

Family: *Aizoaceae*

Taxon: *Tetragonia tetragonoides*

Synonym: *Demidovia tetragonoides* Pall. (*basionym*) **Common Name** New Zealand spinach
Tetragonia expansa Murray

Questionnaire :	current 20090513	Assessor:	Chuck Chimera	Designation:	H(Hawai'i)
Status:	Assessor Approved	Data Entry Person:	Chuck Chimera	WRA Score	7
101	Is the species highly domesticated?		y=-3, n=0		n
102	Has the species become naturalized where grown?		y=1, n=-1		
103	Does the species have weedy races?		y=1, n=-1		
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		n=0, y = 2*multiplier (see Appendix 2)		n
304	Environmental weed		n=0, y = 2*multiplier (see Appendix 2)		
305	Congeneric weed		n=0, y = 1*multiplier (see Appendix 2)		
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		y
406	Host for recognized pests and pathogens		y=1, n=0		n
407	Causes allergies or is otherwise toxic to humans		y=1, n=0		
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
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		y=1, n=0		n
411	Climbing or smothering growth habit		y=1, n=0		y

412	Forms dense thickets	y=1, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	
604	Self-compatible or apomictic	y=1, n=-1	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	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)	y=1, n=-1	y
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	
801	Prolific seed production (>1000/m2)	y=1, n=-1	
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)	y=-1, n=1	n

Designation: H(Hawai'i)

WRA Score 7

Supporting Data:

101	1999. Wagner, W. L./Herbst, D. R./Sohmer, S. H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	No evidence that <i>Tetragonia</i> has been highly domesticated.
201	1999. Wagner, W. L./Herbst, D. R./Sohmer, S. H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	New Zealand, Tasmania, Australia, Japan and South America...In Hawai'i, "cultivated and now established in scattered coastal sites" cultivated and now established in scattered coastal sites"
202	1999. Wagner, W. L./Herbst, D. R./Sohmer, S. H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	New Zealand, Tasmania, Australia, Japan and South America...In Hawai'i, "cultivated and now established in scattered coastal sites" cultivated and now established in scattered coastal sites" [quality of climate match data: high]
203	1992. Whistler, W.A.. Flowers of the Pacific Island Seashore: A guide to the littoral plants of Hawaii, Tahiti, Samoa, Tonga, Cook Islands, Fiji and Micronesia. Isle Botanica, Honolulu, HI	distributed around the Pacific in South America, New Zealand, Australia, and Japan, but in Polynesia appears to be indigenous only to Tonga and the Austral Islands. [tolerates temperate and tropical coastal climates]
203	2003. Starr, F./Starr, K./Loope, L.L.. New plant records from the Hawaiian Archipelago. Bishop Museum Occasional Papers. 74: 23-34.	<i>T. tetragonoides</i> (New Zealand spinach) is now also know from East Maui where it can be found from sea level to 3500 ft [1065 m], especially in Paia and Kula. [broad elevational range >1000 m]
203	2010. NationMaster.com. Encyclopedia - New Zealand spinach. http://www.statemaster.com/encyclopedia/New-Zealand-spinach	It can be found in temperate climates as an invasive plant in North and South America, and has been cultivated along the East Asian rim. It thrives in hot weather, and is considered an heirloom vegetable
203	2010. Plants for aFuture Database. <i>Tetragonia tetragonoides</i> . Plants for a Future Database, http://www.pfaf.org/database/plants.php?Tetragonia+tetragonoides	It is hardy to zone 9 and is frost tender
204	1992. Whistler, W.A.. Flowers of the Pacific Island Seashore: A guide to the littoral plants of Hawaii, Tahiti, Samoa, Tonga, Cook Islands, Fiji and Micronesia. Isle Botanica, Honolulu, HI	distributed around the Pacific in South America, New Zealand, Australia, and Japan, but in Polynesia appears to be indigenous only to Tonga and the Austral Islands.
204	2005. Wagner, W. L./Herbst, D. R./Lorence, D. H.. Flora of the Hawaiian Islands website. Smithsonian Institution, http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/index.htm	Status: Naturalized; Distribution: Midway (Sand Isl.), Nihau, Kauai, Oahu, Maui, Hawaii
205	2010. USDA, ARS, National Genetic Resources Program.. <i>Tetragonia tetragonoides</i> - Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/t	Widely cultivated
301	2003. Wunderlin, R.P./Hansen, B.F.. Guide to the Vascular Plants of Florida. University Press of Florida, Gainesville, FL	Disturbed coastal sites. Rare;...Escaped from cultivation.
301	2005. Staples, G. W./Herbst, D. R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI.	"In the wild, New Zealand spinach inhabits coastal sand dunes and has become naturalized in similar habitats all over the world, including several of the larger Hawaiian islands"
301	2009. Morris, D.I./Duretto, M.F.. Flora of Tasmania Online - 101 Aizoaceae. Tasmanian Herbarium, http://demo1.tmag.tas.gov.au/treatments/families/Aizoaceae/Aizoaceae.html	Tas. (TSE, FLI); also in WA, SA, Qld, NSW, Vic., New Zealand; naturalized in Europe and Africa. Found on coastal sands and rocks in the eastern part of the state. This species can become weedy.
301	2010. Calflora. The Calflora Database - <i>Tetragonia tetragonoides</i> . http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=7945	<i>Tetragonia tetragonoides</i> , a dicot, is an annual herb that is not native to California; it was introduced from elsewhere and naturalized in the wild.
302	1992. Halvorson, W.L.. Alien Plants at Channel Islands National Park.	The herbaceous New Zealand spinach (<i>Tetragonia expansa</i>) occurs widely scattered along coastal areas of the islands and in some disturbed sites. It is not considered a problem species.

302	1999. Starr, F./Martz, K.. Botanical Survey of Midway Atoll - 1999 Update. http://www.hear.org/starr/publications/botanical_survey_of_midway_text.pdf	Several other harmful species turned up during our survey. New Zealand spinach (<i>Tetragonia tetragonoides</i>) is highly invasive in the Farallon Islands, California (Peter Pyle pers comm. 1999). It was discovered by Ramachandran Sudharshan near the Dump Pond. This collection represents a new island record for Midway Atoll. Another small patch of New Zealand spinach was found near the cart trail on South Beach. The patch near the Dump Pond has been controlled with herbicide and the few plants on South Beach were hand pulled, however, due to the large seed bank and persistence of this plant, follow up control measures will need to occur. [Midway Atoll]
302	2002. Harris, G.. Our Native Plant Invaders. The New Zealand Garden Journal. 5 (1): 6-8. http://www.rnzih.org.nz/pages/NativeWeeds.htm	Kokihi or New Zealand Spinach (<i>Tetragonia tetragonoides</i>) is a listed noxious weed in several states in the USA. As the plant is also found in Asia, Australia and parts of the South Pacific, New Zealand is not necessarily the source of the initial introduction.
302	2007. Randall, R.P.. Global Compendium of Weeds - <i>Tetragonia tetragonoides</i> . Hawaii Ecosystems at Risk Project (HEAR). http://www.hear.org/gcw/species/tetragonia_tetragonoides/	Listed as a weed of various places [but evidence suggests only a weed of minor significance]
303	2007. Randall, R.P.. Global Compendium of Weeds - <i>Tetragonia tetragonoides</i> . Hawaii Ecosystems at Risk Project (HEAR). http://www.hear.org/gcw/species/tetragonia_tetragonoides/	No evidence
304	1987. Swarbrick, J.T./Mercado, B.L.. Weed science and weed control in Southeast Asia: an introductory text for students of agriculture in Southeast Asia. Food & Agriculture Org., Rome, Italy	Table 11.1 Prohibited and Restricted weed seeds in crop seed offered for sale in Queensland, Australia in 1985. [<i>Tetragonia tetragonoides</i> listed under Restricted Weeds]
304	2009. Milo Baker Chapter California Native Plant Society. Events and Items of Interest - San Pablo Bay National Wildlife Refuge Restoration. http://www.cnpsmb.org/Newsletters/news0905.pdf	San Pablo Bay National Wildlife Refuge partners with The Bay Institute's STRAW project (Students and Teachers Restoring A Watershed) to restore the salt marsh transition zone at the north end of San Pablo Bay. The restoration efforts include local seed collection, growing the plants in the SPBNWR nursery, pretreatment of restoration zones, installation of plants and maintenance. SPBNWR is also working to map and remove invasive species including New Zealand Spinach <i>Tetragonia tetragonoides</i> and Perennial Pepperweed <i>Lepidium latifolium</i> . The restoration improves habitat for two endangered species that live in the marsh, the California Clapper Rail and Salt Marsh Harvest Mouse. Ongoing volunteer opportunities occur throughout the year with both student and adults. Location: Office is at Sears Point Ranch 2100 Hwy 37 on a Sonoma Land Trust Property. Restoration areas currently include SPBNWR and Sonoma Baylands.
304	2010. WRA Specialist. Personal Communication.	Potential environmental weed, but evidence of negative impacts is minimal. At this time, evidence is sufficient to answer yes to Question 3.02
305	2007. Randall, R.. Global Compendium of Weeds. http://www.hear.org/gcw/	Several other <i>Tetragonia</i> species listed as weeds, but insufficient evidence of impacts found.
401	2009. Morris, D.I./Duretto, M.F.. Flora of Tasmania Online - 101 Aizoaceae. Tasmanian Herbarium, http://demo1.tmag.tas.gov.au/treatments/families/Aizoaceae/Aizoaceae.html	Annual or perennial herb, decumbent or ascending; stems to 1 m long. Leaves broadly hastate, rhomboid or lanceolate; petiole 10–45 mm long, papillose, decurrent; blade 1–8(–10?) cm long, 0.5–5 cm wide, dark green above, paler below with larger papillae. [no spines, thorns, or burrs]
402	2004. Heyligers, P.C./Adams, L.G.. Flora and vegetation of Montagu Island – past and present. <i>Cunninghamia</i> . 8(3): 285-305.	"This vegetation is low, rather carpetlike and interspersed with many small rock outcrops (Fig. 9). <i>Lobelia alata</i> , <i>Dichondra repens</i> and <i>Tetragonia tetragonoides</i> occur scattered amongst the grasses." [vegetation description of Montagu Island off of Australia. Co-occurs with other plants, with no evidence of allelopathic effects]
403	1999. Wagner, W. L./Herbst, D. R./Sohmer, S. H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	Not parasitic

404	1989. Soil Conservation Service. A Graziers' Guide to the Saltbush-Bluebush Downs Country of Western New South Wales. DECCW, Sydney, Australia http://www.environment.nsw.gov.au/resources/soils/saltbush1.pdf	Annuals are generally the most palatable source of feed for stock, particularly in the earlier stages of plant growth. After seed set, haying off and a lowering of feed value occurs. Annuals are only present during droughts as litter, stubble or seed. The downs country produces annuals which can respond to either winter or summer rains. Major winter growing annuals include blue crowfoot (<i>Erodium crinitum</i>), arabian grass (<i>Schismus barbatus</i>), new zealand spinach (<i>Tetragonia tetragonoides</i>), common white sunray (<i>Helipterum floribundum</i>), eastern flat-top saltbush and pop saltbush. An important summer growing annual is button grass (<i>Dactyloctenium radulans</i>). [listed as feed for cattle in Australia]
404	2002. Hartmann, H.E.. Illustrated handbook of succulent plants: Aizoaceae : F - Z. Springer-Verlag, Berlin - Heidelberg - New York	Several species are good fodder in South Africa
405	1997. Gray, M.. new species of <i>Tetragonia</i> (Aizoaceae) from arid Australia. <i>Telopea</i> . 7(2): 119-127.	Oxalate in both <i>T. tetragonoides</i> and <i>T. moorei</i> is mostly soluble, mainly as potassium and/or sodium oxalate (P.W. Michael pers. comm.) and as such, certainly has the propensity to be toxic to animals and humans (Sanz & Reig 1992).
406	2007. Toensmeier, E.. Perennial vegetables: from artichoke to zuiki taro, a gardener's guide to over 100 delicious, easy-to-grow edibles. Chelsea Green Publishing, White River Junction, VT	Few pests or diseases affect this rugged plant.
407	2001. Hegarty, M.P./Hegarty, E.E./Wills, R.B.H.. Food Safety of Australian Plant Bushfoods. Rural Industries Research and Development Corporation, Kingston, Australia http://www.sgapqld.org.au/bush_food_safety.pdf	Gray (1977) advises that the use of young succulent plants in the raw state might need to be treated with some degree of caution". It appears that the need to blanch the greens to reduce the oxalate content before use is now widely accepted in the industry (see instructions above) and methods are being developed to minimise the soluble oxalates in selections for future propagation (Ahmed & Johnson 2000). [potentially toxic if eaten raw, and in large quantities]
407	2010. Dave's Garden. PlantFiles: New Zealand Spinach, Warrigal Greens. Dave's Garden, http://davesgarden.com/guides/pf/go/61772/	Danger: Parts of plant are poisonous if ingested
408	1999. Wagner, W. L./Herbst, D. R./Sohmer, S. H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	Succulent, stout annual herbs [succulent ground cover unlikely to increase fire risk...probably prevents or suppresses fire]
409	2010. Dave's Garden. PlantFiles: New Zealand Spinach, Warrigal Greens. Dave's Garden, http://davesgarden.com/guides/pf/go/61772/	Sun Exposure: Full Sun; Sun to Partial Shade [given coastal habitat, shade tolerance is probably fairly low]
409	2010. Plants for aFuture Database. <i>Tetragonia tetragonoides</i> . Plants for a Future Database, http://www.pfaf.org/database/plants.php?Tetragonia+tetragonoides	It cannot grow in the shade...Edible Parts: Leaves. Leaves - raw or cooked. A spinach substitute[183], the shoot tips are harvested when about 8cm long, this encourages plenty of side growth with lots more shoots to harvest[264]. A delicious substitute for spinach, the very young leaves and shoots can also be eaten raw in salads[193, 264]. The young leaves are best, older leaves developing an acrid taste.
410	2007. Toensmeier, E.. Perennial vegetables: from artichoke to zuiki taro, a gardener's guide to over 100 delicious, easy-to-grow edibles. Chelsea Green Publishing, White River Junction, VT	Plants are drought tolerant and love sandy soils, also tolerating salt
410	2010. Dave's Garden, http://davesgarden.com/guides/pf/go/61772/	Soil pH requirements: 6.1 to 6.5 (mildly acidic) 6.6 to 7.5 (neutral) 7.6 to 7.8 (mildly alkaline)
410	2010. Plant This. Plant Selector - <i>Tetragonia tetragonoides</i> . http://www.plantthis.com.au/plant-information.asp?gardener=23409&tabview=photo&plantSpot=	Soil: ordinary soil, enriched soil, mildly acidic to mildly alkaline
411	1999. Wagner, W. L./Herbst, D. R./Sohmer, S. H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	spreading or procument
411	2010. Starr, F./Starr, K.. Plants of Hawaii - <i>Tetragonia tetragonoides</i> . http://www.hear.org/starr/images/image/?q=050222-4148&o=plants	Photo shows plants smothering certain coastal areas at Mokuauia, Oahu

412	1999. Wagner, W. L./Herbst, D. R./Sohmer, S. H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	spreading or decumbent [can smother ground, but does not form dense thickets]
501	2005. Staples, G. W./Herbst, D. R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI.	"inhabits coastal sand dunes and has become naturalized in similar habitats all over the world" [not aquatic]
502	2010. USDA, ARS, National Genetic Resources Program.. Tetragonia tetragonoides - Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/t	Aizoaceae [not a grass]
503	1999. Wagner, W. L./Herbst, D. R./Sohmer, S. H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	Aizoaceae [not a nitrogen fixing woody plant]
504	2005. Staples, G. W./Herbst, D. R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI.	Succulent herb with long taproot [but not a true geophyte]
601	2009. Morris, D.I./Duretto, M.F.. Flora of Tasmania Online - 101 Aizoaceae. Tasmanian Herbarium, http://demo1.tmag.tas.gov.au/treatments/families/Aizoaceae/Aizoaceae.html	No evidence of substantial reproductive failure in native habitat [Tasmania]
602	2005. Staples, G. W./Herbst, D. R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI.	New Zealand-spinach is propagated from seed, which can be purchased from garden stores, and planted any time of the year in a sunny or partially shaded spot.
602	2009. Morris, D.I./Duretto, M.F.. Flora of Tasmania Online - 101 Aizoaceae. Tasmanian Herbarium, http://demo1.tmag.tas.gov.au/treatments/families/Aizoaceae/Aizoaceae.html	Fruit indehiscent, at first green, becoming dry and bony, to 13 mm long and 12 mm wide, globular or turbinate variously ridged at the summit; ridges produced into short equal or unequal horns. Seeds in 2 rows, c. 2.5 mm long, pyriform. Flowering & fruiting throughout year.
603	2010. WRA Specialist. Personal Communication.	Ability to naturally hybridize unknown
604	1999. Wagner, W. L./Herbst, D. R./Sohmer, S. H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	Flowers sometimes unisexual
604	2004. Sargent, R.D./Otto, S.P.. A phylogenetic analysis of pollination mode and the evolution of dichogamy in angiosperms. Evolutionary Ecology Research. 6: 1183–1199.	Dichogamy, the temporal separation of male and female function, is widespread among angiosperms [Tetragonia expansa, syn. For T. tetragonoides, is listed in Appendix as exhibiting protogyny, which would functionally prevent self-pollination]
604	2010. Plants for aFuture Database. Tetragonia tetragonoides. Plants for a Future Database, http://www.pfaf.org/database/plants.php?Tetragonia+tetragonoides	The flowers are hermaphrodite (have both male and female organs)
605	2004. Sargent, R.D./Otto, S.P.. A phylogenetic analysis of pollination mode and the evolution of dichogamy in angiosperms. Evolutionary Ecology Research. 6: 1183–1199.	Insect-pollinated
606	2005. Staples, G. W./Herbst, D. R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI.	propagated by seed [no evidence of vegetative spread]
607	2009. Morris, D.I./Duretto, M.F.. Flora of Tasmania Online - 101 Aizoaceae. Tasmanian Herbarium, http://demo1.tmag.tas.gov.au/treatments/families/Aizoaceae/Aizoaceae.html	Annual or perennial herb, decumbent or ascending [1 to 2 year time to reproductive maturity]

701	1985. Hanson, C.G./Mason, J.L.. Bird seed aliens in Britain. <i>Watsonia</i> . 15: 237-252.	The following list is based on the cultivation of samples of bird seed and the waste separated from commercial seed carried out by the authors with some additional records contributed by those listed below. The list also includes species recorded on the waste tips between Humberstone and Cleethorpes in N. Lincs., V.c. 54 (now S. Humberside), that received waste from a large petfood distributor. Records are also included from other tips, where there was little doubt that the plants originated from bird seed, and from gardens where bird seed had been distributed. The species imported and sold as bird food are distinguished by the use of block capitals. The remainder are imported as impurities in the main staple crops... <i>Tetragoniaceae Tetragonia tetragonoides</i> (Pallas) Kuntze: Cult. CGH; tips; occasional
702	2009. Vincent, A.. Australian Bush Foods: Information Sheet 10: Warrigal spinach- <i>Tetragonia tetragonoides</i> . Desert Knowledge CRC, http://www.desertknowledgecrc.com.au/research/bushproducts/DKCRC_Bush%20Food_IS-10_Warrigal%20Spinach_July09.pdf	Commercial use: Available from some supermarkets and markets as a fresh green vegetable. The seeds are widely available for propagation from seed dealers and nurseries.
703	2010. WRA Specialist. Personal Communication.	No evidence of seed contamination in produce, but inadvertently spread in other ways [see 7.01]
704	2009. Morris, D.I./Duretto, M.F.. Flora of Tasmania Online - 101 Aizoaceae. Tasmanian Herbarium, http://demo1.tmag.tas.gov.au/treatments/families/Aizoaceae/Aizoaceae.html	Fruit indehiscent, at first green, becoming dry and bony, to 13 mm long and 12 mm wide, globular or turbinate variously ridged at the summit; ridges produced into short equal or unequal horns. Seeds in 2 rows, c. 2.5 mm long, pyriform [no adaptations for wind dispersal]
705	2000. Staples, G.W./Herbst, D.R/Imada, C.T.. Survey of invasive or potentially invasive cultivated plants in Hawai'i. Bishop Museum Occasional Papers. 65: 1-35.	Table 2. Annotated checklist of invasive or potentially invasive cultivated plants in Hawai'i with dispersal syndrome... <i>Tetragonia tetragonioides</i> ...A = aquatic/water
706	2009. Morris, D.I./Duretto, M.F.. Flora of Tasmania Online - 101 Aizoaceae. Tasmanian Herbarium, http://demo1.tmag.tas.gov.au/treatments/families/Aizoaceae/Aizoaceae.html	Fruit indehiscent, at first green, becoming dry and bony, to 13 mm long and 12 mm wide, globular or turbinate variously ridged at the summit; ridges produced into short equal or unequal horns. [not fleshy-fruited, and no evidence of dispersal by birds]
707	2009. Morris, D.I./Duretto, M.F.. Flora of Tasmania Online - 101 Aizoaceae. Tasmanian Herbarium, http://demo1.tmag.tas.gov.au/treatments/families/Aizoaceae/Aizoaceae.html	Fruit indehiscent, at first green, becoming dry and bony, to 13 mm long and 12 mm wide, globular or turbinate variously ridged at the summit; ridges produced into short equal or unequal horns. [no evidence of external dispersal by animals, and no means of external attachment]
708	2010. WRA Specialist. Personal Communication.	Unknown if seeds survive passage through gut [potential to get dispersed by grazing animals. See Question 4.04]
801	2010. WRA Specialist. Personal Communication.	Unknown if carpets of <i>T. tetragonoides</i> can produce seed densities >1000/m ²
802	2003. Moles, A.T./Warton, D.I./Westoby, M.. Seed size and survival in the soil in arid Australia. <i>Austral Ecology</i> . 28 (5): 575-585.	After the seeds had been buried for a year in the soil, mean viability had dropped to 20.7% (standard error = 3.0%), and maximum to 86% (<i>Tetragonia tetragonioides</i>)
802	2008. Liu, K./Eastwood, R. J./Flynn, S./Turner, R. M./Stuppy, W. H.. Seed Information Database (release 7.1, May 2008). http://www.kew.org/data/sid	Storage Conditions: Seeds maintained for 4 5 years in commercial storage conditions (Priestley, 1986); Viability is halved after 4 years storage at room temperature (Ewart, 1908)
803	1990. Arends, L./Pegg, I.R.. Thifensulfuron methyl with metsulfuron methyl - a new sulfonylurea herbicide for broad-leaved weed control in winter cereals in New South Wales and Queensland.. Proceedings of the 9th Australian Weeds Conference..	Thifensulfuron-methyl at 682 g/kg with metsulfuron-methyl at 68 g is a new post em. herbicide (Harmony M Herbicide) for control of broadleaved weeds in wheat, barley, oats and triticale in Australia. Results from 24 field trials carried out in Queensland, New South Wales and Victoria in 1987-88, showed that effective control of <i>Fallopia convolvulus</i> was obtained with 27.3 g thifensulfuron methyl and 2.7 g metsulfuron-methyl. This rate was also effective against <i>Polygonum aviculare</i> , <i>Lamium amplexicaule</i> , <i>Rapistrum rugosum</i> and <i>Tetragonia tetragonioides</i> . <i>Emex australis</i> control as good as the standard was obtained with 30.7 g thifensulfuron-methyl and 3.1 g metsulfuron-methyl. Crop tolerance trials showed that all 16 varieties of wheat, 3 varieties of oats, 2 varieties of barley and 1 of triticale were tolerant. Trials on safe intervals for sowing rotational crops showed that summer crops of sorghum, mung beans [<i>Vigna radiata</i>], soyabeans, maize and sunflowers can follow winter cereals 4 months after treatment with Harmony M on soils of pH 7.8 or less and OM content of no less than 1.7%.

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- 804 2007. Toensmeier, E.. Perennial vegetables: The leaves and shoots are fast growing, and the more you pick, the faster they
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