and Mulligan 1970). However, the dry heads cling to the coats of animals and may reduce the value of wool (Steyermark 1963). Georgia (1931) states that cows are fond of <i>A. minus</i> and the foliage imparts a bitter taste to the milk if eaten in large quantities."

Qsn #	Question	Answer
401	Produces spines, thorns or burrs	y
	Source(s)	Notes
	Lim, T.K. 2015. Edible Medicinal And Non-Medicinal Plants. Volume 9, Modified Stems, Roots, Bulbs. Springer, Dordrecht	"Burdock burr contains minute pointed, barbed bracts that can cause painful and severe ocular discomfort, foreign body sensation, photophobia, marked conjunctival hyperaemia, stringy mucus or even pseudomembranous, conjunctival exudation, eyelid oedema, blepharospasm and pathognomonic abrasions of the corneal epithelium (Havener et al. 1955 ). They reported that a water-soluble glycoside irritant in burdock plant when injected caused severe conjunctival irritations similar to that caused by the embedded bract. Breed and Kuwabara ( 1966 ) reported that burdock bristles when embedded in the conjunctiva, or rarely in the cornea, may evoke a characteristic clinical picture of burdock ophthalmia as described by Havener et al. ( 1955 )."
	Ward, E. (2019). Burr Tongue in Dogs. <a href="https://vcahospitals.com/know-your-pet/burr-tongue-in-dogs">https://vcahospitals.com/know-your-pet/burr-tongue-in-dogs</a> . [Accessed 14 May 2019]	"Burr tongue is the common name for burdock tongue (also called granular stomatitis or granulomatous glossitis) caused by ingestion of the burrs from the burdock plant ( <i>Arctium lappa L.</i> ), a form of thistle. Burdock plants typically bloom in July and August and during these months produce the greatest number of burrs. Burdocks have a prickly head that easily catches on fur or clothing and was the inspiration for Velcro or hook-and-loop fasteners. Burr tongue is most common in the summer months when Burdock plants are blooming. Burr tongue is most commonly seen in long-haired dogs when they accidentally traumatize their tongue and mouth on the burrs during grooming. The hooked scales of the burrs become embedded in the tongue and gums and cause an intense foreign body reaction. Affected dogs often have small red bumps on the tip and edges of their tongue, front of the lips and gums, and occasionally the base of the nose. These bumps may eventually spread and blend together to form larger lesions. In addition, dogs with burr tongue typically have bleeding from the mouth, drooling, trouble keeping food in the mouth while eating, difficulty drinking water, decreased appetite, and pain. These problems can result in behavioural changes, including aggression when an owner tries to look inside the mouth. Some dogs will also have bad breath."
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa L.</i> Canadian Journal of Plant Science, 60(2), 621-634	"inflorescence typically corymbose, sometimes racemose-corymbose on lateral branches; peduncles 3-10 cm; flower heads 3-4 cm diameter between tips of phyllaries, globose in bud, hemispherical and widely open in fruit; outer phyllaries 1 cm long, 1.5 mm at base, green, rarely purplish, glabrous to subglabrous, stiff, spreading, hooked at tip; inner phyllaries tapering to a somewhat straight spine, green or purplish tipped, equaling or exceeding the corollas in length;"

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	Unknown

403	Parasitic	n
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Qsn #	Question	Answer
	<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.	"Plants 1-3 m tall." [Asteraceae. No evidence]

404	Unpalatable to grazing animals	n
	<b>Source(s)</b>	<b>Notes</b>
	Shah, G. M., Jan, U., Bhat, B. A., & Ahangar, F. A. (2009). Diets of Hangul Deer <i>Cervus elaphus hanglu</i> (Cetartiodactyla: Cervidae) in Dachigam National Park, Kashmir, India. <i>Journal of Threatened Taxa</i> , 1(7), 398-400	"Table 2. Species composition of summer diet of Hangul Deer (N = 20)" [Arctium lappa included in diet]
	Sharma, L. K., Charoo, S. A., & Sathyakumar, S. (2010). Habitat use and food habits of Kashmir red deer or hangul ( <i>Cervus elaphus hanglu</i> ) at Dachigam National Park, Kashmir, India. <i>Galemys</i> , 22, 309-329	"TABLE 4 Percent frequency of occurrence and plant types of food items in dung samples (N= 67) of Hangul in Dachigam National Park, April 2007 to June 2009." [Arctium lappa included in diet]
	Smith Thomas, H. (2016). Beating back burdock. Invasive weed species can affect both pasture and profit. <i>Canadian Cattlemen</i> . <a href="https://www.canadiancattlemen.ca/2016/12/06/beating-back-burdock/">https://www.canadiancattlemen.ca/2016/12/06/beating-back-burdock/</a> . [Accessed 14 May 2019]	[Burrs may deter browsing by cattle] "Burdock flowers in late summer, producing a composite seed head that matures by mid-August in southern areas and later in northern climates. Ripe burrs consist of hundreds of tiny hooked slivers, and if these get into an animal's eye they cause severe irritation — especially if caught under an eyelid where they continually scrape the eyeball every time the animal blinks."
	WRA Specialist. (2019). Personal Communication	Browsed by deer, but burrs (hooked outer phyllaries) may deter browsing by cattle

405	Toxic to animals	n
	<b>Source(s)</b>	<b>Notes</b>
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. <i>Canadian Journal of Plant Science</i> , 60(2), 621-634	"Because of its diuretic effects, <i>A. minus</i> has been listed as a poisonous plant (Woodcock 1925)." [No evidence for <i>A. lappa</i> ]
	Quattrocchi, U. 2012. <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	[No evidence] "Plant anticholinergic, antioxidant, antibacterial, antimicrobial, antiproliferative and apoptotic; plant juice applied on boils. Rough leaves rubefacient, for boils. Achene used in common cold, cough, headache, sore throat, acne, itch, psoriasis. Roots diuretic, antiphlogistic, diaphoretic, depurative, alterative, used in psoriasis, skin affections, gout. Veterinary medicine, mastitis, for ruminants."

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

Qsn #	Question	Answer
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa L.</i> Canadian Journal of Plant Science, 60(2), 621-634	"Of the numerous microorganisms that are found on both <i>A. minus</i> and <i>A. Zappa</i> , two are pathogenic to economically important plants: <i>Erysiphe cichoracearum</i> DC. ex Merat (powdery mildew) which affects a variety of cucurbits (species of <i>Cucurbita</i> , <i>Cucumis</i> , <i>Citrillus</i> ) and composites (species of <i>Dahlia</i> , <i>Helianthus</i> , <i>Lactuca</i> , <i>Chrysanthemum</i> ), and <i>Phymatotrichum omnivorum</i> (Shear) Dug. (root rot) which attacks over 1700 plant species, especially cotton and sugar beets (United States Department of Agriculture (USDA) 1953, 1960; Westcott 1971). <i>Meloidogyne</i> species (root-knot nematodes) which attack many cultivated plants, especially legumes, have been reported from <i>A. minus</i> (USDA 1953, 1960). <i>Arctium Lappa</i> serves as host for two strains of cucumber mosaic virus (CMV) (Break and Polak 1966) and <i>Annulus orae</i> , a <i>Nicotiana</i> (tobacco) streak virus (USDA 1960)."
	PlantUse English contributors. (2019). <i>Arctium lappa</i> (PROSEA). <a href="https://uses.plantnet-project.org/en/Arctium_lappa_(PROSEA)">https://uses.plantnet-project.org/en/Arctium_lappa_(PROSEA)</a> . [Accessed 14 May 2019]	"Several important diseases of <i>A. lappa</i> in Japan are caused by: <i>Aspergillus ochraceus</i> , <i>Fusarium oxysporum</i> f. <i>arctii</i> , <i>Erysiphe cichoracearum</i> , <i>Pythium irregulare</i> , <i>Scepticus uniformis</i> , <i>S. griseus</i> , <i>Sclerotinia sclerotiorum</i> , and <i>Sphaerotheca fuliginea</i> . <i>A. lappa</i> is a host for the following viruses: burdock mottle virus (also infecting <i>Chenopodium murale</i> L., <i>C. quinoa</i> L. and <i>Nicotiana rustica</i> L.), burdock mosaic virus, burdock yellow virus (a closterovirus), tobacco ringspot virus (TobRV), burdock stunt disease, and tomato spotted wilt tospovirus. Important insect pests found on <i>A. lappa</i> in Japan are: <i>Tebenna issikii</i> , <i>Pantomorus cervinus</i> (which feeds on the roots), and thrips."

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	Notes
	Lim, T.K. 2015. Edible Medicinal And Non-Medicinal Plants. Volume 9, Modified Stems, Roots, Bulbs. Springer, Dordrecht	[Edible, but may be allergenic to some people] "Burdock root is eaten raw or cooked in a variety of food preparations, and petiole, young leaves and sprouts are also eaten." ... "Sasaki et al. ( 2003 ) reported a case of a 53-yearold Japanese man, with a history of developing urticaria (once after consuming mackerel and 10 times after consuming boiled burdock, carrot, curry and rice), who presented with redness over his entire body and dyspnea 1 hour after eating boiled burdock. The results of the skin prick tests were positive for raw and boiled burdock. Also, contact with the burdock plant could cause allergic contact dermatitis reaction (Rodriquez et al. 1995 ). Allergic skin reactions had also been reported with the use of burdock plasters on the skin."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Lim, T.K. 2015. Edible Medicinal And Non-Medicinal Plants. Volume 9, Modified Stems, Roots, Bulbs. Springer, Dordrecht	"Burdock is a cool climate, temperate crop flourishing best at temperatures of 18–28 °C in full sun and is frost sensitive." ... "A biennial herb growing to 100–300 cm high" [No evidence. Unlikely given habit and habitat]

409	Is a shade tolerant plant at some stage of its life cycle	y
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Lim, T.K. 2015. Edible Medicinal And Non-Medicinal Plants. Volume 9, Modified Stems, Roots, Bulbs. Springer, Dordrecht	"Burdock is a cool climate, temperate crop flourishing best at temperatures of 18–28 °C in full sun and is frost sensitive."
	Plants for a Future. (2019). <i>Arctium lappa</i> . <a href="https://pfaf.org/user/plant.aspx?LatinName=Arctium+lappa">https://pfaf.org/user/plant.aspx?LatinName=Arctium+lappa</a> . [Accessed 14 May 2019]	"It can grow in semi-shade (light woodland) or no shade."
	PlantUse English contributors. (2019). <i>Arctium lappa</i> (PROSEA). <a href="https://uses.plantnet-project.org/en/Arctium_lappa_(PROSEA)">https://uses.plantnet-project.org/en/Arctium_lappa_(PROSEA)</a> . [Accessed 14 May 2019]	"It grows in light to heavy, dry to moist soils, in full sunshine or in the shade."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	<b>Source(s)</b>	<b>Notes</b>
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. Canadian Journal of Plant Science, 60(2), 621-634	" <i>Arctium lappa</i> is found on sandy clay or loam (Moore and Frankton 1974) and in moist lowland meadows (Hawthorn and Hayne 1978). Wiegand and Eames ( 1926) suggest that <i>A. lappa</i> generally is found on more fertile soils than <i>A. minus</i> ."
	Rayner, L. (2002). Growing Food in the Southwest Mountains (3rd Edition). Flagstaff Tea Party, Flagstaff, AZ	"Domesticated burdock root is from Japan. Eaten raw or cooked, it grows in almost any soil. It is usually grown in containers to keep it from becoming invasive."
	Lim, T.K. 2015. Edible Medicinal And Non-Medicinal Plants. Volume 9, Modified Stems, Roots, Bulbs. Springer, Dordrecht	"For quality burdock roots, deep profiled and well-drained sandy loam or fresh, worked soil and well-drained soil rich in humus or nitrogen are preferred. Burdock is responsive to nitrogen fertilisers."

411	Climbing or smothering growth habit	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.	"Plants 1-3 m tall. Leaves usually cordate, basal leaves up to 50 cm long and 30 cm wide, becoming progressively smaller upward, upper surface green and glabrous, lower surface densely white tomentose."

412	Forms dense thickets	n
	<b>Source(s)</b>	<b>Notes</b>
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. Canadian Journal of Plant Science, 60(2), 621-634	[No evidence] "Although <i>A. minus</i> and <i>A. lappa</i> are both considered unsightly weeds, only <i>A. minus</i> occurs frequently enough to be a serious pest (Moore and Frankton 1974). Neither species is a serious weed in crops since they are controlled by cultivation (Frankton and Mulligan 1970)."
	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.	[No evidence] "in Hawai'i sparingly naturalized on O'ahu, Lana'i, and Hawai'i. First collected on Lana'i in 1910 (Rock"

501	Aquatic	n
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y., Raven, P. H. & Hong, D. Y., (eds.). 2011. Flora of China Volume 20-21 (Asteraceae). Science Press, Beijing & Missouri Botanical Garden Press, St. Louis	[Terrestrial] "Herbs to 2 m tall, biennial." ... "Near villages, roadsides, near rivers, wet and waste places, forest margins, thickets, valleys, slopes; 700–3500 m."

502	Grass	n
	<b>Source(s)</b>	<b>Notes</b>
	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 14 May 2019]	Family: Asteraceae (alt.Compositae) Subfamily: Carduoideae Tribe: Cardueae Subtribe: Carduinae

503	Nitrogen fixing woody plant	n
	<b>Source(s)</b>	<b>Notes</b>
	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 14 May 2019]	Family: Asteraceae (alt.Compositae) Subfamily: Carduoideae Tribe: Cardueae Subtribe: Carduinae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y
	<b>Source(s)</b>	<b>Notes</b>
	Lim, T.K. 2015. Edible Medicinal And Non-Medicinal Plants. Volume 9, Modified Stems, Roots, Bulbs. Springer, Dordrecht	"A biennial herb growing to 100–300 cm high (Plate 1 ) with slender, fleshy, tapering roots, which can grow up to 120 cm long and 3–4 cm across."

601	Evidence of substantial reproductive failure in native habitat	n
	<b>Source(s)</b>	<b>Notes</b>
	PlantUse English contributors. (2019). <i>Arctium lappa</i> (PROSEA). <a href="https://uses.plantnet-project.org/en/Arctium_lappa_(PROSEA)">https://uses.plantnet-project.org/en/Arctium_lappa_(PROSEA)</a> . [Accessed 14 May 2019]	"A. lappa is widely distributed and will not easily become endangered. Small germplasm collections are known to exist in Brazil, China, Germany, Poland and the United Kingdom. Breeding programmes on root production are being carried out in Japan."

602	Produces viable seed	y
	<b>Source(s)</b>	<b>Notes</b>
	PlantUse English contributors. (2019). <i>Arctium lappa</i> (PROSEA). <a href="https://uses.plantnet-project.org/en/Arctium_lappa_(PROSEA)">https://uses.plantnet-project.org/en/Arctium_lappa_(PROSEA)</a> . [Accessed 14 May 2019]	"A. lappa is propagated by seed. Seeds germinate at 10-36°C, the optimum temperature being 21-30°C. Germination rate is around 90%. The optimum sowing depth is 2 cm, deeper than 4 cm reduces germination rate considerably. The seeds germinate 3-4 days after sowing. In New Zealand a plant density of 20 plants/m2 is considered optimal for root production."

Qsn #	Question	Answer
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. Canadian Journal of Plant Science, 60(2), 621-634	" <i>Arctium lappa</i> is also a biennial reproducing by seed," ... "A Canadian population of <i>A. Zappa</i> produced $73.2 \pm 3.1$ (SE, n = 171) seeds/head (Hawthorn and Hayne 1978). Relative to <i>A. minus</i> , an increase in the head size of <i>A. Zappa</i> is associated with a decrease in the number of heads/plant to $112 \pm 10$ (SE, n = 10) (Hawthorn and Hayne 1978). <i>Arctium Zappa</i> produced a mean of 8200 seeds/plant with a 95% confidence range of 6500-10 500 (Hawthorn and Hayne 1978)."

603	Hybridizes naturally	y
	Source(s)	Notes
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. Canadian Journal of Plant Science, 60(2), 621-634	"Interspecific hybridization occurs frequently throughout the European range of <i>Arctium</i> (Arenes 1950). In Europe, Arenes (1950) recognized nine interspecific hybrids involving <i>A. Zappa</i> or <i>A. minus</i> (sensu Moore and Frankton 1974); of these only two occur in North America (Moore and Frankton 1974)." ... " <i>Arctium x nothum</i> (Ruhm.) Weiss, a hybrid between <i>A. minus</i> and <i>A. Zappa</i> , is recognized by its large heads (up to 3.5 cm), racemose-corymbose inflorescence and green, glabrous, coarse and spreading involucre. The florets probably do not exceed the inner phyllaries (Moore and Frankton 1974)."

604	Self-compatible or apomictic	
	Source(s)	Notes
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. Canadian Journal of Plant Science, 60(2), 621-634	" <i>Arctium minus</i> is self-compatible (Mulligan and Findlay 1970) and it is likely that <i>A. lappa</i> has a similar potential for self-fertilization (Hawthorn and Hayne 1978)."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. Canadian Journal of Plant Science, 60(2), 621-634	"No specific information is available on the pollination biology of <i>A. lappa</i> . Clapham et al. (1952) state that it is visited by bees and Lepidoptera."
	Wróblewska, A., Stawiarz, E., & Masierowska, M. (2016). Evaluation of Selected Ornamental Asteraceae as a Pollen Source for Urban Bees. Journal of Apicultural Science, 60 (2), 179-192	"When in full bloom, on the florets of both <i>A. lappa</i> and <i>A. tomentosum</i> numerous insects collecting pollen grains were observed, from which they formed dark cream pollen loads. According to Howes (1979), <i>Arctium</i> pollen loads are white coloured. The number of insects visiting the flower heads of both species increased in the afternoon hours, when pollen release intensified. Likewise in <i>Arctium vulgare</i> , the peak of pollen shedding occurs between 12.00 and 14.00 h (Percival, 1955). Pernal and Currie (2001) reported that honey bees collect pollen from <i>A. lappa</i> both in morning and afternoon, and found that the protein content in 100 g of dry weight of unifloral pollen loads from <i>A. lappa</i> reached 17.83%."

606	Reproduction by vegetative fragmentation	n
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. Canadian Journal of Plant Science, 60(2), 621-634	" <i>Arctium lappa</i> is also a biennial reproducing by seed" [No evidence of vegetative spread]

<b>607</b>	<b>Minimum generative time (years)</b>	<b>2</b>
	<b>Source(s)</b>	<b>Notes</b>
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. Canadian Journal of Plant Science, 60(2), 621-634	" <i>Arctium lappa</i> is also a biennial reproducing by seed,"

<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>
	Henkel, A. (1917). Weeds Used in Medicine. Farmers' Bulletin No. 188. U.S. Department of Agriculture, U.S. Department of Agriculture, Washington, D.C.	"The flowers are purple, in small, clustered heads, appearing in the second year, from July to frost. These flower beads are armed with hooked tips, and the burs thus formed are a great pest, attaching themselves to clothing and to the wool and hair of animals."
	Flora of North America. (2019). <i>Arctium lappa</i> . <a href="http://www.efloras.org">http://www.efloras.org</a> . [Accessed ]	"Waste places, roadsides, fields, forest clearings; 0–2200 m" [Grows in heavily-trafficked areas]
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. Canadian Journal of Plant Science, 60(2), 621-634	"Widespread dispersal of <i>Arctium</i> propagules may occur by means of specialized outer phyllaries which are modified to strong hooks at the tip (Fig. 1), making the mature inflorescences efficient at clinging to the fur of animals and the clothing of humans."

<b>702</b>	<b>Propagules dispersed intentionally by people</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Most of the gobo sold in local markets is imported to Hawai'i from Japan or the U.S. mainland, but limited quantities, are produced near Kamuela on the Big Island and on the Wai'anae coast of O'ahu; it was formerly grown in Manoa, Pauoa, and Palolo Valleys on Oahu."
	Lim, T.K. 2015. Edible Medicinal And Non-Medicinal Plants. Volume 9, Modified Stems, Roots, Bulbs. Springer, Dordrecht	"Today, burdock is widely cultivated in Japan, Taiwan and China and also some Southeast Asian countries (in the highlands) mainly for export to Japan."

<b>703</b>	<b>Propagules likely to disperse as a produce contaminant</b>	<b>y</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	"Major Pathway/s: Contaminant, Crop, Herbal, Ornamental"
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. Canadian Journal of Plant Science, 60(2), 621-634	"the dry heads cling to the coats of animals and may reduce the value of wool (Steyermark 1963)."

Qsn #	Question	Answer
	Smith Thomas, H. (2016). Beating back burdock. Invasive weed species can affect both pasture and profit. Canadian Cattlemen. <a href="https://www.canadiancattlemen.ca/2016/12/06/beating-back-burdock/">https://www.canadiancattlemen.ca/2016/12/06/beating-back-burdock/</a> . [Accessed 14 May 2019]	"The first year, it merely grows leaves and accumulates food reserves in its roots, like a carrot. The second it grows a long, deep taproot, and a tall stalk, producing flowers that become burrs that spread the seed by latching onto the hair of livestock and other animals or in baled hay or straw."

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa L.</i> Canadian Journal of Plant Science, 60(2), 621-634	"The hooked outer phyllaries facilitate animal (including human) dispersal of the heads. Heads may also be transported by water."

705	Propagules water dispersed	y
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Animals, Flyers, Cattle, Livestock, Sheep, Water, Escapee"
	Benvenuti, S. (2007). Weed seed movement and dispersal strategies in the agricultural environment. Weed Biology and Management, 7(3), 141-157	"Table 2. Prevalent dispersal strategies of some weed species" [Arctium lappa - Dispersal strategy = Bar/Epi; Bar, barochory; Epi, epizoochory]
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa L.</i> Canadian Journal of Plant Science, 60(2), 621-634	"The hooked outer phyllaries facilitate animal (including human) dispersal of the heads. Heads may also be transported by water."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa L.</i> Canadian Journal of Plant Science, 60(2), 621-634	"It is hypothesized that the bristles prevent predation of the seeds by mammalian and avian predators. Barton and Castle (1877) cite bird predation on seeds, but we have not observed any in the field."
	Benvenuti, S. (2007). Weed seed movement and dispersal strategies in the agricultural environment. Weed Biology and Management, 7(3), 141-157	"Table 2. Prevalent dispersal strategies of some weed species" [Arctium lappa - Dispersal strategy = Bar/Epi; Bar, barochory; Epi, epizoochory]

707	Propagules dispersed by other animals (externally)	y
	Source(s)	Notes
	Haghighi, M., & Mozafariyan, M. (2011). The introduction of extinct endemic vegetables of Iran. Journal of Medicinal Plants Research, 5(33), 7085-7107	"Greater Burdock is rather tall, reaching as much as 2 m. It has large, alternating, cordiform leaves that have a long petiole and are pubescent on the underside. The flowers are purple and grouped in globular capitula, united in clusters. They appear in mid-summer, from July to September. The capitula are surrounded by an involucre made out of many bracts, each curving to form a hook, allowing them to be carried long distances on the fur of animals."

Qsn #	Question	Answer
	Henkel, A. (1917). Weeds Used in Medicine. Farmers' Bulletin No. 188. U.S. Department of Agriculture, U.S. Department of Agriculture, Washington, D.C.	"The flowers are purple, in small, clustered heads, appearing in the second year, from July to frost. These flower beads are armed with hooked tips, and the burs thus formed are a great pest, attaching themselves to clothing and to the wool and hair of animals."
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. Canadian Journal of Plant Science, 60(2), 621-634	"Widespread dispersal of <i>Arctium</i> propagules may occur by means of specialized outer phyllaries which are modified to strong hooks at the tip (Fig. 1), making the mature inflorescences efficient at clinging to the fur of animals and the clothing of humans. With dispersal determined by inflorescence morphology, the pappus has become modified into irritating, stiff, deciduous bristles."

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Mouissie, A., Van Der Veen, C. E., Veen, G. C., & Van Diggelen, R. (2005). Ecological correlates of seed survival after ingestion by fallow deer. <i>Functional Ecology</i> , 19(2): 284-290	"The only species of which no seedlings were recorded in the deer droppings was <i>Arctium lappa</i> ."
	Benvenuti, S. (2007). Weed seed movement and dispersal strategies in the agricultural environment. <i>Weed Biology and Management</i> , 7(3), 141-157	[Dispersed externally and by water] "Table 2. Prevalent dispersal strategies of some weed species" [ <i>Arctium lappa</i> - Dispersal strategy = Bar/Epi; Bar, barochory; Epi, epizoochory]

801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes
	Henkel, A. (1917). Weeds Used in Medicine. Farmers' Bulletin No. 188. U.S. Department of Agriculture, U.S. Department of Agriculture, Washington, D.C.	"The seed of burdock is produced in great abundance, one plant bearing as many as 400,000 seeds."
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. Canadian Journal of Plant Science, 60(2), 621-634	[Prolific seeder, but not in excess of 1000/m2] "Soil seed populations (seed bank) appear to be small and patchy. In areas 5-10 m adjacent to some Waterloo, Ontario populations of <i>A. minus</i> and <i>A. lappa</i> , there were found 435-558 viable seeds/m2 of <i>A. minus</i> and 838 seeds/m2 of <i>A. lappa</i> ."

802	Evidence that a persistent propagule bank is formed (>1 yr)	y
	Source(s)	Notes
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa</i> L. Canadian Journal of Plant Science, 60(2), 621-634	" <i>Arctium lappa</i> seeds were used in the Duvel buried seed experiment where they had 29% and 17% germination after 21 yr at depths of 22 ( 56 cm) and 42 ( 107 cm) inches , respectively. After 39 yr at 42-inch depth, 1 % germination was obtained (Toole and Brown 1946)."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Seed Longevity: Long Term"

803	Well controlled by herbicides	y
	Source(s)	Notes

Qsn #	Question	Answer
	Gross, R. S., Werner, P. A., & Hawthorn, W. R. (1980). The biology of Canadian weeds. 38. <i>Arctium minus</i> (Hill) Bernh. and <i>A. lappa L.</i> Canadian Journal of Plant Science, 60(2), 621-634	[Certain herbicides are effective] " <i>Arctium lappa</i> is susceptible to pichloram, chlorthiamide, dichlobenil and moderately susceptible to boric acid and sodium chlorate (Fryer and Makepeace 1970). It is moderately resistant to bromacil, MCPA-salt, 2,4-D-amine and resistant to simazine, atrazine, monuron, and diuron (Fryer and Makepeace 1970; Dunham 1970)."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	<b>Source(s)</b>	<b>Notes</b>
	Smith Thomas, H. (2016). Beating back burdock. Invasive weed species can affect both pasture and profit. Canadian Cattlemen. <a href="https://www.canadiancattlemen.ca/2016/12/06/beating-back-burdock/">https://www.canadiancattlemen.ca/2016/12/06/beating-back-burdock/</a> . [Accessed 14 May 2019]	"Chopping is also effective, but you must do it at the right time or the plant will regrow from the root. "The best time to chop it is after the stalk is budding but before burrs are ripe. At that point the food reserves are so low in the root that it cannot regrow," says Morishita."
	Tu, M., Hurd, C., & Randall, J. M. (2001). Weed control methods handbook: tools & techniques for use in natural areas. The Nature Conservancy	"The stabbing of root corms has also been an effective control technique for large (two yr old) plants of burdock ( <i>Arctium lappa</i> ) and wild parsnip ( <i>Pastinaca sativa</i> ) in Illinois and Wyoming (W. Kleiman, pers. comm.)."
	WRA Specialist. (2019). Personal Communication	Mechanical control can be effective if conducted at the appropriate stage of growth

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	<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.	[Unknown] "in Hawai'i sparingly naturalized on O'ahu, Lana'i, and Hawai'i. First collected on Lana'i in 1910 (Rock 8042, BISH)."

**Summary of Risk Traits:**

## High Risk / Undesirable Traits

- Broad climate suitability, and elevation range exceeds 1000 m, demonstrating environmental versatility
- Naturalized in regions with tropical climates
- Naturalized on Oahu, Lanai, and Hawaii (Hawaiian Islands) as well as North America and Australia
- A weed of disturbed areas and certain crops
- Other *Arctium* species are invasive
- Pointed, barbed bracts may harm eyes of animals, or tongues of dogs grooming themselves with the burrs stuck in their fur
- Host of crop pathogens
- Shade tolerant
- Tolerates many soil types
- Reproduces by seeds, and may be able to regenerate from large, tuberous root
- Hybridizes with other *Arctium* species
- Reaches maturity in two years (biennial)
- Hooked outer phyllaries (bracts) facilitate animal (including human) dispersal of the heads. Heads may also be transported by water
- Seeds also dispersed as a produce contaminant
- Seeds may form a persistent seed bank (21+ years)
- May be able to resprout from roots if not completely removed

## Low Risk Traits

- A domesticated plant, long cultivated as a food crop. Harvesting prior to flowering minimizes risk of invasiveness
- Palatable to deer, and possibly other browsing animals, but burrs may deter browsing
- Herbicides may provide effective control