

<b>Taxon:</b> <i>Trifolium repens L.</i>	<b>Family:</b> Fabaceae
<b>Common Name(s):</b> white clover	<b>Synonym(s):</b> <i>Trifolium repens</i> var. <i>atropurpureum</i>

<b>Assessor:</b> Chuck Chimera	<b>Status:</b> In Progress	<b>End Date:</b>
<b>WRA Score:</b> 12.5	<b>Designation:</b> H(HPWRA)	<b>Rating:</b> High Risk

**Keywords:** Perennial Herb, Weedy, Fodder, Stoloniferous, Animal-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)	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	n=0, y = 1*multiplier (see Appendix 2)	y
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	y
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals		
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
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		
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y

Qsn #	Question	Answer Option	Answer
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		
604	Self-compatible or apomictic	y=1, n=-1	n
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	1
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		
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)	y=1, n=-1	y
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m <sup>2</sup> )		
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	n
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

**Supporting Data:**

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Office of the Gene Technology Regulator. 2008. The Biology of <i>Trifolium repens L.</i> (White Clover). Version 2. Australian Government Dept. of Health and Ageing, Canberra	[Certain cultivars or genotypes may have traits which may contribute to invasiveness or persistence. This assessment addresses the type that is naturalized in the Hawaiian Islands, with no evidence of domestication or reduction in weedy traits] "It should be noted that due to the large number of white clover cultivars as well as the highly heterozygous nature of white clover populations which results in many genotypes, it has been necessary to generalise much of the information provided in this document and exceptions may be common." ... "Grazing/cutting can be detrimental to white clover although some cultivars (eg Tribute) can be more persistent under hard grazing."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2018. 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"	Low
	Source(s)	Notes

Qsn #	Question	Answer
	<p>USDA, ARS, Germplasm Resources Information Network. 2018. 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 26 Feb 2018]</p>	<p>"Native  Africa  Northern Africa: Algeria ; Egypt ; Libya ; Morocco ; Tunisia  Asia-Temperate  Caucasus: Armenia ; Azerbaijan ; Georgia ; Russian Federation  Checheno-Ingushetia, Dagestan, Kabardino-Balkaria, Karachay-Cherkessia, Krasnodar, North Ossetia, Stavropol  Middle Asia: Kazakhstan ; Kyrgyzstan ; Tajikistan ; Turkmenistan ; Uzbekistan  Siberia: Russian Federation Altay, Buryatia, Chelyabinsk, Gorno-Altay, Irkutsk, Kemerovo, Khakassia, Khanty-Mansi, Krasnoyarsk, Kurgan, Novosibirsk, Omsk, Sverdlovsk, Tomsk, Tuva, Tyumen, Ust Orda Buryat  Western Asia: Afghanistan ; Cyprus ; Iran ; Iraq ; Israel ; Jordan ; Lebanon ; Syria ; Turkey  Asia-Tropical  Indian Subcontinent: Pakistan  Europe  Eastern Europe: Belarus ; Estonia ; Latvia ; Lithuania ; Moldova ; Russian Federation Arkhangelsk, Astrakhan, Bashkortostan, Belgorod, Bryansk, Chuvashia, Ivanovo, Kaliningrad, Kalmykia, Kaluga, Karelia, Kirov, Komi, Kostroma, Kursk, Leningrad, Lipetsk, Mari-El, Mordvinia, Moscow, Murmansk, Nenets, Novgorod, Orel, Orenburg, Penza, Perm, Pskov, Rostov, Ryazan, Saratov, Smolensk, Tambov, Tatarstan, Tula, Udmurtia, Ulyanovsk, Vladimir, Volgograd, Vologda, Voronezh, Yaroslavl; Ukraine  Middle Europe: Austria ; Belgium ; Czechoslovakia ; Germany ; Hungary ; Netherlands ; Poland ; Switzerland  Northern Europe: Denmark ; Faroe Islands ; Finland ; Iceland ; Ireland ; Norway ; Sweden ; United Kingdom  Southeastern Europe: Albania ; Bulgaria ; Former Yugoslavia ; Greece ; Italy ; Romania  Southwestern Europe: France ; Portugal ; Spain"</p>

202	Quality of climate match data	High
	Source(s)	Notes
	<p>USDA, ARS, Germplasm Resources Information Network. 2018. 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 26 Feb 2018]</p>	

Qsn #	Question	Answer
203	<b>Broad climate suitability (environmental versatility)</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i naturalized in pastures, lawns, and along roadsides and trails, 720-2,530 m" [Elevation range exceeds 1000 m, demonstrating environmental versatility]
	Missouri Botanical Garden. 2018. <i>Trifolium repens</i> . <a href="http://www.missouribotanicalgarden.org">http://www.missouribotanicalgarden.org</a> . [Accessed 26 Feb 2018]	"Zone: 3 to 10" [Grows in 8 hardiness zones, demonstrating environmental versatility]

204	<b>Native or naturalized in regions with tropical or subtropical climates</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i naturalized in wet, open areas such as pastures and lawns, 820-2,070 m, on Maui and Hawai'i. First collected on Hawai'i in 1932 (Ewart III 232, BISH)."
	USDA, ARS, Germplasm Resources Information Network. 2018. 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 26 Feb 2018]	"Naturalized Africa East Tropical Africa: Kenya ; Tanzania Northeast Tropical Africa: Ethiopia Southern Africa: South Africa Eastern Cape, Gauteng, KwaZulu-Natal, Mpumalanga, North West, Western Cape Asia-Temperate China: China Asia-Tropical Indian Subcontinent: Bhutan ; India ; Sri Lanka Australasia Australia: Australia New Zealand: New Zealand Northern America Canada ; Mexico ; United States Pacific North-Central Pacific: United States Hawaii Southern America South America Caribbean: West Indies Central America: Central America"

205	<b>Does the species have a history of repeated introductions outside its natural range?</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	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 Europe, central and northern Asia, and northern Africa, common as a pasture clover, introduced worldwide"

301	<b>Naturalized beyond native range</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>

Qsn #	Question	Answer
	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 pastures, lawns, and along roadsides and trails, 720-2,530 m, on Kaua'i, Maui, and Hawai'i. First collected on Hawai'i in 1909 (Rock 3400, BISH)."
	USDA, ARS, Germplasm Resources Information Network. 2018. 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 23 Feb 2018]	"Naturalized Africa East Tropical Africa: Kenya ; Tanzania Northeast Tropical Africa: Ethiopia Southern Africa: South Africa Eastern Cape, Gauteng, KwaZulu-Natal, Mpumalanga, North West, Western Cape Asia-Temperate China: China Asia-Tropical Indian Subcontinent: Bhutan ; India ; Sri Lanka Australasia Australia: Australia New Zealand: New Zealand Northern America Canada ; Mexico ; United States Pacific North-Central Pacific: United States Hawaii Southern America South America Caribbean: West Indies Central America: Central America"

302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	Missouri Botanical Garden. 2018. <i>Trifolium repens</i> . <a href="http://www.missouribotanicalgarden.org">http://www.missouribotanicalgarden.org</a> . [Accessed 26 Feb 2018]	"Can be aggressive and is considered by many to be a lawn weed, particularly by those who try to eradicate it from their lawns. Was a favorite food of rabbits in the Kemper Center gardens."
	Ogle, D., St. John, L. 2008. Plant Guide for white clover ( <i>Trifolium repens L.</i> ). USDA-Natural Resources Conservation Service, Idaho Plant Materials Center, Aberdeen, Idaho	"This plant may become weedy or invasive in some regions or habitats and may displace desirable vegetation if not properly managed." ... "White clover spreads by both seed and stolons and is considered weedy in some locations. It can spread into adjoining vegetative communities under ideal climatic and environmental conditions."

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Burdon, J. (1983). <i>Trifolium Repens L.</i> Journal of Ecology, 71(1), 307-330	"Although white clover is not a serious agricultural weed, it is a common weed in turf, sports surfaces, lawns and along roadsides."

Qsn #	Question	Answer
	Office of the Gene Technology Regulator. 2008. The Biology of <i>Trifolium repens</i> L. (White Clover). Version 2. Australian Government Dept. of Health and Ageing, Canberra	"Ratings have been given on a State/Territory level for white clover as a weed in agricultural ecosystems and there is a large variation in the ratings (Groves et al. 2003). The State with the highest rating is Queensland which rates white clover as 5, meaning it is known to be a major problem at 4 or more locations within the State. This is due to its presence as a weed in turf. A rating of 3 is given by New South Wales, Victoria and Western Australia, which means white clover is naturalised and known to be a minor problem warranting control at 4 or more locations within a State or Territory, with Western Australia actively controlling populations within some parts of the State. White clover has a rating of 1 in South Australia, which means it is naturalised and may be a minor problem but is not considered important enough to warrant control at any location. White clover is noted to be present in Tasmania, where it is not described as an agricultural weed. In the US, white clover has been identified as a weed in apple orchards both because it competes with the trees for nutrients and water and also because its flowers are an unwanted attractant of bees at times when orchards are sprayed with insecticides that could harm bees (MacRae et al. 2005)."

304	Environmental weed	y
	Source(s)	Notes
	Queensland Government. (2018). Weeds of Australia. <i>Trifolium repens</i> . <a href="http://keyserver.lucidcentral.org">http://keyserver.lucidcentral.org</a> . [Accessed 26 Feb 2018]	"A very common and widespread weed of lawns, parks, gardens, roadsides, waste areas, disturbed sites, riparian vegetation, grasslands, open woodlands and alpine vegetation." ... "White clover ( <i>Trifolium repens</i> ) is regarded as an environmental weed in Victoria, New South Wales and Western Australia. It is most problematic in the sub-alpine regions of south-eastern Australia, including Kosciusko National Park, and in some areas it threatens endangered species and native plant communities."
	Office of the Gene Technology Regulator. 2008. The Biology of <i>Trifolium repens</i> L. (White Clover). Version 2. Australian Government Dept. of Health and Ageing, Canberra	"White clover is common in south eastern Australian subalpine grassland communities and present to a lesser degree in woodland communities (Godfree et al. 2004). In mesic grassland communities, white clover constitutes over 40% of total herb cover. Although white clover does not dominate the invaded communities (Godfree et al. 2006; Godfree et al. 2007), it is considered a significant environmental weed in south eastern Australia, mostly due to high adaptability. Where it is present in semi-natural native plant communities at a relatively high abundance it competes for growing space with native analogues and may even exclude native species altogether by forming a mat. This is especially the case along creek lines or in mesic grasslands (Godfree et al. 2006)."

305	Congeneric weed	y
	Source(s)	Notes
	Queensland Government. 2011. Weeds of Australia - Hare's-foot clover - <i>Trifolium arvense</i> . <a href="http://keyserver.lucidcentral.org">http://keyserver.lucidcentral.org</a> . [Accessed 26 Feb 2018]	"Hare's-foot clover ( <i>Trifolium arvense</i> ) is regarded as an environmental weed in Western Australia and Victoria." [Impacts are unspecified]

Qsn #	Question	Answer
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	" <i>Trifolium alexandrinum</i> ... Weed of: Orchards & Plantations, Pome Fruits" ... " <i>Trifolium alpestre</i> ... Weed of: Cereals" ... " <i>Trifolium angustifolium</i> ... Weed of: Cereals, Pastures" ... " <i>Trifolium arvense</i> ... Weed of: Cereals, Lupins, Orchards & Plantations, Pastures" ... " <i>Trifolium aureum</i> ... Weed of: Cereals, Vegetables" ... " <i>Trifolium campestre</i> ... Weed of: Cereals, Orchards & Plantations, Pastures, Pome Fruits" ... " <i>Trifolium cernuum</i> ... Weed of: Pastures" ... " <i>Trifolium clusii</i> ... Weed of: Orchards & Plantations, Pome Fruits" ... " <i>Trifolium dubium</i> ... Weed of: Cereals, Orchards & Plantations, Pastures" ... " <i>Trifolium echinatum</i> ... Weed of: Cereals" ... " <i>Trifolium fragiferum</i> ... Weed of: Cereals, Orchards & Plantations" ... " <i>Trifolium glomeratum</i> ... Weed of: Pastures" ... " <i>Trifolium hybridum</i> ... Weed of: Cereals, Nursery Production, Orchards & Plantations" ... " <i>Trifolium incarnatum</i> ... Weed of: Cereals, Vegetables" ... " <i>Trifolium lappaceum</i> ... Weed of: Orchards & Plantations, Pome Fruits" ... " <i>Trifolium medium</i> ... Weed of: Cereals" ... " <i>Trifolium patens</i> ... Weed of: Pastures" ... " <i>Trifolium pretense</i> ... Weed of: Cereals, Grapevines, Nursery Production, Orchards & Plantations, Pastures, Vegetables" ... " <i>Trifolium procumbens</i> ... Weed of: Cereals" ... " <i>Trifolium purpureum</i> ... Weed of: Orchards & Plantations, Pome Fruits" ... " <i>Trifolium resupinatum</i> ... Weed of: Orchards & Plantations, Pastures, Pome Fruits" ... " <i>Trifolium rubens</i> ... Weed of: Cereals" ... " <i>Trifolium rueppellianum</i> ... Weed of: Orchards & Plantations" ... " <i>Trifolium stellatum</i> ... Weed of: Cereals, Orchards & Plantations, Pome Fruits" ... " <i>Trifolium strepens</i> ... Weed of: Cereals" ... " <i>Trifolium striatum</i> ... Weed of: Pastures" ... " <i>Trifolium subterraneum</i> ... Weed of: Cereals, Pastures" ... " <i>Trifolium tomentosum</i> ... Weed of: Cereals, Pastures" ... " <i>Trifolium tumens</i> ... Weed of: Orchards & Plantations"
	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.	" <i>Trifolium pretense</i> ... in Hawai'i naturalized in wet, open areas such as pastures and lawns, 820- 2,070 m, on Maui and Hawai'i" [Invades disturbed areas]

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] "Perennial herbs from taproots; stems prostrate, rooting at the nodes, often mat-forming, 1-4 dm long, glabrous or sparsely pubescent. Leaflets bright green with pale or dark marks along veins, or both, obcordate to obovate or elliptic, (6-)10-25 mm long, (6-)10-15 mm wide, margins denticulate or serrate, stipules membranous, oblong, adnate to petioles ca. 2/3 their length in younger stages only, later ripped away from petioles but still surrounding the stem, contracted into the subulate apex."

402	Allelopathic	
	Source(s)	Notes
	Newman, E. I., & Rovira, A. D.. (1975). Allelopathy Among Some British Grassland Species. <i>Journal of Ecology</i> , 63(3), 727-737	" <i>Lolium perenne</i> , <i>Hypochoeris radicata</i> , <i>Plantago lanceolata</i> and <i>Trifolium repens</i> , appear to be 'auto-inhibited' (autotoxic), i.e. to be inhibited more by exudate from their own species than other species" [Potentially, but may primarily affect itself]



Qsn #	Question	Answer
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.	"Perennial herbs from taproots; stems prostrate, rooting at the nodes, often mat-forming, 1-4 dm long, glabrous or sparsely pubescent." [Fabaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"fodder, pasture and hay, highly variable"
	Ogle, D., St. John, L. 2008. Plant Guide for white clover ( <i>Trifolium repens L.</i> ). USDA-Natural Resources Conservation Service, Idaho Plant Materials Center, Aberdeen, Idaho	"Forage: White clover is one of the most important pasture legumes. It is highly palatable and nutritious forage for all classes of livestock and most wildlife. White clover is commonly planted with orchardgrass, ryegrass, bromegrass, or tall fescue." ... "Wildlife: White clover is an excellent forage plant for wildlife. Leaves are grazed by white-footed voles, bears, moose, mule and white-tailed deer and blue grouse."

405	Toxic to animals	
	Source(s)	Notes
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Potentially toxic to animals under certain circumstances] "Toxins. White clover can cause bloat in livestock. It has caused laminitis in horses and cattle; after they are ingested, some varieties can liberate HCN, causing cyanogenic poisoning in animals. Cyanogenic glycosides. Plant infusion antirheumatic, astringent, depurative, tonic, eyewash, for fevers, eyes troubles, asthma, colds, cough; whole plant decoction given for fever; plant juice for fever. Veterinary medicine, forage plant to increase lactation."
	Office of the Gene Technology Regulator. 2008. The Biology of <i>Trifolium repens L.</i> (White Clover). Version 2. Australian Government Dept. of Health and Ageing, Canberra	[Potentially] "White clover is not a pathogen and is not capable of causing disease in humans, animals or plants. However, white clover can potentially be toxic to grazing animals if ingested in large quantities or under particular situations because of the presence of toxic and anti-nutritional compounds."

Qsn #	Question	Answer
406	<b>Host for recognized pests and pathogens</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Ogle, D., St. John, L. 2008. Plant Guide for white clover ( <i>Trifolium repens L.</i> ). USDA-Natural Resources Conservation Service, Idaho Plant Materials Center, Aberdeen, Idaho	"Pests and Potential Problems Disease and insect pests of white clover vary with the location, cultural practices and use of white clover and vary among and during the growing season. White clover is susceptible to leaf diseases, root and stolon diseases, nematodes, viral diseases, insects, spider mites and slugs. Practical control of many plant diseases can be accomplished by harvesting to remove disease inoculum and planting disease resistant cultivars. Judicious grazing management combined with chemical control can limit damage from insects, spider mites and slugs."

407	Causes allergies or is otherwise toxic to humans	n
	<b>Source(s)</b>	<b>Notes</b>
	Office of the Gene Technology Regulator. 2008. The Biology of <i>Trifolium repens L.</i> (White Clover). Version 2. Australian Government Dept. of Health and Ageing, Canberra	"White clover is not a pathogen and is not capable of causing disease in humans, animals or plants. However, white clover can potentially be toxic to grazing animals if ingested in large quantities or under particular situations because of the presence of toxic and anti-nutritional compounds."
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Potentially toxic to animals under certain circumstances] "Toxins. White clover can cause bloat in livestock. It has caused laminitis in horses and cattle; after they are ingested, some varieties can liberate HCN, causing cyanogenic poisoning in animals. Cyanogenic glycosides. Plant infusion antirheumatic, astringent, depurative, tonic, eyewash, for fevers, eyes troubles, asthma, colds, cough; whole plant decoction given for fever; plant juice for fever. Veterinary medicine, forage plant to increase lactation."

408	Creates a fire hazard in natural ecosystems	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.	"Perennial herbs from taproots ... in Hawai'i naturalized in pastures, lawns, and along roadsides and trails" [No evidence. Unlikely given habit & habitat]
	Coladonato, M. 1993. <i>Trifolium repens</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. <a href="http://www.fs.fed.us/database/feis/plants/forb/trirep/all.html">http://www.fs.fed.us/database/feis/plants/forb/trirep/all.html</a> . [Accessed ]	[No evidence of increased fire risk] "Information regarding white clover survival following fire is lacking in the literature. White clover is probably a decreaser following fire since most of its growing parts are above ground and fire would quickly defoliate these aboveground parts [3]. White clover probably regenerates following fire via soil-stored seed. It may also sprout from the taproot and/or caudex [19,23]."

409	Is a shade tolerant plant at some stage of its life cycle	
	<b>Source(s)</b>	<b>Notes</b>
	Missouri Botanical Garden. 2018. <i>Trifolium repens</i> . <a href="http://www.missouribotanicalgarden.org">http://www.missouribotanicalgarden.org</a> . [Accessed 26 Feb 2018]	"Easily grown in average, medium, well-drained soils in full sun to part shade. Prefers moist soils in light shade, but tolerates full sun and dryish soils."

Qsn #	Question	Answer
	Office of the Gene Technology Regulator. 2008. The Biology of <i>Trifolium repens L.</i> (White Clover). Version 2. Australian Government Dept. of Health and Ageing, Canberra	"White clover does not grow well in shady conditions and, although it can adapt to shade, the adaptation is more successful if it occurs gradually."
	Coladonato, M. 1993. <i>Trifolium repens</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. <a href="http://www.fs.fed.us/database/feis/plants/forb/trirep/all.html">http://www.fs.fed.us/database/feis/plants/forb/trirep/all.html</a> . [Accessed 26 Feb 2018]	"White clover thrives in full sunlight and declines as grass cover increases. It will grow in partial shade of aspen and oak woodlands [38]. White clover rapidly invades canopy gaps [25]."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Office of the Gene Technology Regulator. 2008. The Biology of <i>Trifolium repens L.</i> (White Clover). Version 2. Australian Government Dept. of Health and Ageing, Canberra	"it is adaptable to a wide range of soil and environmental conditions and combines well with many perennial grasses." ... "White clover requires particular soil conditions to ensure good seedling establishment and to maintain high production. White clover performs well on soils with medium to high fertility containing good levels of phosphorus, sulphur, potassium and molybdenum. It prefers soils that have a pH above 4.5 and have good water-holding capacity but are well draining (Frame 2003; Betts & Ayres 2004)." ... "White clover does not tolerate soil that is too acid or too alkaline, it performs optimally in soils with a pH range of 5.6-6.5 (in water) (Anon. 2008b)."
	Coladonato, M. 1993. <i>Trifolium repens</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. <a href="http://www.fs.fed.us/database/feis/plants/forb/trirep/all.html">http://www.fs.fed.us/database/feis/plants/forb/trirep/all.html</a> . [Accessed 26 Feb 2018]	"White clover can grow in a wide range of soil and moisture conditions but grows best in the humid areas of the temperate zone [39]. It is found along roads, in meadows, and in wooded areas [12]. White clover grows on well drained or poorly drained soils but optimal growth occurs on moist, deep soils with 0 to 8 percent slope. It is not tolerant of drought, excess water, or soils that are saline, highly alkaline, or acid [11]."
	Ogle, D., St. John, L. 2008. Plant Guide for white clover ( <i>Trifolium repens L.</i> ). USDA-Natural Resources Conservation Service, Idaho Plant Materials Center, Aberdeen, Idaho	"White clover thrives best in a cool, moist climate in soils with ample lime, phosphate, and potash. In general, white clover is best adapted to clay and silt soils in humid and irrigated areas. It grows successfully on sandy soils with a high water table or irrigated droughty soils when adequately fertilized. White clover seldom roots deeper than 2 feet, which makes it adapted to shallow soils when adequate moisture is available. Dry soils limit establishment and persistence of white clover."

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.	"Perennial herbs from taproots; stems prostrate, rooting at the nodes, often mat-forming, 1-4 dm long, glabrous or sparsely pubescent." [Low growth habit]

412	Forms dense thickets	n
-----	----------------------	---

Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Office of the Gene Technology Regulator. 2008. The Biology of <i>Trifolium repens L.</i> (White Clover). Version 2. Australian Government Dept. of Health and Ageing, Canberra	"A density of greater than 25% ground cover is commonly sought by pastoralists (Garrett & Chu 1997)." ... "In the Bogong high plains, white clover is found in clearings but only at low densities of less than 1% ground cover in moist flushes on ridges, slopes and streamside flats."
	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 pastures, lawns, and along roadsides and trails" [No evidence]

501	Aquatic	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.	[Terrestrial herb] "Perennial herbs from taproots ... in Hawai'i naturalized in pastures, lawns, and along roadsides and trails, 720-2,530 m, on Kaua'i, Maui, and Hawai'i."

502	Grass	n
	<b>Source(s)</b>	<b>Notes</b>
	USDA, ARS, Germplasm Resources Information Network. 2018. 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 26 Feb 2018]	Family: Fabaceae (alt.Leguminosae) Subfamily: Faboideae Tribe: Trifolieae

503	Nitrogen fixing woody plant	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.	"Perennial herbs from taproots; stems prostrate, rooting at the nodes, often mat-forming, 1-4 dm long, glabrous or sparsely pubescent." [Non-woody, N-fixing species]
	Ogle, D., St. John, L. 2008. Plant Guide for white clover ( <i>Trifolium repens L.</i> ). USDA-Natural Resources Conservation Service, Idaho Plant Materials Center, Aberdeen, Idaho	"When seed is properly inoculated at time of planting, white clover can fix nitrogen from N <sub>2</sub> in the atmosphere, requiring little or no additional nitrogen fertilizer."

Qsn #	Question	Answer
504	<b>Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	Coladonato, M. 1993. <i>Trifolium repens</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. <a href="http://www.fs.fed.us/database/feis/plants/forb/trirep/all.html">http://www.fs.fed.us/database/feis/plants/forb/trirep/all.html</a> . [Accessed 26 Feb 2018]	"A tap root develops in young plants and persists from less than 1 year to 2 years. The majority of the roots are shallow and fibrous, forming at stolon nodes [1]. Most of the roots of white clover are in the top 4 to 10 inches (10-25 cm) of the soil [1]. Some roots occur as deep as 24 inches (60 cm). Roots of at least one cultivar can penetrate up to 5 feet (1.5 m), depending on soil texture and structure [40]."
	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.	"Perennial herbs from taproots; stems prostrate, rooting at the nodes, often mat-forming, 1-4 dm long, glabrous or sparsely pubescent."

601	<b>Evidence of substantial reproductive failure in native habitat</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	USDA, ARS, Germplasm Resources Information Network. 2018. 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 26 Feb 2018]	No evidence. Widespread native & introduced ranges

602	<b>Produces viable seed</b>	y
	<b>Source(s)</b>	<b>Notes</b>
	Ogle, D., St. John, L. 2008. Plant Guide for white clover ( <i>Trifolium repens L.</i> ). USDA-Natural Resources Conservation Service, Idaho Plant Materials Center, Aberdeen, Idaho	"Environmental Concerns White clover spreads by both seed and stolons and is considered weedy in some locations. It can spread into adjoining vegetative communities under ideal climatic and environmental conditions."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Pods oblong-linear, slightly exserted from calyx. Seeds (2)3-4, yellowish brown, ovoid or reniform, 1-1.3 mm long."

Qsn #	Question	Answer
603	Hybridizes naturally	
	Source(s)	Notes
	Office of the Gene Technology Regulator. 2008. The Biology of <i>Trifolium repens L.</i> (White Clover). Version 2. Australian Government Dept. of Health and Ageing, Canberra	[Possibly, but may be a rare occurrence] " <i>T. repens</i> has successfully been crossed with <i>T. nigrescens</i> , <i>T. uniflorum</i> , <i>T. occidentale</i> , <i>T. isthmocarpum</i> , <i>T. argutum</i> , and <i>T. ambiguum</i> in experimental situations (reviewed by Williams 1987b). However most hybrids were recovered through tissue culture methods and many were sterile or showed abnormal development as discussed below. Of these species, only <i>T. nigrescens</i> (ball clover) is able to produce hybrids with white clover following cross-pollination and without further intervention, albeit with some difficulties; many hybrids formed have sterile pollen, have chlorophyll deficiencies or produce non-viable seeds (Chen & Gibson 1972; Williams 1987b; Marshall et al. 1995). The rate of successful hybridisation is greatest when <i>T. repens</i> is used as the female parent plant (Hovin 1962). The formation of hybrids is also highly dependent on the cultivar of <i>T. nigrescens</i> used in the cross (Hovin 1962)."

604	Self-compatible or apomictic	n
	Source(s)	Notes
	Burdon, J. (1983). <i>Trifolium Repens L.</i> Journal of Ecology, 71(1), 307-330	" <i>T. repens</i> is basically self-incompatible, and most selfed individuals set very few seeds, although a few highly self-fertile plants have been found. <i>T. repens</i> has gametophytic self-incompatibility (Atwood 1940, 1942, 1944). Atwood (1940) found that the average seed-set of selfed individuals was 0- 17 seeds per flower, that of incompatible outcrosses 0.03 seeds per flower and that of compatible outcrosses 4.49 seeds per flower."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Ogle, D., St. John, L. 2008. Plant Guide for white clover ( <i>Trifolium repens L.</i> ). USDA-Natural Resources Conservation Service, Idaho Plant Materials Center, Aberdeen, Idaho	"Pollinators: Honeybees and other insects cross-pollinate the flowers as they collect nectar and pollen."
	Burdon, J. (1983). <i>Trifolium Repens L.</i> Journal of Ecology, 71(1), 307-330	" <i>T. repens</i> is pollinated by a wide range of insects, particularly honey bees ( <i>Apis mellifera L.</i> ) and bumble bees ( <i>Bombus spp.</i> ). Nectar is secreted between the base of the stamen tube and the ovary, and is accessible only to insects with a long proboscis. During the visit of an insect the keel and wings provide a landing platform. In order to reach the nectar the wings are forced aside and the keel depressed, thus exposing the anthers and bringing them against the underside of the insect's body. The keel and wings return to their original position after each visit."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes

Qsn #	Question	Answer
	Missouri Botanical Garden. 2018. <i>Trifolium repens</i> . <a href="http://www.missouribotanicalgarden.org">http://www.missouribotanicalgarden.org</a> . [Accessed 26 Feb 2018]	"Spreads aggressively by creeping stems."
	Ogle, D., St. John, L. 2008. Plant Guide for white clover ( <i>Trifolium repens L.</i> ). USDA-Natural Resources Conservation Service, Idaho Plant Materials Center, Aberdeen, Idaho	"White clover spreads by both seed and stolons and is considered weedy in some locations. It can spread into adjoining vegetative communities under ideal climatic and environmental conditions."

607	Minimum generative time (years)	1
Source(s)		Notes
	Turkington, R., & Burdon, J.J., 1983. The biology of Canadian weeds 57: <i>Trifolium repens L.</i> Canadian Journal of Plant Science 63: 243–266	" <i>T. repens</i> plants may flower the first year of growth and continue to flower yearly thereafter."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
Source(s)		Notes
	Turkington, R., & Burdon, J.J., 1983. The biology of Canadian weeds 57: <i>Trifolium repens L.</i> Canadian Journal of Plant Science 63: 243–266	"Although no special dispersal mechanism exists, most seed is probably spread incidentally by the movement of livestock and through other human agencies."
	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 pastures, lawns, and along roadsides and trails" [Probably Yes. Occurs in heavily trafficked areas]
	Office of the Gene Technology Regulator. 2008. The Biology of <i>Trifolium repens L.</i> (White Clover). Version 2. Australian Government Dept. of Health and Ageing, Canberra	"White clover seeds can be dispersed long distances by human activities and through the digestive tract of birds and grazing animals."

702	Propagules dispersed intentionally by people	y
Source(s)		Notes
	Ogle, D., St. John, L. 2008. Plant Guide for white clover ( <i>Trifolium repens L.</i> ). USDA-Natural Resources Conservation Service, Idaho Plant Materials Center, Aberdeen, Idaho	"White clover is one of the most important pasture legumes. It is highly palatable and nutritious forage for all classes of livestock and most wildlife. White clover is commonly planted with orchardgrass, ryegrass, bromegrass, or tall fescue."

703	Propagules likely to disperse as a produce contaminant	y
Source(s)		Notes
	Turkington, R., & Burdon, J.J., 1983. The biology of Canadian weeds 57: <i>Trifolium repens L.</i> Canadian Journal of Plant Science 63: 243–266	"It is a common seed impurity of both <i>Trifolium pratense L.</i> and <i>Lotus corniculatus L.</i> seed (Robinson 1947) and in some lawn-seed mixtures."

704	Propagules adapted to wind dispersal	
Source(s)		Notes



Qsn #	Question	Answer
	Turkington, R., & Burdon, J.J., 1983. The biology of Canadian weeds 57: <i>Trifolium repens L.</i> Canadian Journal of Plant Science 63: 243–266	"Although no special dispersal mechanism exists, most seed is probably spread incidentally by the movement of livestock and through other human agencies."
	Office of the Gene Technology Regulator. 2008. The Biology of <i>Trifolium repens L.</i> (White Clover). Version 2. Australian Government Dept. of Health and Ageing, Canberra	[Possibly small distances] "Alternatively, short distance dispersal may occur by dehiscence, stock trampling, worms, ants, and to a small extent by wind."

705	Propagules water dispersed	y
	Source(s)	Notes
	Coladonato, M. 1993. <i>Trifolium repens</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. <a href="http://www.fs.fed.us/database/feis/plants/forb/trirep/all.html">http://www.fs.fed.us/database/feis/plants/forb/trirep/all.html</a> . [Accessed 26 Feb 2018]	"The seeds are dispersed by wind, water, birds, and grazing animals [4,11,38]."

706	Propagules bird dispersed	y
	Source(s)	Notes
	Ogle, D., St. John, L. 2008. Plant Guide for white clover ( <i>Trifolium repens L.</i> ). USDA-Natural Resources Conservation Service, Idaho Plant Materials Center, Aberdeen, Idaho	"Seeds are eaten by northern bobwhite, bufflehead, American coot, sage grouse, ruffed grouse, sharp-tailed grouse, horned lark, mallard, gray partridge, greater prairie chicken, willow ptarmigan, American pintail, California quail and American robin." [Birds are seed predators, but might disperse viable seeds]
	Office of the Gene Technology Regulator. 2008. The Biology of <i>Trifolium repens L.</i> (White Clover). Version 2. Australian Government Dept. of Health and Ageing, Canberra	"White clover seeds can be dispersed long distances by human activities and through the digestive tract of birds and grazing animals." ... "Viable white clover seed can also be recovered from birds such as sparrows, pigeons, pheasants and rooks (Krach 1959), and it is eaten by species including crimson and Adelaide rosellas ( <i>Platycercus elegans</i> ) and galahs ( <i>Elophus roseicapilla</i> syn. <i>Cacatua roseicapilla</i> ) (Tracey et al. 2007) . However, white clover seed is thought to be relatively unattractive to birds due to its very small size."

707	Propagules dispersed by other animals (externally)	y
	Source(s)	Notes
	Office of the Gene Technology Regulator. 2008. The Biology of <i>Trifolium repens L.</i> (White Clover). Version 2. Australian Government Dept. of Health and Ageing, Canberra	"Alternatively, short distance dispersal may occur by dehiscence, stock trampling, worms, ants, and to a small extent by wind."
	Turkington, R., & Burdon, J.J., 1983. The biology of Canadian weeds 57: <i>Trifolium repens L.</i> Canadian Journal of Plant Science 63: 243–266	"Although no special dispersal mechanism exists, most seed is probably spread incidentally by the movement of livestock and through other human agencies."

708	Propagules survive passage through the gut	y
-----	--	---



Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Office of the Gene Technology Regulator. 2008. The Biology of <i>Trifolium repens L.</i> (White Clover). Version 2. Australian Government Dept. of Health and Ageing, Canberra	"Seeds can remain viable after passing through the digestive tracts of sheep, cattle and goats several days after consumption (Suckling 1952; Yamada & Kawaguchi 1971; Yamada & Kawaguchi 1972)."

801	Prolific seed production (>1000/m <sup>2</sup> )	
	<b>Source(s)</b>	<b>Notes</b>
	Burdon, J. (1983). <i>Trifolium Repens L.</i> Journal of Ecology, 71(1), 307-330	[Rarely] "The density of viable seeds in the soil is not high. Turkington et al. ( 1979) recorded 218 seeds/m <sup>2</sup> in the top 10. 5 cm of soil in a 65-yr-old pasture in North Wales, while Chippindale and Milton (1934) found 289/ m <sup>2</sup> in a similar field in southwest Wales. Buried seed populations as high as 2000/m <sup>2</sup> have been recorded occasionally (Champness and Morris 1948)."

802	Evidence that a persistent propagule bank is formed (>1 yr)	y
	<b>Source(s)</b>	<b>Notes</b>
	Coladonato, M. 1993. <i>Trifolium repens</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. <a href="http://www.fs.fed.us/database/feis/plants/forb/trirep/all.html">http://www.fs.fed.us/database/feis/plants/forb/trirep/all.html</a> . [Accessed 26 Feb 2018]	"Hull [17] reported that seeds stored for 25 years in unheated sheds had a germination rate of 73 percent."
	Burdon, J. (1983). <i>Trifolium Repens L.</i> Journal of Ecology, 71(1), 307-330	[Some seeds will persist in the soil for 4-5 years] "The effect of different storage conditions on the survival and viability of <i>T. repens</i> seed has been reported by Lewis (1958). Seeds buried in soil lost viability rapidly with the initial germination of 90% declining to approximately 11 % after 2 yr, and 9% after 4 yr. In the Beal buried seed experiment, no germination of <i>T. repens</i> was recorded after 5 yr (Darlington 1951). Seed stored in a granary also lost viability rapidly (Lewis 1958) the results after 1, 2 and 4 yr being 91, 33 and 5%, respectively. However, the viability of seed kept in a cold store remained high (84% after 4 yr). Mytton (pers. commun.) found that hard seeds stored in a laboratory for over 20 yr still germinated."

803	Well controlled by herbicides	y
	<b>Source(s)</b>	<b>Notes</b>

Qsn #	Question	Answer
	Burdon, J. (1983). <i>Trifolium Repens L.</i> Journal of Ecology, 71(1), 307-330	"A number of nonselective herbicides have been successful in controlling or eliminating many perennial species including <i>T. repens</i> . The Ontario Herbicide Committee ( 1978) recommends the following applications: diuron, simazine and atrazine all at 15-20 kg in 750 L/ha; sodium chlorate mixtures at 1 kg/10 m; ammate X at 1 kg/ 15 m <sup>2</sup> bromacil at 5-10 kg/ha; amazine at 10 kg/ha; and bromacil + diuron at 10-13 kg/ha. Both the B. C. (Anonymous 1977) and the Ontario Herbicide Committee (1978) recommend mecoprop (MCP) at 1 kg/ha, along with a number of 2,4-D mixtures e.g. 2,4-D dicamba, 2,4-D dichloroprop, and 2,4-D/fenoprop/dicamba, for control of white clover in turfs. Hagggar (1974) manipulated the white clover content in swards by applying various grass-suppressing herbicides such as carbetamide, dalapon, propyzamide, and paraquat."
	Office of the Gene Technology Regulator. 2008. The Biology of <i>Trifolium repens L.</i> (White Clover). Version 2. Australian Government Dept. of Health and Ageing, Canberra	"Where white clover is a weed in native ecosystems, spot application of herbicides and hand pulling are standard control measures. 2,4-D and MCPA known to be effective on white clover (Rolston 1987; Riffkin et al. 2005)."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	n
	Source(s)	Notes
	Office of the Gene Technology Regulator. 2008. The Biology of <i>Trifolium repens L.</i> (White Clover). Version 2. Australian Government Dept. of Health and Ageing, Canberra	"Grazing/cutting can be detrimental to white clover although some cultivars (eg Tribute) can be more persistent under hard grazing." ... Moderate to hot fires will kill or severely thin white clover, and as white clover does not bury its seed, the recovery after fire can be patchy and depends on the growth stage of the plant (McGowen 1997)."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Unknown. Probably No] "in Hawai'i naturalized in pastures, lawns, and along roadsides and trails, 720-2,530 m, on Kaua'i, Maui, and Hawai'i. First collected on Hawai'i in 1909 (Rock 3400, BISH)."

**Summary of Risk Traits:**

## High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Naturalized in regions with subtropical climates (esp. at higher elevations)
- Widely naturalized worldwide, including Kauai, Lanai, Maui & Hawaii (Hawaiian Islands)
- Weed in turf, sports surfaces, lawns, along roadsides & other disturbed sites
- Minor crop weed
- Environmental weed in parts of Australia
- Other *Trifolium* species are invasive weeds
- Palatable to animals, but potentially toxic if consumed in large quantities
- Tolerates many soil types
- Reproduces by seeds & vegetatively by stolons
- Seeds dispersed by internally birds & other animals, externally by animals & humans, by water & intentionally planted by people
- Seeds may be a contaminant in other seed mixes
- Some seeds may persist in the soil for 4-5 years

## Low Risk Traits

- Unarmed (no spines, thorns, or burrs)
- Provides fodder for livestock (palatable despite potential toxicity)
- Thrives in high light environments (may limit spread to densely shaded areas)
- Adds nitrogen to the soil (beneficial to other plants)
- Mostly self-incompatible
- Herbicides provide effective control
- Frequent mowing & fire may suppress or control reestablishment