Taxon: Taraxacum officinale F. H. Wigg. **Family:** Asteraceae

Common Name(s): common dandelion
dandelion
laulele

Synonym(s): Leontodon taraxacum L.
Taraxacum dens-leonis Desf.
Taraxacum vulgare Schrank

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 2 Mar 2016

WRA Score: 20.0 **Designation:** H(HPWRA) **Rating:** High Risk

Keywords: Taprooted Herb, Agricultural Weed, Edible, Apomictic, Wind-Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	Intermediate
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	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	n=0, y = 1*multiplier (see Appendix 2)	y
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	y
304	Environmental weed		
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	y
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	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	y=1, n=-1	y
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	y
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	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	y
704	Propagules adapted to wind dispersal	y=1, n=-1	y
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	y=1, n=-1	y
801	Prolific seed production (>1000/m2)	y=1, n=-1	y
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**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Long history of association with humans, but no evidence of domestication] "Many botanists believe that T. officinale complex originated in Greece, or perhaps the northern Himalayas, and spread across temperate areas to Europe and Asia Minor (Richards, 1973; Schmidt, 1979; Gail, 1994). T. officinale has a fossil record that goes back to glacial and interglacial times in Europe (Godwin, 1956) and it is thought to have colonized the Americas post-Pleistocene via Beringia (Richards, 1973). Later introductions of T. officinale to North America are obscured in conflicting claims (Gail, 1994). The earliest claim is that it arrived on the east coast with the Vikings about 1000 AD; others say it first came on the Mayflower; while others claim the introduction was by later settlers who brought it as a garden plant or a pot herb for medicinal purposes (Schmidt, 1979; Jackson, 1982; Gail, 1994). The earliest recorded observation of T. officinale in North America was in the New England area in 1672 (Rousseau, 1968). The Cree, Digger, Apache and Mohican Indians soon became aware of its virtues and used it as a medicinal herb (Jackson, 1982; Dalby, 1999). It is likely that there have been multiple introductions from many sources (Gail, 1994). The plant is thought to have spread to the west coast with loggers and settlers (Schmidt, 1979)."

102	Has the species become naturalized where grown?	
	Source(s)	**Notes**
	WRA Specialist. 2016. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	**Notes**
	WRA Specialist. 2016. Personal Communication	NA

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	Intermediate
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"T. officinale complex can tolerate a broad range of climatic conditions (Simon et al., 1996) and is distributed in almost every temperate and subtropical region of the world (Holm et al., 1997)."

Qsn #	Question	Answer
202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	

203	**Broad climate suitability (environmental versatility)**	**y**
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"T. officinale complex can tolerate a broad range of climatic conditions (Simon et al., 1996) and is distributed in almost every temperate and subtropical region of the world (Holm et al., 1997). All members of the group compete by colonizing gaps in grasslands and other communities by seed. In cultivated or open ground, it is tolerant of a very wide range of conditions, from 90 to 2780 mm annual precipitation and 4.3 to 26.6°C average annual temperature." ... "It may grow at sea level or up to an elevation of 6000 m, where it can be found in association with subalpine or alpine native Taraxacum species (Longyear, 1918; Holm et al., 1997)."

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.	"in Hawai'i naturalized in lawns and at higher elevations in usually wet, disturbed habitats, on Kaua'i, O'ahu, Uina'i, Maui, and Hawai'i. First collected on O'ahu in 1909 (Forbes 1228, BISH) and also on Maui in 1909 (Brigham et al. s.n., BISH).-"
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"It has been introduced to virtually every other region and country in the world and can be found in arctic to subarctic and alpine to subalpine zones in North and South America; and in montane to alpine zones in New Zealand and Australia, wet and seasonal tropics and oceanic islands. "

205	**Does the species have a history of repeated introductions outside its natural range?**	**y**
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"It has been introduced to virtually every other region and country in the world and can be found in arctic to subarctic and alpine to subalpine zones in North and South America; and in montane to alpine zones in New Zealand and Australia, wet and seasonal tropics and oceanic islands. "

301	**Naturalized beyond native range**	**y**
	Source(s)	**Notes**

Qsn #	Question	Answer
	Oppenheimer, Hank L. 2003. New plant records from Maui and Hawai'i Counties. Bishop Museum Occasional Papers. 73: 3-30	"Common dandelion was known to be naturalized on Kaua'i, O'ahu, Läna'i, Maui, and Hawai'i (Wagner et al., 1990: 361). On Moloka'i, it was noted to be locally common but not widespread. Material examined: MOLOKA'I: Kualapu'u, 370 m, roadside weed near road to golf course, 18 Nov 2001, Oppenheimer H110128."
	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 naturalized in lawns and at higher elevations in usually wet, disturbed habitats, on Kaua'i, O'ahu, Lana'i, Maui, and Hawai'i. First collected on O'ahu in 1909 (Forbes 1228, BISH) and also on Maui in 1909 (Brigham et al. s.n., BISH).-"
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 2 Mar 2016]	"Naturalized: Africa East Tropical Africa: Kenya; Tanzania Northeast Tropical Africa: Eritrea; Ethiopia South Tropical Africa: Mozambique; Zambia; Zimbabwe Southern Africa: Lesotho; Namibia; South Africa; Swaziland West Tropical Africa: Ghana West-Central Tropical Africa: Burundi; Cameroon; Rwanda; Zaire Western Indian Ocean: Madagascar; Mauritius; Reunion Asia-Temperate Arabian Peninsula: Yemen China: China Eastern Asia: Japan; Korea Western Asia: Cyprus Asia-Tropical Indian Subcontinent: Nepal Indo-China: Vietnam Malesia: Indonesia; Philippines Australasia Australia: Australia New Zealand: New Zealand Northern America Eastern Canada: Canada - New Brunswick, - Newfoundland, - Nova Scotia, - Ontario, - Prince Edward Island, - Quebec; St. Pierre and Miquelon North-Central U.S.A.: United States - Kansas, - Minnesota, - Missouri, - North Dakota, - Oklahoma, - South Dakota, - Wisconsin Northeastern U.S.A.: United States - Connecticut, - Maine, - Massachusetts, - Michigan, - New Hampshire, - New Jersey, - New York, - Ohio, - Pennsylvania, - Rhode Island, - Vermont, - West Virginia Northern Mexico: Mexico - Baja Norte, - Chihuahua, - Coahuila, - Durango, - Nuevo Leon, - San Luis Potosi, - Tamaulipas Northwestern U.S.A.: United States - Colorado, - Montana, - Oregon, - Washington, - Wyoming South-Central U.S.A.: United States - New Mexico, - Texas Southeastern U.S.A.: United States - Alabama, - Arkansas, - Delaware, - District of Columbia, - Florida, - Georgia, - Kentucky, - Louisiana, - Maryland, - Mississippi, - North Carolina, - South Carolina, - Tennessee, - Virginia Southern Mexico: Mexico - Aguascalientes, - Chiapas, - Federal District, - Guanajuato, - Guerrero, - Hidalgo, - Jalisco, - Mexico, - Michoacan, - Morelos, - Oaxaca, - Puebla, - Queretaro, - Tlaxcala, - Veracruz Southwestern U.S.A.: United States - Arizona, - California, - Utah

		Subarctic America: Canada - Northwest Territory; Greenland; United States - Alaska Western Canada: Canada - Alberta, - British Columbia, - Manitoba, - Nunavut, - Saskatchewan Pacific North-Central Pacific: United States - Hawaii South-Central Pacific: French Polynesia Southwestern Pacific: Fiji; New Caledonia; Niue; Tonga Southern America Brazil: Brazil Caribbean: Bahamas; Cuba; Hispaniola; Jamaica; Puerto Rico Mesoamerica: Guatemala; Honduras; Panama Northern South America: Venezuela Southern South America: Argentina; Chile; Paraguay; Uruguay Western South America: Ecuador; Peru"

302	**Garden/amenity/disturbance weed**	**y**
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[A disturbance & amenity weed with detrimental impacts on agriculture] "It prefers disturbed ground (Witty and Bing, 1985; Lovell and Rowan, 1991; Hamill, 1997; Holm et al., 1997) and, in fact, in undisturbed communities, a plant may not flower until its fourth season (Gorchakovskii and Abramchuk, 1996)." ... "It is mostly an annoying weed of gardens and amenity grasslands, frequently found in urban and anthropogenic sites, and municipalities spend considerable amounts on pesticides for its control on public property (Surgeoner and Roberts, 1992; Schnick et al, 2002)." ... "In lawns, golf courses, municipal parks, athletic fields and gardens, T. officinale complex plants are an aesthetic problem during flowering and seed production periods, interrupting turfgrass uniformity and density (Riddle et al., 1991; Holm et al., 1997)."

303	**Agricultural/forestry/horticultural weed**	**y**
	Source(s)	**Notes**

Qsn #	Question	Answer
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Taraxacum officinale complex is a widespread weed of pastures and forage, orchards, agricultural and horticultural crops, and turf and lawn systems, where it can be damaging to high grade sports turf (Raikes et al., 1994). It is discouraged by tillage, so that it is becoming more prevalent in non-intervention systems with direct drilling (Rioux, 1994). It is an increasing problem in annual cereal and oilseed crops in western Canada (Derksen and Thomas, 1997), and was ranked the sixth most important weed occurring in corn, soybean and winter wheat fields in southwestern Ontario, Canada being found in more than 25% of 593 fields examined (Frick and Thomas, 1992). It was the sixth most abundant weed species in reduced and no tillage fields and the tenth most abundant species in conventionally tilled fields (Frick and Thomas, 1992). However, the brilliantly coloured inflorescences can give fields a weedier appearance than is really the case (Holm et al., 1997). In the USA, corn yields were drastically reduced by T. officinale complex, especially when the previous crop was corn rather than soybeans (Hartwig, 1990). It has also been reported as one of the most dominant weed species in wheat fields in Pakistan (Ahmad, 1993). It can compete seriously with seed-grown forb crops, notably lucerne in North America, and to a lesser extent beet, oilseed rape, lettuce, soyabean and other beans (Phaseolus spp.) although it may invade areas of winter kill rather than directly causing crop thinning (Rioux and Legere, 1992)."

304	Environmental weed	
	Source(s)	**Notes**
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). 1983. Handbook of Hawaiian Weeds. University of Hawaii Press, Honolulu, HI	"Found in moderately moist regions from 1,000 to 4,000 feet. A weed in lawns, pastures, and cultivated areas."
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"It is mostly an annoying weed of gardens and amenity grasslands, frequently found in urban and anthropogenic sites, and municipalities spend considerable amounts on pesticides for its control on public property (Surgeoner and Roberts, 1992; Schnick et al, 2002)."
	Queensland Government. 2011. Weeds of Australia - Taraxacum officinale. http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/html/Taraxacum_officinale.htm. [Accessed 2 Mar 2016]	[Potentially. Impacts unspecified] "Dandelion (Taraxacum officinale) is commonly a weed of habitation and agricultural areas, but also invades natural vegetation in the temperate regions of Australia. It is regarded as an environmental weed in Victoria, New South Wales, South Australia, Tasmania and Western Australia. This species is most problematic in alpine and sub-alpine vegetation in the cooler temperate regions of south-eastern Australia."

305	Congeneric weed	y
	Source(s)	**Notes**
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	Several species are listed as weeds. Of note are Taraxacum erythrospermum, Taraxacum laevigatum, & Taraxacum laevigatum

Qsn #	Question	Answer
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.	[No evidence] "Leaves oblanceolate, 6--40 cm long, 0.7- 15 cm wide, ± runcinate-pinnatifid or lobed, the terminal lobe usually larger than the others, usually sparsely pubescent on lower surface and midrib, otherwise glabrous."

402	**Allelopathic**	**y**
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"T. officinale complex possesses allelopathic properties that can reduce germination and growth of other plant species (Dwyer, 1977; Jackson, 1982; Falkowski et al., 1990). In addition, phenolic compounds produced by T. officinale complex are considered responsible for biological control of Fusarium oxysporum f.sp. radicis-lycopersici in greenhouse tomato plantings in Canadian experiments (Kasenberg and Traquair, 1988). Satisfactory control of this pathogen was achieved when residues of T. officinale complex were incorporated into sterilized greenhouse soil. The mode of action is unknown but it may act directly by secretion of allelochemicals or promotion of antagonistic microflora (Jarvis, 1989). T. officinale complex leaves are capable of producing an anti-fungal toxin called lettucenin A (Mizutani, 1989). It is a stress-induced antifungal sesquiterpenoid that is present in sufficient quantity in dandelion to suppress invasion of a pathogen in vivo (Hanawa et al., 1994). It was found that lettucenin A production started at an early stage of fungal infection, before the appearance of symptoms, and ended soon after the death of the pathogen (Hanawa et al., 1994)."

403	**Parasitic**	**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.	"Taprooted perennial or biennial herbs with milky sap." [Asteraceae. No evidence]

404	**Unpalatable to grazing animals**	**n**
	Source(s)	**Notes**

Qsn #	Question	Answer
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Taraxacum is palatable and nutritious to a wide range of polyphagous herbivores, both vertebrate and invertebrate, but hosts few oligophagous specialists. It recovers well from heavy browsing both above and below ground. Mammals, including both domestic and wild animals eat the leaves and seeds (Ellison and Aldous, 1952; Powell, 1972; Angier, 1980; Jackson, 1982; Swihart, 1990; Curtis et al., 2002). Birds commonly eat the seeds, leaves and inflorescences (Longyear, 1918; Eckert et al., 1973; Angier, 1980; Jackson, 1982). Insects such as wasps (Paquette et al., 1993; Bagatto et al., 1996), midges (Neuer-Markmann and Beiderbeck, 1990; Peschken et al., 1993), mites (Iraola-Calvo et al., 1999), aphids (Wood Baker, 1979; Gange and Brown, 1991; Kaakeh and Hogmire, 1991; Sugimoto and Takahashi, 1996), weevils (McAvoy et al., 1983; Masaki et al., 1984; Galford, 1987; Gange et al., 1994), caterpillars (Dethier, 1993; Dussourd and Denno, 1994), leafhoppers (Lamp et al., 1984), beetles (Schütte and Hauss, 1985; Keller, 1986; Leal et al., 1994; Crutchfield and Potter, 1995; Hoshikawa, 1995; Schütte, 1996) and several others (Petanovic, 1990; Jacobs et al., 1992; Fox and Caldwell, 1994; Jacob and Evans, 2000) attack various parts of the plant. Taraxacum officinale complex also acts as a host of several nematodes (Anon., 1960; Conners, 1967; Georgi, 1988a; b; Romanenko and Korchinsky, 1996) and other non-vertebrates including slugs (Hanley et al., 1995; Frank and Friedli, 1999) and snails (Desbuquois and Daguzan, 1995)."

405	Toxic to animals	n
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"T. officinale complex is quite a nutritious forage (Dutt et al., 1982; Marten et al., 1987; Wilman and Riley, 1993) It is an excellent pasture feed for dairy cattle, improving milk flow and quality (Jackson, 1982) and has been cited as a cure for catarrh in livestock (Kostuch and Kopec, 1997). It contains carotenoids, vitamins A, C and D, polysaccharides, organic acids, proteins, sugars, pectin, choline and minerals, especially K (Neamtu et al., 1992), andhas only trace amounts of essential oils and a low amount of tannin that might affect quality or palatability (Falkowski et al., 1990). The plant can contain as much protein as white clover (Bockholt et al., 1995) and is a valuable feed, based on its fat and carbohydrate content (Spatz and Baumgartner, 1990). Bergen et al. (1990) found that T. officinale complex had protein and mineral contents high enough to exceed the established requirements for cattle, and that cattle consumed dandelion as readily as, or sometimes in preference to, grass pasture. However, Falkowski et al. (1990) reported that it was not eaten readily by most domestic animals because of its bitterness."

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

Qsn #	Question	Answer
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Taraxacum officinale complex provides an alternative host to several important viruses, so that weeds can act as a reservoir and contagion for insect- and nematode-borne disease. These include tomato ring spot virus, spread by Xiphinema americanum (Mountain et al., 1992; Ramsdell et al., 1993 and many earlier reports); tomato spotted wilt virus and cucumber mosaic cucumovirus which infect many agricultural, ornamental and greenhouse crops (Murphy et al., 1999; Groves et al., 2002); beet western yellows virus in Brassica napa (Polák and Májková, 1992); beet pseudo-yellows virus in Cucumis melo (Soria et al., 1991); dandelion virus with many potential hosts (Dijkstra et al., 1985); lettuce mosaic virus in Iraq (Shawkat et al., 1982); dandelion yellow mosaic virus in lettuce (Bos et al., 1983); lettuce pseudoyellows virus, which infects Lactuca sativa and Cucumis sativus (van Dorst et al., 1980) and cherry rasp leaf virus (Hansen et al., 1974). It may also act as an alternative host for boll weevils (Haynes and Smith, 1992), cabbage looper, yellow-striped armyworm (Dussourd and Denno, 1994), green peach aphid (Kaakeh and Hogmire, 1991), larvae of the apple moth pest Lacanobia subjuncta (Landolt, 2002), Pseudomonas viridiflava, which causes bacterial streak and bulb rot of onion (Gitaitis et al., 1998), and other microorganisms (refer to Natural Enemies table)."

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Potentially] "Taraxacum officinale complex is used as a medicinal plant (see section on Uses), however, overindulgence may render the liver inactive and cause various unpleasant symptoms (Jackson, 1982). The pollen of T. officinale complex has been identified as an allergen in honey (Helbling and Wuethrich, 1987) and can cause allergic contact and photoallergic contact dermatitis (Mark et al., 1999)." ... "T. officinale complex is commonly used as a salad green (Gao, 1995; Letchamo and Gosselin, 1995)."

408	Creates a fire hazard in natural ecosystems	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.	[No evidence. Presumably does not contribute to fuel load & does not generally occur in fire prone habitats] "in Hawai'i naturalized in lawns and at higher elevations in usually wet, disturbed habitats"
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	No evidence

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"It shows a wide range of adaptability to light, being able to grow vigorously in full sunlight, or in diffused light in the shade of trees or buildings (Longyear, 1918)."

Qsn #	Question	Answer
410	**Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)**	**y**
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"It can grow in a wide range of soils (Simon et al., 1996) but it flourishes best in moist, good quality loam (Jackson, 1982). Soil moisture determines its local distribution, with well-watered areas of lawns being especially favourable for its growth (Longyear, 1918). However, it has been recorded pushing up through concrete, hanging from eavestroughs of houses, and growing from cracks in old stone walls (Jackson, 1982)." ... " It grows in soils ranging in pH of 4.2-8.2 (Holm et al., 1997). It can tolerate moderate salinity and can occur in submaritime sites and on the bare verges of salted roadside verges in Europe and the USA. It also shows differential tolerance of heavy metals (Zhuikova et al., 1999). It has been shown to respond positively to K (Tilman et al., 1999), P (Zaprzalka and Peters, 1982) and N (Lihan and Jezikova, 1991) and negatively to Na and Mg (Panak et al., 1991) in the soil."

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.	"Taprooted perennial or biennial herbs with milky sap."

412	Forms dense thickets	n
	Source(s)	**Notes**
	Stewart-Wade, S. M., Neumann, S., Collins, L. L., & Boland, G. J. (2002). The biology of Canadian weeds. 117. Taraxacum officinale GH Weber ex Wiggers. Canadian Journal of Plant Science, 82(4), 825-853	[Not reported to form monotypic cover] "When present in dense populations, T. officinale can cause slower drying of hay because of its high water content, and can be a potential seed source for other parts of the farm (Tardif 1997)."

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 herb] "now a cosmopolitan weed of temperate climates; in Hawai'i naturalized in lawns and at higher elevations in usually wet, disturbed habitats, on Kaua'i, O'ahu, Uina'i, Maui, and Hawai'i."

502	Grass	n
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 2 Mar 2016]	"Family: Asteraceae (alt.Compositae) Subfamily: Cichorioideae Tribe: Cichorieae Subtribe: Crepidinae"

503	Nitrogen fixing woody plant	n

Qsn #	Question	Answer
	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.	"Taprooted perennial or biennial herbs with milky sap." [Asteraceae]

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.	"Taprooted perennial or biennial herbs with milky sap."

601	**Evidence of substantial reproductive failure in native habitat**	**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.	[No evidence] "Native to Eurasia, now a cosmopolitan weed of temperate climates"

602	**Produces viable seed**	**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.	"Achenes pale gray or yellow at maturity, the body 3-4 mm long, the beak 2.5-4 times as long as the body."
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Although stamens and pistils are present and pollen is produced regularly, the seed of T. officinale complex develops without fertilization (Roberts, 1936). Originally, it was thought that seeds were primarily produced by allogamy, and insects such as honeybees and flies were pollinators (Longyear, 1918). However, it has been suggested by UK investigators that insect visitors, attracted by the bright yellow inflorescences, may be needed to trigger seed set (Williams et al., 1996)."

Qsn #	Question	Answer
603	**Hybridizes naturally**	**y**
	Source(s)	**Notes**
	Stewart-Wade, S. M., Neumann, S., Collins, L. L., & Boland, G. J. (2002). The biology of Canadian weeds. 117. Taraxacum officinale GH Weber ex Wiggers. Canadian Journal of Plant Science, 82(4), 825-853	"Although sexual reproduction is rare or absent in North America (Solbrig and Simpson 1974), natural hybrids have been reported to occur between T. officinale and T. platycarpum in Japan (Watanabe et al. 1997). More than 90% of the plants classified as T. officinale had alleles introduced from T. platycarpum and were morphologically intermediate between the two species with respect to the number of marginal hairs in the outer involucral bract, the length of corniculate appendages on the outer involucral bract, and the size of the seed (Watanabe et al. 1997)."
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Taraxacum officinale complex has been reported to compete and hybridize with native Taraxacum species (Watanabe et al., 1997). Also, it has been documented as a weed in national parks in the USA and Canada (Tyser and Worley, 1992; Stewart-Wade et al., 2002)."

604	Self-compatible or apomictic	y
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"As T. officinale complex is an apomict (the embryo develops without fertilization) and a triploid of hybrid origin, most pollen grains are abortive and sterile, and cannot form pollen tubes (Solbrig, 1971; Jenniskens, 1984)."

605	Requires specialist pollinators	n
	Source(s)	**Notes**
	Stewart-Wade, S. M., Neumann, S., Collins, L. L., & Boland, G. J. (2002). The biology of Canadian weeds. 117. Taraxacum officinale GH Weber ex Wiggers. Canadian Journal of Plant Science, 82(4), 825-853	[Flies & bees may trigger seed set] "As T. officinale is an apomict (the embryo develops without fertilization) and a triploid of hybrid origin, most pollen grains are abortive and sterile, and cannot form pollen tubes (Solbrig 1971; Jenniskens 1984)." ... "Originally, it was thought that seeds were primarily produced by allogamy, and insects such as honeybees and flies were pollinators (Longyear 1918). However, it has been suggested by UK investigators that insect visitors, attracted by the bright yellow inflorescences, may be needed to trigger seed set (Williams et al. 1996)."

606	Reproduction by vegetative fragmentation	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Potentially from root fragments] "Vegetative growth is limited to the formation of multi-rosette clumps and root fragmentation. The regenerative capacity of T. officinale complex roots has been examined by Naylor (1941) and Khan (1973). Vegetative propagule weight was positively correlated to establishment success (Bostock and Benton, 1983). Root segments that were 1.25 mm in diameter had to be at least 6-10 mm in length to regenerate, and segments as short as 2 mm could regenerate only if they were more than 4 mm in diameter (Warmke and Warmke, 1950). The minimum length for shoot regeneration was 1.5 mm and for root regeneration 2 mm (Khan, 1969). More shoots and roots regenerated from longer root segments than from shorter ones (Khan, 1969). Regenerative capacity decreased as fragment volume decreased (down the length of the root) (Mann and Cavers, 1979). Planting cuttings in an inverted or horizontal plane, rather than the normal planting orientation resulted in a decline in regeneration and survival, and an increase in regeneration time (Mann and Cavers, 1979)." ... "T. officinale complex can also be dispersed by tillage with a plough or disc, because of its ability to regenerate vegetatively from root sections (von Hofsten 1954). "

607	Minimum generative time (years)	2
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Sometimes 1, but normally 2 years] "Generally, during the first season of growth, T. officinale complex seedlings produce only leaves, usually in rosettes (Longyear, 1918). In the spring of the second season, and each season thereafter, inflorescences are produced (Longyear, 1918). However, under favourable conditions, some seedlings can bloom in their first year (von Hofsten, 1954; Listowski and Jackowska, 1965)." ... "The time of first flowering is partly dependent on the surrounding plant community and, in undisturbed communities, a plant may not flower until its fourth season (Gorchakovskii and Abramchuk, 1996)."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	**Notes**
	Stewart-Wade, S. M., Neumann, S., Collins, L. L., & Boland, G. J. (2002). The biology of Canadian weeds. 117. Taraxacum officinale GH Weber ex Wiggers. Canadian Journal of Plant Science, 82(4), 825-853	"After flowering, T. officinale scapes elongate significantly, allowing enhanced wind dispersal of seeds (Radosevich and Holt 1984). The seeds have pappi that further aid in dispersal by wind (Lovell and Rowan 1991)." ... "Seeds are also dispersed in the excreta of animals such as cattle, horses and birds (Salisbury 1961), and by water, especially via irrigation ditches (Salisbury 1961; Radosevich and Holt 1984). Seeds can survive in water for up to 9 months (Comes et al. 1978)."
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). 1983. Handbook of Hawaiian Weeds. University of Hawaii Press, Honolulu, HI	"Propagation: By seed. Dispersed by the wind."

702	Propagules dispersed intentionally by people	y

Qsn #	Question	Answer
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"The beneficial uses of T. officinale complex indicate that it is likely tc be introduced to new areas. Most likely pathways include seeds distributed by mail, and travellers carrying them on their person and in their baggage upon their return (Gail, 1994)."

703	Propagules likely to disperse as a produce contaminant	y
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"T. officinale complex can also contaminate hay, and so can be a potential seed source for other parts of the farm (Tardif, 1997)."

704	Propagules adapted to wind dispersal	y
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"After flowering, the scapes of T. officinale complex elongate significantly, allowing enhanced wind dispersal of seeds (Radosevich and Holt 1984). The seeds have pappi that further aid in dispersal by wind (Lovell and Rowan 1991). The seed settling velocity may be a useful surrogate for the measurement of dispersal ability (Andersen 1992) and the average settling velocity of seed-pappus units of T. officinale complex is 2.37 km h-1 (Andersen 1993). Sheldon and Burrows (1973) found that the distance travelled by seed-pappus units of T. officinale complex increased with increasing wind speed. Wind speeds of 5.47, 10.94, and 16.41 km h-1 resulted in distances travelled of 0.76, 1.52, and 2.27 m, respectively. Von Hofsten (1954) estimated the dissemination distance of seeds was 200-500 m."

705	Propagules water dispersed	y
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Seeds are also dispersed by water, especially via irrigation ditches (Salisbury 1961; Radosevich and Holt 1984). Seeds can survive in water for up to 9 months (Comes et al., 1978)."

706	Propagules bird dispersed	
	Source(s)	**Notes**
	Green, A. J. (2015). The importance of waterbirds as an overlooked pathway of invasion for alien species. Diversity and Distributions. 22(2): 239–247	"Table 1 Summary of studies addressing waterbird dispersal of alien species that were not included in Reynolds et al. (2015). The specific alien species, a summary of the main findings, the waterbird dispersal vector (sample size in parentheses, where given) and location are identified." [Taraxacum officinale - 44 seedlings raised from pellets of gulls]
	Stewart-Wade, S. M., Neumann, S., Collins, L. L., & Boland, G. J. (2002). The biology of Canadian weeds. 117. Taraxacum officinale GH Weber ex Wiggers. Canadian Journal of Plant Science, 82(4), 825-853	[Possibly, although primarily wind-dispersed] "Seeds are also dispersed in the excreta of animals such as cattle, horses and birds (Salisbury 1961), and by water, especially via irrigation ditches (Salisbury 1961; Radosevich and Holt 1984)."

Qsn #	Question	Answer
707	**Propagules dispersed by other animals (externally)**	
	Source(s)	**Notes**
	Fischer, S. F., Poschlod, P., & Beinlich, B. (1996). Experimental studies on the dispersal of plants and animals on sheep in calcareous grasslands. Journal of Applied Ecology, 33(5): 1206-1222	Table 1. Plant species and number of diaspores found in the fleece of one sheep during the examination period (July- late September 1993) and the factors influencing diaspore attachment and transport" [Taraxacum officinale seeds founds in fleece[... "Three species (Leontodon hispidus, Prunella grandiflora, Taraxacum officinale) detected in the fleece after wallowing were not even present with mature diaspores on the rest of the research plot."

708	**Propagules survive passage through the gut**	**y**
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Seeds are dispersed in the excreta of animals such as cattle, horses and birds (Salisbury 1961; Mt. Pleasant and Schlather 1994)."

801	**Prolific seed production (>1000/m2)**	**y**
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"In a heavily infested area in Canada, the average number of seeds produced by T. officinale complex was 60,000/m², equivalent to about 600,000,000 seeds/ha (Roberts, 1936). Under near optimal conditions, the number of inflorescences/plant ranged from 48 to 146, with an average of 93, while the number of seeds/inflorescence ranged from 130 to 412, with an average of 252 (Roberts, 1936). This provides an average of 23,436 seeds/plant (Roberts, 1936)."

802	**Evidence that a persistent propagule bank is formed (>1 yr)**	**y**
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"In another study, following burial of T. officinale complex seeds for varying time periods, a small number of seeds (1%) were still viable for up to 9 yr after burial (Burnside et al., 1996). Typically, 1-6% of T. officinale complex seeds remained viable 4 yr after burial in soil, and soil storage for 5 yr or longer resulted in little detectable viability (Chepil, 1946; Roberts and Neilson, 1981). Von Hofsten (1954) found that seeds remained viable longer in the soil (up to 20-30 yr) than when dry-stored indoors. Depth of seed burial was negatively correlated to establishment success (Bostock and Benton, 1983), and Russwurm and Martin (1977) found seed can readily germinate under 2 cm of soil. Storage of seeds at room temperature decreased seed viability, compared to storage at 4°C (Letchamo and Gosselin, 1996). Mezynski and Cole (1974) reported that percentage germination decreased during 30 d storage of seeds at -15°C or 22°C, compared to fresh seeds. Al-Hially (1991) found that the rate of germination increased after 90 d storage."

Qsn #	Question	Answer
803	**Well controlled by herbicides**	**y**
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"For land clearance and pre-emergence control, glyphosate is typically used, either alone or in combination with a wide variety of other herbicides. In grasslands, for example, pastures, silage and hay-crops not undersown to legumes, and in sports turf, Taraxacum is usually controlled by 2,4-D, often accompanied by herbicides such as picloram, dicamba, dichlorprop, fluazifop-P, mecoprop, sethoxydim or triclopyr (Darwent and Lefkovitch, 1995; Anon., 1997). Other agents have been successfully used in grassland including isoxaben, metsulfuron, quinclorac, clopyralid, dithiopyr, fluroxypyr and imazaquin (Neal, 1990; Chandran et al., 1998). In Lucerne (Zaprzalka and Peters, 1982), chlorsulfuron, hexazinone (Moyer et al 1990; Malik et al., 1993), terbacil and dichlobenil (Waddington, 1980; 1987) effectively control Taraxacum. Maleic hydrazide has been used to control T. officinale complex in apple orchards in the USA (Miller and Eldridge, 1989). Considerable success in 'organic' control has been achieved using corn gluten meal, a waste product from corn milling (Bingaman and Christians, 1995; Quarles, 1999)."

804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	**y**
	Source(s)	**Notes**
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Mechanical removal of T. officinale complex plants has been of limited value, as the long taproot must be entirely removed. The plant responds positively to repeated cutting (Dahmen and Kuhbauch, 1990; Teyssonneyre et al., 2002) or heavy grazing (Rogalski et al., 1997 Harker et al., 2000) where 'gaps' in the crop cover are created. In addition, debudding or defoliation of the plant can result in a shift of the shoot-root ratio, favouring root growth and exacerbating the problem (Letchamo and Gosselin, 1995). Struik (1967) studied the reaction of T. officinale complex to different grassland management regimes; mown, heavily grazed, lightly grazed, and uncut. As the degree of defoliation increased, plant radius decreased, length of the longest leaf decreased, root length decreased, leaf number increased and plant form changed from upright to slanting and appressed. The cover rate of T. officinale complex in grasslands was significantly higher grazed and mown treatments (Popolizio et al., 1994; Klimes et al., 2003). Taraxacum officinale complex is able to rapidly replace a large quantity of leaves relative to other organs during short periods (every 30-50 d) between mowing (Sawada et al., 1982), partly due to increased light availability (von Hofsten, 1954). Cutting the scapes of T. officinale complex in bud or in flower resulted in the production of seeds that were non-viable, while cutting the scapes after the seeds had ripened resulted in 91% seed germination (Gill, 1938)."

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**

Qsn #	Question	Answer
	CABI, 2016. Taraxacum officinale complex. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Unknown for Hawaiian Islands] "Biological Control: Sheep and geese have been used for biological control of T. officinale complex, with sheep being more effective than geese in controlling the weed in Christmas tree plantations in North Carolina, USA. (Müller et al., 1999). Phoma exigua and P. herbarum have been isolated from T. officinale complex in Ontario, Canada, and considered as potential biocontrol agents (Neumann Brebaum, 1998; Neumann Brebaum and Boland, 1999). Controlled-environment studies showed that young T. officinale plants were more susceptible to P. herbarum than older plants (Neumann and Boland, 2002). P. taraxaci was considerec as a biocontrol agent for T. officinale complex in Sweden (von Hofsten, 1954). P. taraxaci spread by pycnospores and infected seeds, however, it was extremely variable with respect to its pathogenicity on T. officinale complex and its viability in soil. Von Hofsten (1954) also mentioned an unnamed 'ring-forming fungus' which released a substance that was highly toxic to T. officinale complex and other plants. Sclerotinia species have also been tested as biological control agents for T. officinale complex in Canada and New Zealand (Riddle et al., 1991; Waipara et al., 1993). Sclerotinia sclerotiorum and S. minor Jagger were evaluated in a controlled environment and in turfgrass swards for their virulence on T. officinale complex. Isolates of both species reduced the dry weight of plants in a controlled environment and reduced the number of plants in turfgrass swards. Heat-killed seeds of perennial ryegrass were suitable as both a growth substrate for Sclerotinia spp. and a delivery system to T. officinale complex (Riddle et al., 1991). A mycelium-on-wheat preparation has been used for S. sclerotiorum, while either a granular sodium alginate formulation or a mycelium-on-barley preparation has been employed to deliver S. minor (Ciotola et al., 1991; Brière et al., 1992; Waipara et al., 1993). Sclerotinia sclerotiorum caused localized infection on the leaf laminas and created basal necroses of 1-2 cm in length on tap roots of T. officinale complex (Burpee, 1992; Waipara et al., 1993). These necroses inhibited leaf regrowth from the root after defoliation (Burpee, 1992). "

Summary of Risk Traits:

High Risk / Undesirable Traits
• Elevation range exceeds 1000 m, demonstrating environmental versatility
• Broad climate suitability
• Naturalized in regions with subtropical climates
• Widely naturalized (including all main Hawaiian Islands except Kahoolawe)
• Primarily a weed of certain crops, gardens and amenity grasslands
• Other Taraxacum species are weedy
• Allelopathic
• Host of crop pathogens
• Shade tolerant
• Tolerates many soil types
• Reproduces by seeds
• Hybridizes with other Taraxacum species
• Apomictic
• Can spread vegetatively by root fragments
• Seeds dispersed by wind, water, as a seed contaminant, internally in animals & intentionally by people
• Prolific seed production
• May form a persistent seed bank
• Tolerates mowing, cutting & grazing

Low Risk Traits
• Unarmed (no spines, thorns or burrs)
• Palatable to animals & people
• Herbicides provide effective control