Taxon: Alysicarpus vaginalis (L.) DC.

Family: Fabaceae

Common Name(s): alyce clover
buffalo clover
buffalo-bur
one-leaf clover
white moneywort

Synonym(s): Alysicarpus nummularifolius
Hedysarum vaginale L.

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 22 Sep 2021

WRA Score: 14.0 **Designation:** H(HPWRA) **Rating:** High Risk

Keywords: Annual/Perennial Herb, Turf Weed, Fodder, N-Fixing, 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)	High
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		
304	Environmental weed		
305	Congeneric weed		
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic	y=1, n=0	n
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y
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	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	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	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m2)	y=1, n=-1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	**Is the species highly domesticated?**	**n**
	Source(s)	**Notes**
	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 of domestication] "A variable species native to the Paleotropics; in Hawai'i naturalized in dry, disturbed areas such as along roadsides and in vacant lots, 20-150 m, on Kaua'i, O'ahu, Maui, and reported, but not documented, from Hawai'i."

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. (2021). Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. (2021). 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"**	**High**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 20 Sep 2021]	"Native Africa NORTHEAST TROPICAL AFRICA: Sudan, Yemen [Arkhabīl Suquţrá] EAST TROPICAL AFRICA: Kenya, Tanzania, Uganda WEST-CENTRAL TROPICAL AFRICA: Democratic Republic of the Congo, Gabon, Rwanda, Sao Tome and Principe WEST TROPICAL AFRICA: Ghana, Niger, Nigeria, Sierra Leone, Togo SOUTH TROPICAL AFRICA: Angola, Mozambique, Zambia, Zimbabwe SOUTHERN AFRICA: Eswatini, South Africa [KwaZulu-Natal, Limpopo, Mpumalanga] WESTERN INDIAN OCEAN: Mauritius, Reunion Asia-Temperate ARABIAN PENINSULA: Oman, Yemen EASTERN ASIA: Japan [Ryukyu Islands], Taiwan Asia-Tropical INDIAN SUBCONTINENT: India, Sri Lanka, Pakistan PAPUASIA: Papua New Guinea INDO-CHINA: Cambodia, Laos, Thailand, Vietnam MALESIA: Indonesia, Malaysia, Philippines"

Qsn #	Question	Answer
202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 20 Sep 2021]	

203	**Broad climate suitability (environmental versatility)**	**y**
	Source(s)	**Notes**
	Duke, J. A. (1981). Handbook of Legumes of World Economic Importance. Plenum Press, New York	"Adapted to areas near Gulf of Mexico; requires a tropical to subtropical climate, and will grow from sea level to 1,380-m altitude in many tropical areas."
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 20 Sep 2021]	"Broad adaptation to temperature, from warm temperate regions to the tropics, and from sea level to 1,400 m asl in many tropical areas. Leaves killed by light to moderate frosts. Plants killed by heavy frosts but can regenerate strongly from seed in the following spring/summer."

204	**Native or naturalized in regions with tropical or subtropical climates**	**y**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. (1999). Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"A variable species native to the Paleotropics; in Hawai'i naturalized in dry, disturbed areas such as along roadsides and in vacant lots, 20-150 m, on Kaua'i, O'ahu, Maui, and reported, but not documented, from Hawai'i."

205	**Does the species have a history of repeated introductions outside its natural range?**	**y**
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 20 Sep 2021]	"Naturalized: Australasia: Australia (Queensland, Northern Territory) Northern America: USA Central America: Panama Cultivated: Papuasia: Papua New Guinea Northern America: USA"

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

Qsn #	Question	Answer
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 20 Sep 2021]	"Naturalized Australasia AUSTRALIA: Australia [Queensland, Northern Territory], Australia (n.) [Queensland, Northern Territory] Northern America REGION: United States Southern America CENTRAL AMERICA: Panama REGION: South America"
	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.	[Kauai, Oahu, Maui, Hawaii (unvouchered)] "A variable species native to the Paleotropics; in Hawai'i naturalized in dry, disturbed areas such as along roadsides and in vacant lots, 20-150 m, on Kaua'i, O'ahu, Maui, and reported, but not documented, from Hawai'i. First collected on O'ahu in 1916 (Bridwell s.n., BISH).-"
	Oppenheimer, H. (2007). New plant records from Moloka'i, Lāna'i, Maui, and Hawai'i for 2006. Bishop Museum Occasional Papers 96:17-34	[Molokai] "Alysicarpus vaginalis (L.) DC New island record Wagner et al. (1999: 646) reported this herbaceous perennial from Kaua'i, O'ahu, Maui, and probably Hawai'i, where it apparently has not been documented with a voucher specimen. On Moloka'i it was noted to be occasional in lawns and waste areas at low elevation. Material examined. MOLOKA'I: Pauwalu, near sea level, occasional in lawn, 11 Aug 2006, Oppenheimer H80619; Oneali'i Park, near sea level, weed in lawn, 29 Nov 2006, Oppenheimer & Perlman H110626 (BISH)."

302	Garden/amenity/disturbance weed	y
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 20 Sep 2021]	"Common weed of lawns and golf fairways where A. vaginalis persists under regular mowing. It is a weed of roadsides and other disturbed habitat in Guam, Hawaii, and Fiji. It is considered an invasive species on many Pacific Islands."
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). (1983) Handbook of Hawaiian Weeds. University of Hawaii Press, Honolulu, HI	"Found in arid regions. A weed in lawns."
	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 dry, disturbed areas such as along roadsides and in vacant lots, 20-150 m"
	Singh, S. & Walia, U.S. (2010). Identification of Weeds and Their Control Measures. Scientific Publishers, Jodhpur	"It is a common weed of lawns, roadside, wastelands, orchards etc. Control Measures: Atrazine as pre-emergence in maize. Pre-emergence application of pendimethalin, and alachlor and pre-plant application of trifluralin in kharif pulses and oil seed crops. Use of contact herbicides in non-cropped areas. Hand weeding is also another method of its control."
	Oppenheimer, H. (2007). New plant records from Moloka'i, Lāna'i, Maui, and Hawai'i for 2006. Bishop Museum Occasional Papers 96:17-34	"On Moloka'i it was noted to be occasional in lawns and waste areas at low elevation. Material examined. MOLOKA'I: Pauwalu, near sea level, occasional in lawn, 11 Aug 2006, Oppenheimer H80619; Oneali'i Park, near sea level, weed in lawn, 29 Nov 2006, Oppenheimer & Perlman H110626 (BISH)."

303	Agricultural/forestry/horticultural weed	

Qsn #	Question	Answer
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 20 Sep 2021]	"Common weed of lawns and golf fairways where A. vaginalis persists under regular mowing. It is a weed of roadsides and other disturbed habitat in Guam, Hawaii, and Fiji. It is considered an invasive species on many Pacific Islands."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Weed of: Bananas, Cereals, Orchards and Plantations"
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Valued as a cover and forage crop. May impact agriculture or environment, but impacts are generally not quantified] "A. vaginalis has been valued for use as a cover and forage crop, environmental soil improver, as well as a source for traditional medicine, and has as a consequence spread across tropical and subtropical regions around the world (Duke, 1981; Halim and Pengelly, 1992; Hanelt et al., 2001). However, it has the potential to negatively impact the environment due to its invasive traits which include broad distribution range, multiple vectors for seed dispersal, and seed viability of over a year. Further research on the invasiveness of the species is recommended."

304	Environmental weed	
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Potentially, although further research is recommended] "A. vaginalis has been valued for use as a cover and forage crop, environmental soil improver, as well as a source for traditional medicine, and has as a consequence spread across tropical and subtropical regions around the world (Duke, 1981; Halim and Pengelly, 1992; Hanelt et al., 2001). However, it has the potential to negatively impact the environment due to its invasive traits which include broad distribution range, multiple vectors for seed dispersal, and seed viability of over a year. Further research on the invasiveness of the species is recommended."

Qsn #	Question	Answer
305	**Congeneric weed**	
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 21 Sep 2021]	[Alysicarpus rugosus] "Recorded as a weed of wet season cropping in India (upland rice, mung beans and pigeon pea). Has become naturalized in Taiwan. Hard-seededness assists long-term spread."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	Alysicarpus bupleurifolius - "Weed of: Cotton, Orchards & Plantations"; Alysicarpus glumaceus - "Weed of: Cereals"; Alysicarpus longifolius - "Weed of: Cotton, Orchards & Plantations"; Alysicarpus monilifer - Weed of: Cereals, Cotton, Orchards & Plantations; Alysicarpus ovalifolius - Weed of: Cereals; Alysicarpus procumbens - Weed of: Bananas, Cereals, Orchards and Plantations; Alysicarpus rugosus - Weed of: Bananas, Cereals, Cotton, Orchards & Plantations, Sunflowers; Alysicarpus tetragonolobus - Weed of: Bananas, Cereals, Cotton, Orchards & Plantations
	WRA Specialist. (2021). Personal Communication	Several species are documented as weeds, but evidence of quantitative impacts are generally lacking

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] "Erect or spreading to prostrate perennial herbs; stems 10-60 cm long. Leaflets broadly to narrowly oblong-elliptic, sometimes a few of them lanceolate, 1-6.5 cm long, 0.3-2(-2.6) cm wide, gradually more bract-like toward apex of branches. Flowers subsessile, in leaf-opposed inflorescences up to 10 cm long; calyx persistent in fruit, the teeth narrowly deltate, 3-4 mm long; corolla orange or reddish to purple, ca. 6 mm long. Pods 1.2-2.5 cm long, reticulate-veined, breaking into 4-7 articles, with slightly raised borders between the articles, each article 2.5-3 mm long, puberulent with uncinate hairs. Seeds brown to yellowish, ca. 15 mm long."

402	**Allelopathic**	**n**
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 20 Sep 2021]	"Declines under intense competition from vigorous tussock grasses, but combines well with native grasses controlled by heavy grazing. It can combine well with creeping, sward-forming grasses under heavy grazing and frequent cutting as in lawns."

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.	"Erect or spreading to prostrate perennial herbs" [Fabaceae. No evidence]

404	**Unpalatable to grazing animals**	**n**

Qsn #	Question	Answer
	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 for all kinds of livestock, but in large quantities causes diarrhea."
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 20 Sep 2021]	"Palatability/acceptability: Well eaten by cattle and horses. Similar palatability to Medicago sativa and Aechynomene americana under grazing by sheep."
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). (1983) Handbook of Hawaiian Weeds. University of Hawaii Press, Honolulu, HI	"Regarded as fair forage."

405	Toxic to 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 for all kinds of livestock, but in large quantities causes diarrhea."
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 20 Sep 2021]	"Toxicity: Reported not to cause bloat in cows, presumably due to the presence of condensed tannins in the forage."

406	Host for recognized pests and pathogens	
	Source(s)	**Notes**
	Duke, J. A. (1981). Handbook of Legumes of World Economic Importance. Plenum Press, New York	"Biotic Factors: Following fungi have been reported on this plant: Acanthostigma heterochaete, Erysiphe polygoni, Ophiogene philippinensis, Parodiella perisporioides, Pel/icularia filamentosa , Synchytrium alysicarpi. It is also attacked by the bacterium, Xanthomonas alysicarpi var vaginalidis. It is sensitive to nematode attacks, especially on heavy, poorly drained soils."
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 20 Sep 2021]	[Potentially] "A main disadvantage of the crop is its susceptibility to root-knot nematodes. Prevention measures include growing the plant on heavier soils, which reduce the severity of infestation, and to use certain cultivars that may be more resistant to nematodes. Other pests of the plant include leaf-mining caterpillars. It is host to the plume moth Exelastis crepuscularis. A number of seed beetles of the genus Bruchidius complete their larval development in the seeds of A. vaginalis, including two recently described from the plant."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	**Notes**

Qsn #	Question	Answer
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Used in Ayurveda. Whole plant to treat sword wounds, pain in joints and bone fractures. Traditional medicinal plants formulation in the treatment of patients with urolithiasis, using the combinations of Asystasia gangetica, Alysicarpus vaginalis and Arundo donax. An infusion of powdered seeds used against dysentery and colics. Roots antifertility, antidote, expectorant, a decoction taken for coughs, one teaspoon of the root powder mixed with a pinch of pepper powder and common salt; root paste applied on forehead to treat headache, and on the site of snakebite; root powder with water given in snakebite; root juice with milk used for fevers and to check conception. Veterinary medicine, leaves ground with those of Blepharispermum subsessile given to cure anthrax. Fodder for all kinds of livestock, but in large quantities causes diarrhea."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 20 Sep 2021]	[No evidence. Unlikely to contribute to fuel load relative to grasses] "Fire is uncommon in the heavily grazed swards that favour Alyce clover. A perennial accession (IRFL 3240) persisted and spread following burning in Florida due to its deep, well-developed crown. Very hot fires may kill the plant but stands will regenerate from seed."

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 20 Sep 2021]	"Alyce clover grows well under moderate shade and is more vigorous under the canopy of shrubs rather than in the open. Similar shade tolerance to Grona heterocarpa subsp. ovalifolia in a greenhouse study in Malaysia."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 20 Sep 2021]	"A. vaginalis grows on a wide range of soil types from coralline sands to moderately acid clays. It has moderate fertility requirements and responds to P and K fertilizers when growing on less fertile soils. Its susceptibility to nematodes can limit productive growth to heavier soils, including black clays. Low tolerance to salinity."
	't Mannetje, L. & Jones, R.M. (Eds.). (1992). Plant Resources of South-East Asia. No. 4. Forages. Pudoc Scientific Publishers, Wageningen, Netherlands	"A. vaginalis grows on a wide range of soil types, from coraline sands to clays, but prefers lighter soils. It has been collected from very acid (pH(H1i0) 4.5) to neutral soils."
	Duke, J. A. (1981). Handbook of Legumes of World Economic Importance. Plenum Press, New York	"Grows in most cultivated soils, but favors clay loams and sandy soils."

411	Climbing or smothering growth habit	n
	Source(s)	**Notes**

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.	"Erect or spreading to prostrate perennial herbs"

412	Forms dense thickets	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. An erect or prostrate herb unlikely to impede movement or exclude other vegetation] "in Hawai'i naturalized in dry, disturbed areas such as along roadsides and in vacant lots"
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[No evidence] "A. vaginalis has been valued for use as a cover and forage crop, environmental soil improver, as well as a source for traditional medicine, and has as a consequence spread across tropical and subtropical regions around the world (Duke, 1981; Halim and Pengelly, 1992; Hanelt et al., 2001). However, it has the potential to negatively impact the environment due to its invasive traits which include broad distribution range, multiple vectors for seed dispersal, and seed viability of over a year. Further research on the invasiveness of the species is recommended."

501	Aquatic	n
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. (1999). Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Terrestrial] "in Hawai'i naturalized in dry, disturbed areas such as along roadsides and in vacant lots, 20-150 m"

502	Grass	n
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 20 Sep 2021]	Family: Fabaceae (alt. Leguminosae) Subfamily: Faboideae Tribe: Desmodieae Subtribe: Desmodiinae

Qsn #	Question	Answer
503	**Nitrogen fixing woody plant**	**n**
	Source(s)	**Notes**
	Rathi, S., Gaur, S., Tak, N., Tak, A., & Gehlot, H. S. (2017). Genetically diverse root nodule bacteria associated with Alysicarpus vaginalis from alkaline soil of Rajasthan, India. Plant Archives, 17(1), 495-505	[N-fixing herbaceous plant] "Occurrence of root nodules in Alysicarpus vaginalis has already been reported from India (Gehlot et al., 2012; Ojha et al., 2015) and other places of the world and almost all reported cases are showing association of slow growing strains supposed to be Bradyrhizobium (Doignon-Bourcier et al., 2000) except Leigh and Coplin (1992) who studied the tumor like structure formed by Rhizobium species on roots of A. vaginalis. Root nodule bacteria (RNB) are also known for possessing plant growth promoting (PGP) activity such as indole acetic acid (IAA) production, phosphate solubilization in addition to fixing nitrogen."

504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	**n**
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed]	"Erect or spreading, procumbent annual or short-lived perennial herb, 10–60 (–100) cm tall, often woody at the base; prostrate under heavy grazing. Stems glabrous or slightly pubescent, numerous, 10–100 cm long, emanating from the rootstock; rooting at the nodes under sustained moist conditions; variable pubescence, moderately branched and leafy. "

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[No evidence] "A. vaginalis is native to Africa, Asia, Malesia, and Australia (Acevedo-Rodriguez and Strong, 2012) and introduced to South America, the West Indies and the United States, naturalizing in many of these places (Halim and Pengelly, 1992). While A. vaginalis occurs across East Africa, it is uncommon in West Africa (Duke, 1981) and is not included in Flora Europaea (Royal Botanic Garden Edinburgh, 2014). A. vaginalis may be one of the four Alysicarpus species in Madagascar that are possibly native, although none are endemic (Puy et al., 2002)."

602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 21 Sep 2021]	"A short-day plant producing relatively high seed yields in the first season of growth. Seed requires an after-ripening period of approximately 16 weeks to overcome physiological dormancy. Physical dormancy must also be overcome by abrasive scarification to break the seed coat."

Qsn #	Question	Answer
	Duke, J. A. (1981). Handbook of Legumes of World Economic Importance. Plenum Press, New York	"Easily propagated from scarified seed. Seeded in late spring for seed to mature in same season. Seeding rate 11-13 kg/ha broadcast, 2kg/ha for pasture. Inoculation, unnecessary. Stems branch in thin stands but plants grow 1-m tall with little branching in thick stands. In Taiwan, seeded in grass pastures in April-May. If fruit matures and shatters, crop is reseeded in succeeding years. Requires little cultivation or care after seeding."
	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 1.2-2.5 cm long, reticulate-veined, breaking into 4-7 articles, with slightly raised borders between the articles, each article 2.5-3 mm long, puberulent with uncinate hairs. Seeds brown to yellowish, ca. 15 mm long."

603	Hybridizes naturally	
	Source(s)	**Notes**
	WRA Specialist. (2021). Personal Communication	Unknown. No evidence found

604	Self-compatible or apomictic	y
	Source(s)	**Notes**
	Taylor, S. G., & Baltensperger, D. D. (1987). Seedling Vigor of Selected Alysicarpus Accessions. Agronomy Journal, 79 (1), 101-103	"Alyceclover is a self-pollinated, warm-season legume that is grown as an annual crop in Florida (Duke, 1981)."

605	Requires specialist pollinators	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.	"Flowers subsessile, in leaf-opposed inflorescences up to 10 cm long; calyx persistent in fruit, the teeth narrowly deltate, 3-4 mm long; corolla orange or reddish to purple, ca. 6 mm long."
	Tropical Plants Database, Ken Fern. (2021). Alysicarpus vaginalis. https://tropical.theferns.info/viewtropical.php?id=Alysicarpus+vaginalis. [Accessed 21 Sep 2021]	Pollinators: Insects

606	Reproduction by vegetative fragmentation	y
	Source(s)	**Notes**
	Duke, J. A. (1981). Handbook of Legumes of World Economic Importance. Plenum Press, New York	[Often rooting at nodes] "Erect or spreading procumbent summer perennial herb (self-regenerating summer annual in Florida), woody at base; stems 10-60 cm tall, densely to sparsely pubescent, becoming glabrous, often rooting at nodes;"

Qsn #	Question	Answer
607	**Minimum generative time (years)**	**1**
	Source(s)	**Notes**
	't Mannetje, L. & Jones, R.M. (Eds.). (1992). Plant Resources of South-East Asia. No. 4. Forages. Pudoc Scientific Publishers, Wageningen, Netherlands	"Annual or short-lived perennial, erect to prostrate herb with many stems 10-100 cm long emanating from the rootstock."

701	**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)**	
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Possibly, although seeds lack means of external attachment] "Species cultivated in agricultural settings thus possibly spread by machinery and vehicle tires"

702	**Propagules dispersed intentionally by people**	**y**
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"A. vaginalis spreads by seeds (Duke, 1981). Dispersal by humans is primarily through intentional introduction, as it has been cultivated around the world for environmental purposes and as a forage crop, but it is likely to have unintentionally escaped from cultivation resulting in naturalizing in non-native environments such as the West Indies, South America, and the USA (Duke, 1981; Hanelt et al., 2001). Other dispersal agents include livestock, who graze upon the species (Duke, 1981). It can also spread abiotically by water, as it often grows on sandy coastlines (Quattrocchi, 2012, Flora of China Editorial Committee, 2014)."

703	**Propagules likely to disperse as a produce contaminant**	
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Could possibly be dispersed as a contaminant of other crops] "Species widely cultivated in agricultural settings as a forage and cover crop and soil improver"

Qsn #	Question	Answer
704	**Propagules adapted to wind dispersal**	**n**
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"A. vaginalis spreads by seeds (Duke, 1981). Dispersal by humans is primarily through intentional introduction, as it has been cultivated around the world for environmental purposes and as a forage crop, but it is likely to have unintentionally escaped from cultivation resulting in naturalizing in non-native environments such as the West Indies, South America, and the USA (Duke, 1981; Hanelt et al., 2001). Other dispersal agents include livestock, who graze upon the species (Duke, 1981). It can also spread abiotically by water, as it often grows on sandy coastlines (Quattrocchi, 2012, Flora of China Editorial Committee, 2014)."
	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 1.2-2.5 cm long, reticulate- veined, breaking into 4-7 articles, with slightly raised borders between the articles, each article 2.5-3 mm long, puberulent with uncinate hairs. Seeds brown to yellowish, ca. 15 mm long.

705	**Propagules water dispersed**	**y**
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"It can also spread abiotically by water, as it often grows on sandy coastlines (Quattrocchi, 2012, Flora of China Editorial Committee, 2014)."

706	**Propagules bird dispersed**	**n**
	Source(s)	**Notes**
	Duke, J. A. (1981). Handbook of Legumes of World Economic Importance. Plenum Press, New York	[Not fleshy fruited] "pods 1.2-2.5 cm long, not constricted between articles; articles 4-7, subcylindrical, 2.5-3 mm long, 1.5-3 mm broad, with raised reticulate ridges, puberulous; seeds yellowish, speckled brown or entirely yellow-brown, ellipsoidal, slightly compressed, longest dimension 1.7 mm, shorter 1.5 mm, about 1-mm thick."

707	**Propagules dispersed by other animals (externally)**	
	Source(s)	**Notes**
	Gross, C. L., Whalen, M. A., & Andrew, M. H. (1991). Seed selection and removal by ants in a tropical savanna woodland in northern Australia. Journal of Tropical Ecology, 7(1), 99-112	"Table 1. Mean number of seed harvester colonies at each site, and the amount (g) of seed excavated from N nests of Chelaner sp 1, Pheidole sp. 1 and Meranoplus spp. 1, 2 and 3." [A small number of Alysicarpus vaginalis seeds were collected in ant middens, suggest some external transport of seeds by ants may occur]

708	**Propagules survive passage through the gut**	**y**
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 21 Sep 2021]	"Alyce clover spreads naturally under grazing probably aided by spread of seed in dung. It becomes more prevalent under grazing."

Qsn #	Question	Answer
	Gardener, C.J., McIvor, J.G. & Jansen, A. (1993). Survival of Seeds of Tropical Grassland Species Subjected to Bovine Digestion. Journal of Applied Ecology 30(1): 75-85	"Table 1. Fraction of germinable, hard and rotten seed before and after digestion for 44 tropical and temperate legumes" [Alysicarpus vaginalis - 74.4% were intact before ingestion, and 69.8% were hard after ingestion]

801	Prolific seed production (>1000/m2)	y
	Source(s)	**Notes**
	Duke, J. A. (1981). Handbook of Legumes of World Economic Importance. Plenum Press, New York	"Crop sets seed abundantly in late fall, and seed must be harvested before the fruits shatter."
	Nnadi, L. A., & Haque, I. (1986). Forage legume-cereal systems: Improvement of soil fertility and agricultural productivity with special reference to sub-Saharan Africa. Pp. 330-362 in Haque I. et al. (Eds.). Potentials of Forage Legumes in Farming Systems of Sub-Saharan Africa. ILCA, Addis Ababa	"Light also has an important effect on the reproduction of some species. Jones and Mccown (1983) reported that Caribbean stylo (Stylosanthes hamata cv. Verano) produced little seed in an intercrop with maize due to its failure to flower in the shade of a full maize canopy (50,000 plants/ha in 75 cm rows), whereas Alysicarpus vaginalis produced 2000-4000 seeds/m.2 "
	't Mannetje, L. & Jones, R.M. (Eds.). (1992). Plant Resources of South-East Asia. No. 4. Forages. Pudoc Scientific Publishers, Wageningen, Netherlands	"Seeds dark red, 1-1.5 mm long, copiously produced."

802	Evidence that a persistent propagule bank is formed (>1 yr)	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Singer, K. L., & Pitman, W. D. (1988). Germination requirements of a perennial Alysicarpus vaginalis accession. Agronomy Journal, 80(6), 962-966	"Germination of a perennial alyceclover [Alysicarpus vaginalis (L.) DC.] accession, which has potential value as a grazing-tolerant pasture legume for peninsular Florida and some tropical locations, was evaluated for response to seed storage and scarification treatments. Both pratical means of enchancing germination and characteristics of germination limitations were considered. A series of experiments evaluated responses to storage time, storage temperature, physical seed coat disruption with sandpaper, and exposure to steam, hot water, and dry heat. Freshly harvested seed failed to germinate regardless of seed treatment. Seed that had been stored for 3 to 8 yr produced rapid, essentially complete germination when scarified with sandpaper. A storage period of approximately 16 wk was sufficient for rapid germination regardless of storage temperature. At 4 wk of storage, a storage temperature of 7 degrees C resulted in higher germination than storage at 24 degrees C. Steam exposure times of from 40 min to 2 h or exposure to 80 degrees C water for 5 to 10 min produced slow germination rates but greater than 60% germination after 56 d. Exposure to dry heat for 6 or 12 h produced poorer results (48% germination at 56 d) than steam or hot water. These heat treatments could have value either where mechanical scarification is not available or in situations where sporadic, early season rainfall creates high pasture establishment risks for seed lots that have been scarified to provide rapid, complete germination. Failure of scarified, imbibed, fresh seed to germinate indicates a physiological limitation to germination. Rapid, essentially complete germination of these seed lots after storage periods of from 16 wk to a number of years indicates that an after-ripening period overcomes this limitation. Physical seed coat impermeability or hardseededness is demonstrated by the need for scarification even in seed that has been stored long enough to meet the after-ripening requirement "
	't Mannetje, L. & Jones, R.M. (Eds.). (1992). Plant Resources of South-East Asia. No. 4. Forages. Pudoc Scientific Publishers, Wageningen, Netherlands	"Propagation is by seed, which usually has a high percentage of hard seed. Scarification is then required for immediate germination. Sowing rates of 2-4 kg/ha should be adequate, although in the United States, where it is used as hay crop, rates of up to 16 kg/ha are recommended."
	Jayasuriya, K. G., Wijetunga, A. S., Baskin, J. M., & Baskin, C. C. (2013). Seed dormancy and storage behaviour in tropical Fabaceae: a study of 100 species from Sri Lanka. Seed Science Research, 23(4), 257-269	"Table 1. Germination, dormancy and storage behaviour of seeds of 73 Fabaceae species assigned to the first seed germination–storage behaviour category. E, endemic; I, introduced; MS, manual scarification; N, native; PY, physical dormancy. Zero to 27% of seeds are non-dormant, and the others have PY" [Alysicarpus vaginalis - seeds show physical dormancy and require scarification to germinate]

803	Well controlled by herbicides	y
	Source(s)	**Notes**
	Singh, S. & Walia, U.S. (2010). Identification of Weeds and Their Control Measures. Scientific Publishers, Jodhpur	"It is a common weed of lawns, roadside, wastelands, orchards etc. Control Measures: Atrazine as pre-emergence in maize. Pre-emergence application of pendimethalin, and alachlor and pre-plant application of trifluralin in kharif pulses and oil seed crops. Use of contact herbicides in non-cropped areas. Hand weeding is also another method of its control."

Qsn #	Question	Answer
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 21 Sep 2021]	"Severely damaged by acifluorofen, chloramben, paraquat and MSMA. Tolerant of dinoseb (1.1–3.3 kg/ha), 2,4-DB (0.5 kg/ha), naptalam (0.5 kg/ha) and bentazone (0.8–2.2 kg/ha). Repeat applications of bentazone at the highest rate caused severe damage."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 20 Sep 2021]	"Alyce clover is very tolerant of continuous, heavy grazing and regular mowing. Under grazing conditions, single plants change from an erect form of growth to a prostrate habit. Tall erect plants cut at or near ground level may not recover quickly." ... "Common weed of lawns and golf fairways where A. vaginalis persists under regular mowing."

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] "in Hawai'i naturalized in dry, disturbed areas such as along roadsides and in vacant lots, 20-150 m, on Kaua'i, O'ahu, Maui, and reported, but not documented, from Hawai'i."

Summary of Risk Traits:

High Risk / Undesirable Traits
• Broad climate suitability, and potential elevation range exceeds 1000 m
• Thrives in tropical climates
• Naturalized on Kauai, Oahu, Molokai, Maui, Hawaii (Hawaiian Islands), and elsewhere in the tropics
• A common weed of, and controlled in, lawns and golf fairways; also a weed of roadside and vacant lots
• A frequently reported weed of several agricultural crops, although negative impacts are generally not quantified or specified
• Other species may also be weeds
• May be a host of crop pests and pathogens
• Shade tolerant
• Tolerates many soil types
• Reproduces by seed as an annual or perennial and vegetatively by rooting at nodes
• Reported to be self-pollinated
• Able to reach maturity in one growing season
• Seeds dispersed in the dung of grazing animals, by water, through intentional cultivation, and possibly by other vectors
• Capable of prolific seed production
• Seeds are hard-coated, and may form a persistent seed bank
• Tolerates regular grazing and mowing

Low Risk Traits
• Unarmed (no spines, thorns, or burrs)
• Provides fodder for livestock
• Not reported to be toxic
• Herbicides may provide effective control