**Taxon:** Trifolium alexandrinum L. **Family:** Fabaceae

**Common Name(s):** berseem clover
Egyptian clover

**Synonym(s):** Trifolium alexandrinum L. subsp.

**Assessor:** Chuck Chimera **Status:** Assessor Approved **End Date:** 2 Mar 2022

**WRA Score:** 2.0 **Designation:** L **Rating:** Low Risk

**Keywords:** Annual Herb, Domesticated, Fodder, N-Fixing, Human-Dispersed

| Qsn # | Question | Answer Option | Answer |
|---|---|---|---|
| 101 | Is the species highly domesticated? | y=-3, n=0 | y |
| 102 | Has the species become naturalized where grown? | y=1, n=-1 | y |
| 103 | Does the species have weedy races? | | |
| 201 | Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical" | (0-low; 1-intermediate; 2-high) (See Appendix 2) | High |
| 202 | Quality of climate match data | (0-low; 1-intermediate; 2-high) (See Appendix 2) | Low |
| 203 | Broad climate suitability (environmental versatility) | y=1, n=0 | n |
| 204 | Native or naturalized in regions with tropical or subtropical climates | y=1, n=0 | y |
| 205 | Does the species have a history of repeated introductions outside its natural range? | y=-2, ?=-1, n=0 | y |
| 301 | Naturalized beyond native range | y = 1*multiplier (see Appendix 2), n= question 205 | y |
| 302 | Garden/amenity/disturbance weed | | |
| 303 | Agricultural/forestry/horticultural weed | | |
| 304 | Environmental weed | n=0, y = 2*multiplier (see Appendix 2) | n |
| 305 | Congeneric weed | n=0, y = 1*multiplier (see Appendix 2) | y |
| 401 | Produces spines, thorns or burrs | y=1, n=0 | 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 | y=1, n=0 | n |

| 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 | | |
| 604 | Self-compatible or apomictic | | |
| 605 | Requires specialist pollinators | y=-1, n=0 | n |
| 606 | Reproduction by vegetative fragmentation | y=1, n=-1 | n |
| 607 | Minimum generative time (years) | 1 year = 1, 2 or 3 years = 0, 4+ years = -1 | 1 |
| 701 | Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas) | | |
| 702 | Propagules dispersed intentionally by people | y=1, n=-1 | y |
| 703 | Propagules likely to disperse as a produce contaminant | | |
| 704 | Propagules adapted to wind dispersal | y=1, n=-1 | n |
| 705 | Propagules water dispersed | | |
| 706 | Propagules bird dispersed | y=1, n=-1 | n |
| 707 | Propagules dispersed by other animals (externally) | | |
| 708 | Propagules survive passage through the gut | | |
| 801 | Prolific seed production (>1000/m2) | | |
| 802 | Evidence that a persistent propagule bank is formed (>1 yr) | | |
| 803 | Well controlled by herbicides | y=-1, n=1 | y |
| 804 | Tolerates, or benefits from, mutilation, cultivation, or fire | | |
| 805 | Effective natural enemies present locally (e.g. introduced biocontrol agents) | | |

**Supporting Data:**

| Qsn # | Question | Answer |
|---|---|---|
| 101 | **Is the species highly domesticated?** | **y** |
| | **Source(s)** | **Notes** |
| | Piano E., & Pecetti L. (2010) Minor Legume Species. In: Boller B., Posselt U.K., Veronesi F. (eds) Fodder Crops and Amenity Grasses. Handbook of Plant Breeding, vol 5. Springer, New York, NY | "Berseem clover is unknown in the wild. Its origin and ancestry were examined by Badr et al. (2008) using AFLP markers. They concluded that T. salmoneum Mout. is the likely progenitor species, which evolved into T. alexandrinum through artificial selection during the domestication process in Syria, with the possible contribution of T. berytheum Boiss. in the same process. After domestication, the early forms of berseem clover may have been taken into rainfed cultivation in Palestine and later into irrigated cropping in Egypt. The Syro-Egyptian germplasm pool is still genetically well differentiated from that of other provenances (such as southern Asia, southern Europe and North Africa), where the species was introduced more recently and likely underwent separate evolutionary processes (Martiniello et al. 1992; Badr et al. 2008)." |
| | Muhammad D., Misri, B., EL-Nahrawy, M., Khan, S. & Serkan, A. (2014). Egyptian Clover (Trifolium alexandrinum) King of Forage Crops. FAO, Cairo | "Berseem is a crop for mild climates and neutral to alkaline soils; in its area of origin it is grown as a winter annual. It was domesticated in Egypt in antiquity and is the oldest cultivated clover. It is uncommon in the wild and there are differences of opinion on its exact origin but it probably came from what is now Syria. Frame (2005) states that it originated in the eastern, Mediterranean; Knight 1985 gives Syria as its origin and the date of its introduction to Egypt as the sixth century AD; the Turkey study in this publication states that T. alexandrinum is found in the wild there." |

| 102 | **Has the species become naturalized where grown?** | **y** |
|---|---|---|
| | **Source(s)** | **Notes** |
| | EPPO (2022). EPPO Global Database (available online). https://gd.eppo.int. [Accessed 28 Feb 2022] | [Trifolium alexandrinum] "A cultivated plant of uncertain origin. Naturalized in various Mediterranean countries, Caucasus, Central Asia to China" |

| 103 | **Does the species have weedy races?** | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall | "Weed of: Orchards & Plantations, Pome Fruits" [Potential weed of some crops, but impacts have not been corroborated in subsequent reviews of the cited literature] |
| | Groves, R. H. et al. (2003). Weed categories for natural and agricultural ecosystem management. Bureau of Rural Sciences, Canberra | Categorized as the following in Queensland, New South Wales and Tasmania: "Present in a State or Territory but not given a rating as an agricultural weed, either because it was not considered a problem or because it was not known to occur in agricultural areas at present." |
| | CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc | Identified as a host of other pests and pathogens, but no direct competitive or detrimental impacts to agriculture or the natural environment have been specified |

| Qsn # | Question | Answer |
|---|---|---|
| **201** | **Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"** | **High** |
| | **Source(s)** | **Notes** |
| | USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 28 Feb 2022] | "Cultivated<br>REGION:<br>Africa<br>NORTHERN AFRICA: Algeria, Egypt<br>NORTHEAST TROPICAL AFRICA: Sudan<br>Asia-Temperate<br>WESTERN ASIA: Iraq, Israel, Jordan, Lebanon, Syria, Turkey<br>CHINA: China<br>EASTERN ASIA: Taiwan<br>Asia-Tropical<br>INDIAN SUBCONTINENT: India, Pakistan<br>MALESIA: Indonesia<br>Australasia<br>AUSTRALIA: Australia<br>Europe<br>REGION: Europe<br>Northern America<br>SOUTHWESTERN U.S.A.: United States [California]<br>Naturalized<br>Africa<br>NORTHERN AFRICA: Egypt<br>Asia-Temperate<br>WESTERN ASIA: Israel, Jordan, Lebanon" |

| 202 | Quality of climate match data | Low |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis | "Cultivated. Guangdong, Jiangsu, Taiwan [native range unknown; cultivated in N Africa and SW Asia]." |

| Qsn # | Question | Answer |
|---|---|---|
| **203** | **Broad climate suitability (environmental versatility)** | **n** |
| | **Source(s)** | **Notes** |
| | Hedayetullah, M., & Zaman, P. (Eds.). (2019). Forage Crops of the World, Volume I: Major Forage Crops. Apple Academic Press Inc., Oakville, ON | "Berseem requires a dry and cool and moderately cold climate. Such conditions prevail during winter and spring seasons in North India which is considered as favorable and productive zone for this crop. The optimum temperature at the time of sowing berseem is 25°C. For vegetative growth, temperature range of 25–27°C has been found ideal. Uniformly high temperature in South Indian conditions limits the cultivation of berseem. Berseem is mainly valued as a winter crop in the subtropics as it grows well in mild winter and recovers strongly after cutting. It does not grow well under hot summer conditions. It is cultivated from 35°N to the tropics, from sea level up to 750 m (Hannaway et al., 2004). Berseem has some frost tolerance up to −15°C for some cultivars (Suttie, 1999). During frost plant remains dormant and no regeneration is recorded. Berseem can grow in areas where annual rainfall ranges between 550 and 750 mm. It can withstand some drought and short periods of waterlogging." |

| | | |
|---|---|---|
| **204** | **Native or naturalized in regions with tropical or subtropical climates** | **y** |
| | **Source(s)** | **Notes** |
| | Muhammad D., Misri, B., EL-Nahrawy, M., Khan, S. & Serkan, A. (2014). Egyptian Clover (Trifolium alexandrinum) King of Forage Crops. FAO, Cairo | "Its production potential, easy cultivation and wide adaptability led to widespread use in mild, humid temperate and sub-tropical areas. Its spread was spectacular in Northern India, now including Pakistan, where farming systems are similar to those in Egypt: wheat-rice rotations, irrigation, smallholder farms with cattle and buffaloes reared on cut fodder and crop residues. Now India has by far the greatest area under berseem; Pakistan comes third with somewhat less than Egypt." |
| | Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall | "Preferred Climate/s: Dryland, Mediterranean, Subtropical, Tropical Origin: Africa, E Asia, Europe, W Asia" |

| | | |
|---|---|---|
| **205** | **Does the species have a history of repeated introductions outside its natural range?** | **y** |
| | **Source(s)** | **Notes** |
| | Piano E., & Pecetti L. (2010) Minor Legume Species. In: Boller B., Posselt U.K., Veronesi F. (eds) Fodder Crops and Amenity Grasses. Handbook of Plant Breeding, vol 5. Springer, New York, NY | "Berseem, or Egyptian, clover is an annual species grown worldwide, mostly in the Mediterranean Basin, the Indian subcontinent and the southern USA, but also introduced in Australia and South Africa. It is a very important forage legume in warm environments with mild winters, and specifically in countries such as Egypt, Turkey, India, Pakistan, southern Italy and Tunisia." |
| | Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis | "Cultivated. Guangdong, Jiangsu, Taiwan [native range unknown; cultivated in N Africa and SW Asia]." |

| | | |
|---|---|---|
| **301** | **Naturalized beyond native range** | **y** |

| Qsn # | Question | Answer |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Bojňanský, V. & Fargašová, A. (2007). Atlas of Seeds and Fruits of Central and East-European Flora: The Carpathian Mountains Region. Springer, Dordrecht, The Netherlands | "Originally growing in the Mediterranean region and Egypt, on fields and shady fallows; widely cultivated in the warmer areas of southern Europe; frequently escaping and temporarily naturalized in the Carpathians." |
| | EPPO (2022). EPPO Global Database (available online). https://gd.eppo.int. [Accessed 28 Feb 2022] | [Trifolium alexandrinum] "A cultivated plant of uncertain origin. Naturalized in various Mediterranean countries, Caucasus, Central Asia to China" |

| 302 | Garden/amenity/disturbance weed | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall | "Weed of: Orchards & Plantations, Pome Fruits" |
| | CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc | Identified as a host of other pests and pathogens, but no direct competitive or detrimental impacts to agriculture or the natural environment have been specified |

| 303 | Agricultural/forestry/horticultural weed | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall | "Weed of: Orchards & Plantations, Pome Fruits" [Potential weed of some crops, but impacts have not been corroborated in subsequent reviews of the cited literature] |
| | Groves, R. H. et al. (2003). Weed categories for natural and agricultural ecosystem management. Bureau of Rural Sciences, Canberra | Categorized as the following in Queensland, New South Wales and Tasmania: "Present in a State or Territory but not given a rating as an agricultural weed, either because it was not considered a problem or because it was not known to occur in agricultural areas at present." |
| | CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc | Identified as a host of other pests and pathogens, but no direct competitive or detrimental impacts to agriculture or the natural environment have been specified |

| 304 | Environmental weed | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall | "Weed of: Orchards & Plantations, Pome Fruits" [No evidence of impacts to natural areas or environment] |
| | CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc | Identified as a host of other pests and pathogens, but no direct competitive or detrimental impacts to agriculture or the natural environment have been specified |
| | Global Invasive Species Database (2022). http://www.iucngisd.org/gisd/. [Accessed 1 Mar 2022] | No evidence |

| 305 | Congeneric weed | y |
|---|---|---|
| | **Source(s)** | **Notes** |

| Qsn # | Question | Answer |
|---|---|---|
| | Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall | "Trifolium alpestre ... Weed of: Cereals" ... "Trifolium angustifolium ... Weed of: Cereals, Pastures" ... "Trifolium arvense ... Weed of: Cereals, Lupins, Orchards & Plantations, Pastures" ... "Trifolium aureum ... Weed of: Cereals, Vegetables" ... "Trifolium campestre ... Weed of: Cereals, Orchards & Plantations, Pastures, Pome Fruits" ... "Trifolium cernuum ... Weed of: Pastures" ... "Trifolium clusii ... Weed of: Orchards & Plantations, Pome Fruits" ... "Trifolium dubium ... Weed of: Cereals, Orchards & Plantations, Pastures" ... "Trifolium echinatum ... Weed of: Cereals" ... "Trifolium fragiferum ... Weed of: Cereals, Orchards & Plantations" ... "Trifolium glomeratum ... Weed of: Pastures" ... "Trifolium hybridum ... Weed of: Cereals, Nursery Production, Orchards & Plantations" "Trifolium incarnatum ... Weed of: Cereals, Vegetables" ... "Trifolium lappaceum ... Weed of: Orchards & Plantations, Pome Fruits" ... "Trifolium medium ... Weed of: Cereals" ... "Trifolium patens ... Weed of: Pastures" ... "Trifolium pretense ... Weed of: Cereals, Grapevines, Nursery Production, Orchards & Plantations, Pastures, Vegetables" ... "Trifolium procumbens ... Weed of: Cereals" ... "Trifolium purpureum ... Weed of: Orchards & Plantations, Pome Fruits" ... "Trifolium resupinatum ... Weed of: Orchards & Plantations, Pastures, Pome Fruits" ... "Trifolium rubens ... Weed of: Cereals" ... "Trifolium rueppellianum ... Weed of: Orchards & Plantations" ... "Trifolium stellatum ... Weed of: Cereals, Orchards & Plantations, Pome Fruits" ... "Trifolium strepens ... Weed of: Cereals" ... "Trifolium striatum ... Weed of: Pastures" ... "Trifolium subterraneum ... Weed of: Cereals, Pastures" ... "Trifolium tomentosum ... Weed of: Cereals," |
| | White, M. R. (ed.). (2013). Invasive Plants and Weeds of the National Forests and Grasslands in the Southwestern Region. Second Edition. USDA Forest Service, Southwestern Region, Apache-Sitgreaves National Forests | "White clover may become weedy or invasive in some regions or habitats and may displace desirable vegetation if not properly managed making it a concern in riparian and moist meadow habitats. This species generally occurs as a weed in wildland areas of the Southwestern Region rather than as an invasive plant." |

| 401 | Produces spines, thorns or burrs | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis | "Annual herbs, sparsely pubescent to glabrescent. Stems erect or ascending, 20–60 cm, striate, branched at base. Leaves palmately 3-foliolate, alternate on lower part of stem, opposite on upper part; petioles equal to leaflets in lower leaves, shorter in upper leaves; stipules lanceolate, adnate to petiole for 1/2 their length, veins 4 or 5, pale green, margins sparsely ciliate, apex subulate; leaflets obovate or broadly elliptic to oblonglanceolate, 15–30(–50) × 6–15 mm, lateral veins 6–10, base broadly cuneate to obtuse, margins of apical 1/2 serrate, apex obtuse, rarely retuse. Flowers numerous, in ovoid or conic, terminal or axillary heads, 12–25 × 10–15 mm; peduncles 1–2 × heads; involucre of short bracts, united at base. Calyx 3.5–4 mm, veins 10; teeth unequal, plumose, lower tooth equal to tube, others shorter. Corolla creamy white,8–13 mm. Legume 22–25 mm. Seed 1, yellow, ovoid." |

| 402 | Allelopathic | |
|---|---|---|

| Qsn # | Question | Answer |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Piano E., & Pecetti L. (2010) Minor Legume Species. In: Boller B., Posselt U.K., Veronesi F. (eds) Fodder Crops and Amenity Grasses. Handbook of Plant Breeding, vol 5. Springer, New York, NY | "It is considered a very interesting crop for its high forage yield distributed over several mowings (in the regrowing types), good quality (its crude protein content being comparable to that of lucerne), high digestibility and palatability, as well as its positive effect on the soil fertility in rotation with other crops, particularly cereals and cotton." |
| | Muhammad D., Misri, B., EL-Nahrawy, M., Khan, S. & Serkan, A. (2014). Egyptian Clover (Trifolium alexandrinum) King of Forage Crops. FAO, Cairo | [Extracts exhibit allelopathic effects under experimental conditions] "Crop competition is a natural phenomenon. Besides the inherent characters of plants to compete, chemical exudates from them are toxic or harmful to others and do not let these grow, or hamper their growth. This is known as allelopathy; it occurs in berseem and Toaima et al (1999) studied the allelopathic effects of two cultivars. Root extracts of Giza 15 and Helaly were prepared and their effects on germination, seedling length and fresh weight/10 seedlings of succeeding summer crops after seven days of sowing were studied. Summer crops tested were maize, soybean, berseem and sunflower. Germination in all crops except maize was reduced considerably by root extracts of Giza 15. Reduction in germination was 57.0 and 66.67% with 20 and 10% concentration extract respectively in case of soybean. In sunflower germination was almost completely inhibited by root extract of Giza 15. With application of 20% concentration of this root extract germination was reduced by 87.67% in sunflower. Similarly, seedling length of soybean and berseem was reduced considerably with 20% root extract of Giza 15. As far as the antitoxic effect of Giza 15 root extract is concerned, it reduced germination of berseem by 77.0% and 82.09% with application of 20% and 10% concentration extracts of Giza 15. The root extract of Helaly reduced germination in all crops except maize. These detrimental effects of allelopathic constituents of two cultivars are visible only under experimental conditions. The compounds in due time get degraded by soil micro organisms or get transformed and cause no significant effect on succeeding crops." |

| 403 | Parasitic | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis | "Annual herbs, sparsely pubescent to glabrescent." [No evidence] |

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

| Qsn # | Question | Answer |
|---|---|---|
| | Piano E., & Pecetti L. (2010) Minor Legume Species. In: Boller B., Posselt U.K., Veronesi F. (eds) Fodder Crops and Amenity Grasses. Handbook of Plant Breeding, vol 5. Springer, New York, NY | "Because of its high growing point, berseem clover is not well suited to grazing but it recovers well after mowing, particularly those types characterised by marked regrowth ability as described below. It is considered a very interesting crop for its high forage yield distributed over several mowings (in the regrowing types), good quality (its crude protein content being comparable to that of lucerne), high digestibility and palatability, as well as its positive effect on the soil fertility in rotation with other crops, particularly cereals and cotton. In countries such as India or Tunisia, the winter availability of green feed provided by berseem clover is a basic element for the sustainability of the local dairy industry (Malaviya et al. n.d.). In southern Italy, this crop has the important function to supplement the often poor forage yield of natural pasturelands on which the widespread extensive livestock systems rely." |

| 405 | Toxic to animals | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Fuller, T.C. & McClintock, E.M. (1986). Poisonous plants of California: Issue 53 of California natural history guides. University of California Press, Berkeley and Los Angeles, CA | [Contains chemicals that may cause infertility if consumed exclusively] "Symptoms: Infertility and an effect on the growth rate of animals; perhaps increased mastitis in cows. Unknown toxins cause photosensitization or " bighead." Infertility of ewes was first demonstrated in those feeding almost exclusively on Trifolium subterraneum. This species solidly occupies vast areas in Australia and is the only source of food for these animals. Subclover is not widely adapted to California conditions; sparingly naturalized mostly along the immediate central and northern coast. The phytoestrogen content of the Subterranean Clover cultivar 'Yarloop' may be 200 times greater than that of other cultivars. This amount exceeds the level that is considered the cause of infertility in ewes. Phytoestrogens have been found in the sperm of males feeding on plants of Subterranean Clover. Genistein, from Subterranean Clover, has been found to be the most potent of the isoflavones. Coumestrol, however, is 30 to 100 times as potent as the isoflavones. Although California has no records of infertility in animals feeding on legumes with phytoestrogens, animals fed exclusively on such legumes should be watched for infertility. These estrogens also occur in Alfalfa, Medicago sativa, and Berseem Clover, Trifolium alexandrinum, the latter rarely grown in California." |
| | Heuzé V., Tran G., Boudon A., Bastianelli D., Lebas F. (2016). Berseem (Trifolium alexandrinum). Feedipedia, a programme by INRAE, CIRAD, AFZ and FAO. https://www.feedipedia.org/node/248. [Accessed 1 Mar 2022] | [No evidence] "It is a high quality green forage. Berseem should be cut 50 to 60 days after planting and then every 30-40 days (Suttie, 1999). The highest yield of protein with a relatively low yield of fibre was obtained by cutting the plant at a height of about 40 cm. Five to six cuttings can be done under irrigation and one or two at the end of the cool season in dryland (Göhl, 1982)." |

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

| Qsn # | Question | Answer |
|---|---|---|
| | Muhammad D., Misri, B., EL-Nahrawy, M., Khan, S. & Serkan, A. (2014). Egyptian Clover (Trifolium alexandrinum) King of Forage Crops. FAO, Cairo | "Foliar diseases caused by fungi, bacteria and viruses are very common in clovers and Egyptian clover is no exception. Black stem and leaf spots are very common. Shaat (2003) studied these diseases in Minia. Isolation and pathogenicity tests revealed two genera of fungi identified as Phoma and Epicoccum. Two isolates viz, Phoma medicaginis and Epicoccum spp. were identified as the cause. The former causes spotting of the foliage and black stem while the latter caused limited, small and dark brown spots mainly on leaves and at times on stem. Younger plants were more susceptible to fungal infections. Hundred percent incidence of disease was found on 25 day old plants while 35 and 45 day old plants recorded 87.0 and 66.0% of disease with 66% and 40% severity. Disease incidence was more severe in early cuts and declined in later ones. Disease incidence after first cut was 53% with 34% severity. In second and third cut the incidence was 36% and 26% with 20% and 10% severity respectively. Similarly, early irrigation caused more disease while late irrigation reduced these significantly. Irrigation after 14 days caused 100% incidence with 54% severity while irrigation after intervals of 21 and 35 days caused 70% and 23% incidence with 24% and 14% severity respectively. Spray of antioxidants to 25 days old stands resulted in protection against P. medicaginis infection. Ascorbic acid provided the highest protection when applied 24 hours before inoculation followed by salicylic acid." |
| | CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc | "Major host of: Agrotis ipsilon (black cutworm); Helicotylenchus dihystera (common spiral nematode); Hypera postica (lucerne weevil); Languria mozardi (clover stem borer); Lolium temulentum (darnel); Macrophomina phaseolina (charcoal rot of bean/tobacco); Pseudomonas syringae pv. syringae (bacterial canker or blast (stone and pome fruits))<br>Minor host of: Aphis gossypii (cotton aphid); Aproaerema modicella (groundnut leaf miner); Bagrada hilaris (painted bug); Cornu aspersum (common garden snail); Cuscuta campestris (field dodder); Didymella rabiei (chick pea blight); Etiella zinckenella (pea pod borer); Haematonectria haematococca (dry rot of potato); Hoplolaimus indicus (lance nematode); Orobanche ramosa (branched broomrape); Phalaris minor (littleseed canarygrass); Pratylenchus penetrans (nematode, northern root lesion); Pratylenchus thornei; Rotylenchulus reniformis (reniform nematode); Sitona cylindricollis (sweetclover weevil); Spodoptera littoralis (cotton leafworm); Spodoptera litura (taro caterpillar); Thysanoplusia orichalcea (slender burnished brass moth); Verticillium dahliae (verticillium wilt)<br>Wild host of: Chrysodeixis eriosoma (green looper caterpillar)" |

| 407 | Causes allergies or is otherwise toxic to humans | 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 | No evidence of risks or hazard to humans |

| Qsn # | Question | Answer |
|---|---|---|
| **408** | **Creates a fire hazard in natural ecosystems** | **n** |
| | **Source(s)** | **Notes** |
| | Piano E., & Pecetti L. (2010) Minor Legume Species. In: Boller B., Posselt U.K., Veronesi F. (eds) Fodder Crops and Amenity Grasses. Handbook of Plant Breeding, vol 5. Springer, New York, NY | [No evidence. A cultivated annual requiring sufficient precipitation or irrigation to grow] "In major growing areas such as North Africa and India, berseem clover is usually grown under frequent irrigation. However, in southern Italy and other regions it is grown rainfed. In Australia a minimum of 550mm rainfall is suggested for high forage production when grown rainfed in southern New South Wales (Hackney et al. 2007). Although its annual cycle should prevent the species from being exposed to severe drought stress, enhanced drought tolerance in spring may be an important requirement for rainfed cultivation." |

| 409 | Is a shade tolerant plant at some stage of its life cycle | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | American Meadows (2022). Berseem Clover Seeds. https://www.americanmeadows.com/grass-and-groundcover-seeds/clover-seeds/berseem-clover-seeds. [Accessed 1 Mar 2022] | "Light Requirements - Full Sun" |
| | Cantueso Natural Seeds. (2022). Trifolium alexandrinum. https://cantuesoseeds.com/en/product/bulk-seeds/trifolium-alexandrinum/. [Accessed 1 Mar 2022] | "Light Requirements Full Sun" |

| 410 | Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island) | y |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Piano E., & Pecetti L. (2010) Minor Legume Species. In: Boller B., Posselt U.K., Veronesi F. (eds) Fodder Crops and Amenity Grasses. Handbook of Plant Breeding, vol 5. Springer, New York, NY | "Berseem clover tolerates a wide range of soils, although with a preference for well-drained heavy loams or clays. Some salt tolerance was reported in the species." |
| | Muhammad D., Misri, B., EL-Nahrawy, M., Khan, S. & Serkan, A. (2014). Egyptian Clover (Trifolium alexandrinum) King of Forage Crops. FAO, Cairo | "It grows on wide ranges of soils. However, well drained medium loamy soils rich in lime are preferred. It does not withstand acidic soils but grows well in alkaline and saline situations." |

| 411 | Climbing or smothering growth habit | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis | "Annual herbs, sparsely pubescent to glabrescent." |

| Qsn # | Question | Answer |
|---|---|---|
| **412** | **Forms dense thickets** | **n** |
| | **Source(s)** | **Notes** |
| | Muhammad D., Misri, B., EL-Nahrawy, M., Khan, S. & Serkan, A. (2014). Egyptian Clover (Trifolium alexandrinum) King of Forage Crops. FAO, Cairo | "Berseem is an annual legume with oblong leaflets, hollow stems and upright growth habit which varies from erect to decumbent during winter and spring." [No evidence. An annual, cultivated crop] |

| 501 | Aquatic | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Piano E., & Pecetti L. (2010) Minor Legume Species. In: Boller B., Posselt U.K., Veronesi F. (eds) Fodder Crops and Amenity Grasses. Handbook of Plant Breeding, vol 5. Springer, New York, NY | [Terrestrial] "Berseem clover tolerates a wide range of soils, although with a preference for well-drained heavy loams or clays." |

| 502 | Grass | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 28 Feb 2022] | Genus: Trifolium<br>Subgenus: Trifolium<br>Section: Trifolium<br>Family: Fabaceae (alt. Leguminosae)<br>Subfamily: Faboideae<br>Tribe: Trifolieae |

| 503 | Nitrogen fixing woody plant | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Muhammad D., Misri, B., EL-Nahrawy, M., Khan, S. & Serkan, A. (2014). Egyptian Clover (Trifolium alexandrinum) King of Forage Crops. FAO, Cairo | [N-fixing annual herb] "Berseem's greatest contribution to Egyptian agriculture is its ability to fix atmospheric nitrogen and increase soil fertility, which may be the main reason for its adoption by farmers. The Agriculture Research Council began producing inoculants in 1950 and their efforts to find and produce more compatible and efficient rhizobia continue. Three local rhizobium isolates were compared with a reference strain and control. The number of nodules per 10 plants and their dry weight was recorded after 45 days from sowing. Dry weight of plants was recorded and plants analyzed for N content after 45 days from sowing. Fresh and dry weight/ha were recorded in all treatments. Samples were analyzed for chemical constituents, total digestible protein and digestible nutrients. Native rhizobia can be very effective. Uninoculated plants produced up to 110 nodules per 10 plants while inoculated plants showed significant increases in nodule numbers and dry weight. Local strains surpassed the reference strain significantly in increasing nodule number and biomass. Significant differences due to both inoculation and cultivars were observed ." |

| 504 | Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers) | n |
|---|---|---|

| Qsn # | Question | Answer |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Muhammad D., Misri, B., EL-Nahrawy, M., Khan, S. & Serkan, A. (2014). Egyptian Clover (Trifolium alexandrinum) King of Forage Crops. FAO, Cairo | "Berseem plants are erect, rather hairy annual with a deep root system and trifoliate, elongated and oblong leaflets." |

| 601 | Evidence of substantial reproductive failure in native habitat | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Piano E., & Pecetti L. (2010) Minor Legume Species. In: Boller B., Posselt U.K., Veronesi F. (eds) Fodder Crops and Amenity Grasses. Handbook of Plant Breeding, vol 5. Springer, New York, NY | "Berseem, or Egyptian, clover is an annual species grown worldwide, mostly in the Mediterranean Basin, the Indian subcontinent and the southern USA, but also introduced in Australia and South Africa. It is a very important forage legume in warm environments with mild winters, and specifically in countries such as Egypt, Turkey, India, Pakistan, southern Italy and Tunisia." [No evidence] |

| 602 | Produces viable seed | y |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Muhammad D., Misri, B., EL-Nahrawy, M., Khan, S. & Serkan, A. (2014). Egyptian Clover (Trifolium alexandrinum) King of Forage Crops. FAO, Cairo | "Berseem can be a multiuse crop for both forage and seed production; it is self-incompatible and must be crosspollinated to produce seed; this is done primarily by bees. Good seed yields are produced when honey bees, Apis mellifera, are introduced to the field at eight colonies per hectare. Unlike other legumes, the flower structure of berseem provides a greater opportunity for cross-pollination after each visit by a pollinator, the pistil and stamens move back to their original position. A second or third visit by an insect will have the same effect and the chances of the pistil being properly fertilized will last as long as it remains in a condition to receive pollen. Berseem should be cut and swathed when 80-90% of the heads are brown; the swaths are left to dry and may be threshed in 7-10 days. Seed should be dried if the moisture content exceeds 14%. Specialized machinery may be required for further processing. Average seed yield is about 750 kilograms per hectare in pure stands for seed production. However seed can be produced in faba bean (Vicia faba) and wheat fields as intercrops but seed yield are lower. Thousands of tonnes of berseem seed are produced in Egypt annually for export to Eastern Asian and Southern and Western European countries." |
| | Heuzé V., Tran G., Boudon A., Bastianelli D., Lebas F. (2016). Berseem (Trifolium alexandrinum). Feedipedia, a programme by INRAE, CIRAD, AFZ and FAO. https://www.feedipedia.org/node/248. [Accessed 28 Feb 2022] | "Berseem is only propagated by seeds and is usually sown in early autumn. It can be sown on a conventional seedbed or be direct drilled." |

| Qsn # | Question | Answer |
|---|---|---|
| **603** | **Hybridizes naturally** | |
| | **Source(s)** | **Notes** |
| | Kaur, A., Kaur, K.P., Kalia, A. et al. (2017). Generation of interspecific hybrids between Trifolium vesiculosum and T. alexandrinum using embryo rescue. Euphytica, 213(11), 1-15 | [Hybridization possible, but hybrids failed to set seeds under natural conditions] "Abstract Interspecific hybrids were developed between Trifolium alexandrinum cultivar Wardan 9 Trifolium vesiculosum and T. alexandrinum cultivar BL1 9 T. vesiculosum through embryo rescue, as the crosses failed to set seed under natural conditions." |

| 604 | Self-compatible or apomictic | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Muhammad D., Misri, B., EL-Nahrawy, M., Khan, S. & Serkan, A. (2014). Egyptian Clover (Trifolium alexandrinum) King of Forage Crops. FAO, Cairo | "Berseem can be a multiuse crop for both forage and seed production; it is self-incompatible and must be crosspollinated to produce seed; this is done primarily by bees." |
| | Piano E., & Pecetti L. (2010) Minor Legume Species. In: Boller B., Posselt U.K., Veronesi F. (eds) Fodder Crops and Amenity Grasses. Handbook of Plant Breeding, vol 5. Springer, New York, NY | [Depends on genotype] "The species is normally cross-pollinated by insects but considerable variation for self-pollination may occur, as the self-incompatibility mechanism is incomplete and variable among genotypes. Contrasting results were reported for its mating system, ranging from high self-incompatibility to self-fertility (Tasei 1984; Dixit et al. 1989). Tripping of flowers is nonetheless required for pollination and seed set even in self-compatible lines (Roy et al. 2005)." |

| 605 | Requires specialist pollinators | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Muhammad D., Misri, B., EL-Nahrawy, M., Khan, S. & Serkan, A. (2014). Egyptian Clover (Trifolium alexandrinum) King of Forage Crops. FAO, Cairo | "Trifolium alexandrinum is an entomophilous, cross pollinated plant. Honey bees are the most important agents of cross fertilization. Under Egyptian conditions cross-pollination in traditional cultivars, Meskawi and Fahl was up to 82 percent in the presence of bees. Under uncaged conditions seed set was 51.9% while under caged conditions seed set was only 0.96% confirming its cross pollinated character." |

| 606 | Reproduction by vegetative fragmentation | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Heuzé V., Tran G., Boudon A., Bastianelli D., Lebas F. (2016). Berseem (Trifolium alexandrinum). Feedipedia, a programme by INRAE, CIRAD, AFZ and FAO. https://www.feedipedia.org/node/248. [Accessed 28 Feb 2022] | "Berseem is only propagated by seeds and is usually sown in early autumn. It can be sown on a conventional seedbed or be direct drilled." |

| 607 | Minimum generative time (years) | 1 |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Muhammad D., Misri, B., EL-Nahrawy, M., Khan, S. & Serkan, A. (2014). Egyptian Clover (Trifolium alexandrinum) King of Forage Crops. FAO, Cairo | "Trifolium alexandrinum is an annual, 30-60 cm tall, with erect hairy, stems and branches.: |

| Qsn # | Question | Answer |
|---|---|---|
| **701** | **Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)** | |
| | **Source(s)** | **Notes** |
| | Bojňanský, V. & Fargašová, A. (2007). Atlas of Seeds and Fruits of Central and East-European Flora: The Carpathian Mountains Region. Springer, Dordrecht, The Netherlands | "Seeds broad ellipsoid to ovoid, hilum rounded, white, 2-2.5 x 1.5-1.8 mm. Surface smooth, slight lustrous, yellow- to pale- or dark-brown." [Seeds small and could attach to footwear, tires, or tools in soil, but direct evidence lacking] |

| | | |
|---|---|---|
| **702** | **Propagules dispersed intentionally by people** | **y** |
| | **Source(s)** | **Notes** |
| | Piano E., & Pecetti L. (2010) Minor Legume Species. In: Boller B., Posselt U.K., Veronesi F. (eds) Fodder Crops and Amenity Grasses. Handbook of Plant Breeding, vol 5. Springer, New York, NY | "Berseem, or Egyptian, clover is an annual species grown worldwide, mostly in the Mediterranean Basin, the Indian subcontinent and the southern USA, but also introduced in Australia and South Africa. It is a very important forage legume in warm environments with mild winters, and specifically in countries such as Egypt, Turkey, India, Pakistan, southern Italy and Tunisia." |
| | Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. (2010). Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis | "Cultivated. Guangdong, Jiangsu, Taiwan [native range unknown; cultivated in N Africa and SW Asia]." |

| | | |
|---|---|---|
| **703** | **Propagules likely to disperse as a produce contaminant** | |
| | **Source(s)** | **Notes** |
| | Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall | "Major Pathway/s: Contaminant, Crop, Ornamental, Pasture" [Possibly could be introduced as a contaminant of other seed shipments, although this plant is typically cultivated and introduced intentionally] |
| | Buddenhagen, C. E., Rubenstein, J. M., Hampton, J. G., & Rolston, M. P. (2021). The phytosanitary risks posed by seeds for sowing trade networks. PloS one, 16(11), e0259912 | [Seed shipments of Trifolium alexandrinum were contaminated by dodder] "Also, a dodder, Cuscuta pedicellata Ledeb., not known to present in New Zealand, arrived in 2018 with a five-tonne shipment of berseem clover (Trifolium alexandrinum L.) and was sold for use in regenerative agriculture seed mixes, and then recalled [48], the problem species was not detected during border inspections, but by the seed company." |

| | | |
|---|---|---|
| **704** | **Propagules adapted to wind dispersal** | **n** |
| | **Source(s)** | **Notes** |
| | Bojňanský, V. & Fargašová, A. (2007). Atlas of Seeds and Fruits of Central and East-European Flora: The Carpathian Mountains Region. Springer, Dordrecht, The Netherlands | "Seeds broad ellipsoid to ovoid, hilum rounded, white, 2-2.5 x 1.5-1.8 mm. Surface smooth, slight lustrous, yellow- to pale- or dark-brown." [No obvious morphological adaptations for wind dispersal] |

| Qsn # | Question | Answer |
|---|---|---|
| **705** | **Propagules water dispersed** | |
| | **Source(s)** | **Notes** |
| | Bojňanský, V. & Fargašová, A. (2007). Atlas of Seeds and Fruits of Central and East-European Flora: The Carpathian Mountains Region. Springer, Dordrecht, The Netherlands | "Seeds broad ellipsoid to ovoid, hilum rounded, white, 2-2.5 x 1.5-1.8 mm. Surface smooth, slight lustrous, yellow- to pale- or dark-brown." [Buoyancy unknown, but could possibly be secondarily dispersed by water] |

| 706 | **Propagules bird dispersed** | **n** |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Bojňanský, V. & Fargašová, A. (2007). Atlas of Seeds and Fruits of Central and East-European Flora: The Carpathian Mountains Region. Springer, Dordrecht, The Netherlands | "Seeds broad ellipsoid to ovoid, hilum rounded, white, 2-2.5 x 1.5-1.8 mm. Surface smooth, slight lustrous, yellow- to pale- or dark-brown." [No evidence. Not fleshy-fruited] |

| 707 | **Propagules dispersed by other animals (externally)** | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Bojňanský, V. & Fargašová, A. (2007). Atlas of Seeds and Fruits of Central and East-European Flora: The Carpathian Mountains Region. Springer, Dordrecht, The Netherlands | "Seeds broad ellipsoid to ovoid, hilum rounded, white, 2-2.5 x 1.5-1.8 mm. Surface smooth, slight lustrous, yellow- to pale- or dark-brown." [Seeds small and could attach to animals, but direct evidence lacking] |

| 708 | **Propagules survive passage through the gut** | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Muhammad D., Misri, B., EL-Nahrawy, M., Khan, S. & Serkan, A. (2014). Egyptian Clover (Trifolium alexandrinum) King of Forage Crops. FAO, Cairo | [Unknown. Other Trifolium species can be dispersed by gut passage through animals] "Egyptian clover, or berseem, Trifolium alexandrinum, a very important crop, for fodder and soil fertility maintenance, was domesticated in Egypt and is now widespread in irrigated cropping systems in west and south Asia and used in commercial farming in many countries with mild winters;" |

| Qsn # | Question | Answer |
|---|---|---|
| **801** | **Prolific seed production (>1000/m2)** | |
| | **Source(s)** | **Notes** |
| | Hedayetullah, M., & Zaman, P. (Eds.). (2019). Forage Crops of the World, Volume I: Major Forage Crops. Apple Academic Press Inc., Oakville, ON | "The seeds are abundant under favorable conditions." |
| | Muhammad D., Misri, B., EL-Nahrawy, M., Khan, S. & Serkan, A. (2014). Egyptian Clover (Trifolium alexandrinum) King of Forage Crops. FAO, Cairo | [Unknown. Seed densities under cultivation may not reflect natural seed production] "Berseem is an unusual crop since its vegetative growth is the part used. Its foliage and tender stems of the plants are fed to animals. During its vegetative phase the crop is harvested several times and used as forage. In order to get the maximum cuts farmers try to prolong its growth and some use last phase for seed production. To obtain a good seed crop, berseem fields have to be uncut after February-March to let it produce seed which is available by mid June. By this time it is too late to sow the next crop so few farmers produce their own seed. Berseem grows during the entire winter from October to May; it is rarely grown with the intention of seed production. Sometimes farmer leave crop for seed." |

| | | |
|---|---|---|
| **802** | **Evidence that a persistent propagule bank is formed (>1 yr)** | |
| | **Source(s)** | **Notes** |
| | Bahukhandi, D., Manjunatha, N., Vijay, D., & Singh, H. V. (2017). Effect of seed treatments and storage containers on seed quality of berseem (Trifolium alexandrinum L.). Range Management and Agroforestry, 38(2), 227-233 | [Seeds may be stored for up to 24 months, and may persist in the soil under ideal conditions] "The study indicated that bamboo containers and earthen pots were suitable for short term (6-12 months) and polylined bags for medium term (12-24 months) storage. The combination of seed treatment with carbendazim or malathion, and polylined bag as storage container was found suitable to maintain berseem seed viability for more than 24 months." |
| | Walters, C., Wheeler, L. M., & Grotenhuis, J. M. (2005). Longevity of seeds stored in a genebank: species characteristics. Seed Science Research, 15(01), 1-20 | [Trifolium alexandrinum seeds remained viable for 43.3 years under artificial storage conditions] "Table 1. Storage performance of seeds in the USDA National Plant Germplasm System (NPGS) collection. The study includes accessions that were harvested between 1934 and 1975 and had initial germination percentages greater than 75% (except where indicated). Seeds were initially stored at 5°C, but were transferred to - l8°C in 1978. Data for most species reflect storage for 24- 26 years at - 18°C. Initial and final germination values are averages calculated within 1 year of harvest and after the indicated storage time, respectively." |

| | | |
|---|---|---|
| **803** | **Well controlled by herbicides** | **y** |
| | **Source(s)** | **Notes** |

| Qsn # | Question | Answer |
|---|---|---|
| | Burdon, J. (1983). Trifolium repens L. Journal of Ecology, 71(1), 307-330 | [Herbicides to control other Trifolium species would presumably be effective if needed] "A number of nonselective herbicides have been successful in controlling or eliminating many perennial species including T. repens. 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 I kg/10 m; ammate X at 1 kg/ 15 m2 bromacil at 5-10 kg/ha; amizine 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 (MCPP) 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. Haggar (1974) manipulated the white clover content in swards by applying various grass-suppressing herbicides such as carbetamide, dalapon, propyzamide, and paraquat." |
| | Western Australian Herbarium (1998–2021). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. https://florabase.dpaw.wa.gov.au/. [Accessed 2 Mar 2022] | [Herbicides to control Trifolium resupinatum would likely prove effective if needed] "Suggested method of management and control. Prevent seed set for 5 years. Spot spray with 1% glyphosate before flowering. Otherwise spot spray with 4 g Lontrel®, 1 g Logran®, 0.1 g metsulfuron methyl (600 g/L) or 0.1 g Glean® in 10 L water + wetting agent when plants are actively growing. Repeat annually for several years. Read the manufacturers' labels and material safety data sheets before using herbicides." |

| 804 | **Tolerates, or benefits from, mutilation, cultivation, or fire** | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Muhammad D., Misri, B., EL-Nahrawy, M., Khan, S. & Serkan, A. (2014). Egyptian Clover (Trifolium alexandrinum) King of Forage Crops. FAO, Cairo | [Can be cut repeatedly, but as an annual, the crop will not persist for greater than one growing season] "Berseem is an unusual crop since its vegetative growth is the part used. Its foliage and tender stems of the plants are fed to animals. During its vegetative phase the crop is harvested several times and used as forage. In order to get the maximum cuts farmers try to prolong its growth and some use last phase for seed production." |
| | Heuzé V., Tran G., Boudon A., Bastianelli D., Lebas F. (2016). Berseem (Trifolium alexandrinum). Feedipedia, a programme by INRAE, CIRAD, AFZ and FAO. https://www.feedipedia.org/node/248. [Accessed 28 Feb 2022] | [May depend on height of plants] "Berseem should be cut when basal buds are short (about 2-4 cm high) so that they escape cutting, which would hamper regrowth and forage yield (Villax, 1963). Pasture - Berseem does not perform well under grazing as livestock may damage its upper growing buds. When grazing is intended in irrigated pastures it should start before the sward becomes too erect. The sward should be grazed down to 5-6 cm high and the rest period should be about 30-40 days between grazing periods (Hackney et al., 2007)." |

| 805 | **Effective natural enemies present locally (e.g. introduced biocontrol agents)** | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | WRA Specialist. (2022). Personal Communication | Unknown |

**Summary of Risk Traits:**

High Risk / Undesirable Traits
• Naturalized in regions with tropical to subtropical climates (native range unknown)
• Reported to be a weed in some crops (although impacts have not been specified or quantified)
• Other Trifolium species have become invasive
• Contains chemicals that may cause infertility if consumed exclusively by animals
• Tolerates a wide range of soils
• Reproduces exclusively by seeds
• Some genotypes may be self-compatible
• Seeds dispersed intentionally by people and potentially as a seed contaminant
• Seeds able to be stored for extended periods; May form a persistent seed bank
• Can be repeatedly cut, but plants are annuals and will only persist for one growing season

Low Risk Traits
• Despite naturalization and reports of weediness, negative impacts have not been specified or quantified
• Unarmed (no spines, thorns, or burrs)
• Palatable and provides fodder for livestock
• Thrives in full sun (dense shade may inhibit ability to spread)
• Not reported to spread vegetatively
• Herbicides may provide effective control if needed

Second Screening Results for Herbs or Low Stature Shrubby Life Forms

(A) Reported as a weed of cultivated lands? Yes, but impacts have not been quantified
(B) Unpalatable to grazers or known to form dense stands? No. Palatable to grazers, and not known to form dense stands
Outcome = Accept (Low Risk)