

Taxon: Coreopsis lanceolata	Family: Asteraceae
Common Name(s): garden coreopsis lanceleaf coreopsis lanceleaf tickseed sand coreopsis	Synonym(s): Chrysomelea lanceolata Tausch Coreopsis crassifolia Dryand. ex Aiton Coreopsis heterogyna Fernald Coreopsis oblongifolia Nutt. Coreopsoides lanceolata (L.) Moench

Assessor: Assessor	Status: Assessor Approved	End Date: 9 Mar 2014
WRA Score: 12.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Naturalized, Agricultural Weed, Environmental Weed, Herbaceous Wildflower, Wind-dispersed

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

Qsn #	Question	Answer Option	Answer
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
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		
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic	y=1, n=-1	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	y
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	n
801	Prolific seed production (>1000/m2)		
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
	Britton, N.L. & Brown, A. 1913. An Illustrated Flora of the Northern United States, Canada and the British Possessions. Vol. III. Gentianaceae to Compositae. Charles Scribner's Sons, New York, NY	No evidence
	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
102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	NA
103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	NA
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	Intermediate
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 6 Mar 2014]	"Native: (links to other web resources are provided for some distributions) NORTHERN AMERICA (Check conservation status in U.S. & Canada in NatureServe Explorer database) Eastern Canada: Canada - Ontario [s.] Northeastern U.S.A.: United States - Indiana, Michigan, New Jersey, New York [s.e.], Ohio, Pennsylvania, Vermont, West Virginia North-Central U.S.A.: United States - Illinois, Kansas [e.], Missouri, Oklahoma [e. & s.], Wisconsin Southeastern U.S.A.: United States - Alabama, Arkansas, Florida [n.], Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Virginia South-Central U.S.A.: United States - New Mexico [c.], Texas"
	Wunderlin, R.P. & Hansen, B.F. 2003. Guide to the Vascular Plants of Florida. University Press of Florida, Gainesville, FL	"Occasional; northern cos. south to Volusia and Lake Cos." [Range extends into subtropical regions of Florida]

Qsn #	Question	Answer
202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 7 Mar 2014]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Britton, N.L. & Brown, A. 1913. An Illustrated Flora of the Northern United States, Canada and the British Possessions. Vol. III. Gentianaceae to Compositae. Charles Scribner's Sons, New York, NY	"In dry or moist soil. Ontario to Virginia. Michigan. Illinois. Florida. Louisiana and Missouri. Escaped from cultivation eastward." [Wide latitudinal distribution]
	Harrison, M. 2006. Groundcovers for the South. Pineapple Press Inc., Sarasota, FL	"Zones: 3-8" [Can be grown in >5 hardiness zones]

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i, commonly cultivated and now sparingly naturalized on Lana'i and in Hawai'i Volcanoes National Park, Hawai'i."
	Wunderlin, R.P. & Hansen, B.F. 2003. Guide to the Vascular Plants of Florida. University Press of Florida, Gainesville, FL	"Occasional; northern cos. south to Volusia and Lake Cos." [Native range extends into subtropical regions of Florida]

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Native to the central U.S. from Michigan southward to New Mexico and Florida, <i>C. lanceolata</i> is widely cultivated."
	USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 7 Mar 2014]	Widely cultivated and naturalized.

301	Naturalized beyond native range	y
	Source(s)	Notes
	Saito, T. I., & Okubo, K. 2013. Influences of invasive herb <i>Coreopsis lanceolata</i> on riparian endemic herbs in relation to the understory light availability. Landscape and ecological engineering, 9(2): 271-280	"Alien perennial herb <i>Coreopsis lanceolata</i> (Compositae), native to North America, invades in Japan (Shimizu 2003) and other countries (Batianoff and Halford 2002; Sung-Sik and Lee 2008; Wu et al. 2010)."

Qsn #	Question	Answer
	Auld, B., Morita, H., Nishida, T., Ito, M., & Michael, P. 2003. Shared exotica: plant invasions of Japan and south eastern Australia. <i>Cunninghamia</i> , 8(1): 147-152	"Appendix 1. Invading plant species (mostly regarded as weeds) common to Japan and eastern Australia that are exotic to both countries. *Species that are widespread in both countries are marked with an asterisk. These generally occur over more than 4 degrees of latitude, may occur in more than one habitat type and are often locally abundant in at least one habitat in both countries." [List includes * <i>Coreopsis lanceolata</i> L.]
	Howell, C. J., & Sawyer, J. W. (2006). New Zealand naturalised vascular plant checklist. New Zealand Plant Conservation Network, Wellington, NZ	"Fully naturalized"
	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, commonly cultivated and now sparingly naturalized on Lana'i and in Hawai'i Volcanoes National Park, Hawai'i."
	Starr, F. & Starr, K. 2013. New Plant Records from Maui and Hawai'i. Bishop Museum Occasional Papers 114: 33-36	"This prolific daisy (lanceleaf coreopsis) has been previously documented as naturalized on Lana'i, West Maui, and Hawai'i (Wagner et al. 1999, Meidell et al. 1997). it is here reported as naturalized on east Maui, where it was spreading aggressively by seeds from plantings in a botanical garden. Noted as invasive by the garden owner. Material examined: MAUI: east Maui, enchanting Floral Gardens of Kula, mass plantings with naturalized plants spreading in various locations, in association with various other botanical garden exotics, 2300 ft [701 m], 24 Apr 2012, Starr, Starr & Takeda 120424-01."
	Meidell, J.S., Oppenheimer, H.L. & Bartlett, R.T. 1997. New plant records from Pu'u Kukui watershed and adjacent areas, Maui. Bishop Museum Occasional Papers 49: 17-18	"Wagner et al. (1990:289) document the naturalized range of this taxa as Lana'i and Hawai'i Islands. A collection was obtained along the roadside at the Honokowai Ditch Trail head, 464m ASL, West Maui. Specimens were ubiquitous among alien vegetation supplanting the natural components of Lowland Mesic Shrubland. The distribution of this population precludes any reasonable possibility of deliberate cultivation in this area, indicating that this taxa has become naturalized on Maui. Material examined. MAUI: Lahaina District, West Maui, 464 m, South rim of Honokowai Valley, 29 July 1996, Meidell & Oppenheimer 124 (BISH)."
	Wu, Z. Y., Raven, P. H. & Hong, D. Y., (eds.). 2011. Flora of China Volume 20-21 (Asteraceae). Science Press, Beijing & Missouri Botanical Garden Press, St. Louis	"Widely cultivated and naturalized in China [native to North America]."

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Gardner, H.W. 2010. Tallgrass Prairie Restoration in the Midwestern and Eastern United States: A Hands-On Guide. Springer, New York	"If one minimizes competition from other plants, this plant is easily cultivated in many soils. However, its lifetime is short (about 3-5 years) requiring replenishment by seed. It often decreases as the prairie matures." [Poor competitive ability, and decrease in abundance as other vegetation matures suggests that this plant is disturbance-adapted]
	Csurhes, S. & Edwards, R. 1998. Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	"It is a weed of waste areas and roadsides in Queensland" [Disturbance adapted]

Qsn #	Question	Answer
	Wu, Z. Y., Raven, P. H. & Hong, D. Y., (eds.). 2011. Flora of China Volume 20-21 (Asteraceae). Science Press, Beijing & Missouri Botanical Garden Press, St. Louis	"Sandy soils, ditches and roadsides, other disturbed sites." [Disturbance-adapted]

303	Agricultural/forestry/horticultural weed	y
	Source(s)	Notes
	Miyawaki, S., & Washitani, I. (2004). Invasive alien plant species in riparian areas of Japan: the contribution of agricultural weeds, revegetation species and aquacultural species. <i>Global Environmental Research</i> 8(1): 89-101	"Agricultural weeds" are undesirable plants that invade highly disturbed agricultural land, where they reduce the productive capacity of crops (Pimentel, 1986)." ... "Table 5. Invasive alien plant species identified along 123 rivers (109 river systems) in Japan." [<i>Coreopsis lanceolata</i> - Category = W: agricultural weed]
	Csurhes, S. & Edwards, R. 1998. Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	"Occurs as a weed of agricultural land and wasteland in South Africa (Wells et al. 1986)." ... "It is a weed of waste areas and roadsides in Queensland..."

304	Environmental weed	y
	Source(s)	Notes
	Saito, T. I., & Okubo, K. 2012. Effects of vegetation cutting on the invasive plant <i>Coreopsis lanceolata</i> vary with vegetation type. <i>Landscape and Ecological Engineering</i> , 8 (2): 207-214	" <i>Coreopsis lanceolata</i> (Compositae), native to North America, is an invasive perennial herbaceous plant species in Japan (Shimizu 2003), where this species was often seeded artificially for landscaping (Suzuki and Kondo 1991). Because <i>C. lanceolata</i> is considered to reduce the abundances of native endemic plants (Batianoff and Halford 2002; Saito and Okubo 2006; Hatase et al. 2007), this species has been designated an "invasive alien species" in Japan, in order to prevent its expansion and mitigate its impact on native ecosystems (MOEJ 2010). Therefore, the development of a management approach that can control the abundance of <i>C. lanceolata</i> and promote those of native plants is urgently needed. <i>C. lanceolata</i> invades various native vegetation types (Saito and Okubo 2006; Hatase et al. 2008),"
	Michael, P. (ed.). 2012. The Master Weed Wackers Manual. A compilation of the most common weeds found on Port Macquarie Landcare sites. Port Macquarie Landcare Group, Inc., Port Macquarie, NSW	"Ecology: A short lived perennial herb which produces abundant seed that germinates readily under high light and heat conditions; well suited to road-sides, burned heath, dunes, compacted turf or recreation areas, overstocked/degraded pasture on poor soils. <i>Coreopsis</i> is now a widespread environmental weed on poor soils and in open grassland and woodland. It is spread rapidly by wind and forms interconnected root mats."
	BMCC Bushcare. 2007. Weeds of Blue Mountains Bushland - Garden Plants Going Wild - A Guide To Identification and Control. www.weedsbluemountains.org.au	"Now moving down watercourses into good bushland, following the siltation from urban runoff. Clumping and rapid spread crowd out native plants and reduce the germination of native seed."
	Poon, E., Westcott, D.A., Burrows, D. & Webb, A. 2007. Assessment of research needs for the management of invasive species in the terrestrial and aquatic ecosystems of the Wet Tropics. Reef & Rainforest Research Centre Ltd, Cairns	"Table 9. The ten most serious invasive garden plants still available for sale by nurseries in Queensland (from Groves et al. 2005)." [<i>Coreopsis lanceolata</i> included in this list]

Qsn #	Question	Answer
	JianJun, Z., YiAn, X., & XiaoJun, Z. 2012. Clonal reproductive property and community characteristic of invasive species <i>Coreopsis lanceolata</i> . <i>Bulletin of Botanical Research</i> , 32(2): 147-150	"The clonal reproductive property and community characteristic of invasive species <i>Coreopsis lanceolata</i> in different habitats in Lu Shan, Jiangxi province were studied. The results showed that there was no significant difference in clonal architecture under habitats with different resources. Whether in rock or deserted farmland, the clonal architecture was mainly phalanx which developed from the base of plant, it seemed that there was no correlation between the guerrilla clonal architecture and the level of environment resources. Those guerrilla clonal growth traits made <i>C. lanceolata</i> had collectivize growth strategy, which improved its resistance to barren and drought environment. Thus, naturalized <i>C. lanceolata</i> could dominate various indigenous plants in Lushan, the companion species of <i>C. lanceolata</i> populations were weeds with wider adaptability." [Possibly Yes]
	Saito, T. I., & Okubo, K. 2013. Influences of invasive herb <i>Coreopsis lanceolata</i> on riparian endemic herbs in relation to the understory light availability. <i>Landscape and ecological engineering</i> , 9(2): 271-280	"We considered that <i>C. lanceolata</i> reduces endemic riparian species but coexists with <i>L. inschanica</i> . Preventing invasion and dominance of <i>C. lanceolata</i> is desirable to conserve endemic riparian vegetation." ... " <i>C. lanceolata</i> has been designated as an invasive alien species in Japan to prevent its expansion and mitigate its invasive impact (Ministry of the Environment, Government of Japan 2010), as this species is considered to reduce native plants (Batianoff and Halford 2002; Saito and Okubo 2006; Hatase et al. 2007)."

305	Congeneric weed	y
	Source(s)	Notes
	Liang, Y., Liu, J., Zhang, S. P., Wang, S. J., Guo, W. H., & Wang, R. Q. 2008. Genetic diversity of the invasive plant <i>Coreopsis grandiflora</i> at different altitudes in Laoshan Mountain, China. <i>Canadian Journal of Plant Science</i> , 88 (4): 831-837	" <i>Coreopsis grandiflora</i> has caused damage on Laoshan Mountain by reducing the biodiversity of native species (Liang et al. 2008). Some studies suggest that genetic diversity has no relationship with invasion (Poulin et al. 2005; Li and Ye 2006), but this study's results show that the high genetic diversity seen may play an important role in the invasion of <i>C. grandiflora</i> ."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Wu, Z. Y., Raven, P. H. & Hong, D. Y., (eds.). 2011. <i>Flora of China Volume 20-21 (Asteraceae)</i> . Science Press, Beijing & Missouri Botanical Garden Press, St. Louis	"Perennials, 10–30(–60+) cm. Aerial nodes proximal to first peduncle usually 1–3(–5+), distalmost 1–3 internodes 1–2(–8+) cm. Leaves: basal and cauline on proximal 1/4–1/3(–1/2) of plant height; petioles 1–5(–8+) cm; blades simple or with 1 or 2+ lateral lobes, simple blades or terminal lobes ovate-lanceolate or lanceolate to oblanceolate or linear-lanceolate, 5–12 cm × 8–15(–18+) mm."

402	Allelopathic	
	Source(s)	Notes
	Guo, R. Q., Zhao, H., Zhang, K., Jiang, Z., Yang, Z. M., & Yan, Q. 2010. Allelopathy Effect of Aqueous Extract of <i>Coreopsis lanceolata</i> L. on Seeds Germination. <i>Northern Horticulture</i> , 4: 017	"Several kinds of seeds were used as the receptor to study the allelopathy of <i>Coreopsis lanceolata</i> L. in different aqueous extracts." [Yes, under laboratory conditions]

Qsn #	Question	Answer
403	Parasitic	n
	Source(s)	Notes
	Wu, Z. Y., Raven, P. H. & Hong, D. Y., (eds.). 2011. Flora of China Volume 20-21 (Asteraceae). Science Press, Beijing & Missouri Botanical Garden Press, St. Louis	"Perennials, 10–30(–60+) cm." [Asteraceae - No evidence]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Masters, R., Mitchell, P. & Dobbs, S. 2010. Ornamental and garden plants: controlling deer damage F-6427. Oklahoma State University Cooperative Extension Unit. http://www.icwdm.org/publications/pdf/deer/osu_deer_damage.pdf . [Accessed]	"Herbaceous Plants—Perennial Flowers Rarely Damaged" [List includes <i>Coreopsis lanceolata</i>]
	Simmonds, H., Holst, P. & Bourke, C. 2000. The palatability, and potential toxicity of Australian weeds to goats. Rural Industries Research and Development Corporation, Barton, Australia	"The palatability* of weeds (not necessarily endemic to Australia) to goats when the weeds are grown in Australia. H = high; M = moderate; L = low; N = not known to be eaten." [<i>Coreopsis lanceolata</i> = M] [Moderately palatable to goats. Less palatable to deer]
	Ober, H. K., DeGroot, L. W., Aldrich, J. H., Norcini, J. G., & Knox, G. W. 2012. Wildflowers Susceptible to Deer Damage in North Florida. WEC315. Institute of Food and Agricultural Sciences, University of Florida. Gainesville, FL	"We investigated foraging preference of wild white-tailed deer among annuals and perennials native to north Florida and south Georgia at two sites in Gadsden County for two years. These areas had high deer densities. We selected 11 native annual to short-lived perennial species in the Asteraceae family to investigate:" ... "Table 1. Average percentage of plants of each wildflower species damaged by foraging deer." [Lanceleaf tickseed - % of plants damaged = 3%] [Of the 11 species tested, <i>C. lanceolata</i> was browsed the least, suggesting relative unpalatability to deer]
	Derano, P. 2007. Creating A Deer Proof Garden. Creating A Deer Proof Garden, Ltd	<i>Coreopsis lanceolata</i> is recommended in this book, and is possibly unpalatable to deer, or tolerant of deer browsing

405	Toxic to animals	n
	Source(s)	Notes
	Simmonds, H., Holst, P. & Bourke, C. 2000. The palatability, and potential toxicity of Australian weeds to goats. Rural Industries Research and Development Corporation, Barton, Australia	"The potential toxicity of weeds to goats. +++ high risk; ++ moderate risk; + low risk; □ no known risk." [<i>Coreopsis lanceolata</i> = □ no known risk]
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

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

Qsn #	Question	Answer
	Norcini, J.G. 2012. Native Wildflowers -- <i>Coreopsis lanceolata</i> L. ENH 147. Revised. Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. http://edis.ifas.ufl.edu . [Accessed]	"Lanceleaf coreopsis is relatively insect and disease free. Infrequent damage to flowers by stink bugs may occur -- about 1/2 inch below the flower the stem collapses where the stink bug has been feeding and the flower dies. During late fall and winter, some plants may succumb to diseases but since the plant reseeds itself and other plants will spread, the overall planting of lanceleaf coreopsis should look good year to year."
	Missouri Botanical Garden. 2014. <i>Coreopsis lanceolata</i> . http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=j880 . [Accessed 7 Mar 2014]	"No serious insect or disease problems."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Stafford, K. 2011. Firewise Plant List - Texas. http://txmg.wpengine.netdna-cdn.com/ellis/files/2012/03/Texas-Plant-Flammability-List.pdf . [Accessed 9 Mar 2014]	"Coreopsis lanceolata - Flammability - Firewise = Low" [Low flammability wildflower recommended for fire prone landscapes]
	Knutson-Pedersen, J. 2005. Fire Safe Landscaping. Tree Notes. Number 17 (revised). California Department of Forestry and Fire Protection. ceres.ca.gov/foreststeward/pdf/treenote17.pdf	"The following is a partial list of plants that can be planted within each of the four zones around a structure." [C. lanceolata included in a list of recommended plants]

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	Norcini, J.G. 2012. Native Wildflowers -- <i>Coreopsis lanceolata</i> L. ENH 147. Revised. Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. http://edis.ifas.ufl.edu . [Accessed]	"Lanceleaf coreopsis grows best in full sun in slightly moist, well-drained soil."
	BMCC Bushcare. 2007. Weeds of Blue Mountains Bushland - Garden Plants Going Wild - A Guide To Identification and Control. www.weedsbluemountains.org.au	"Prefers open areas and full sun, and was initially confined to roadsides, railway embankments, disturbed areas, and bushland edges."
	Missouri Botanical Garden. 2014. <i>Coreopsis lanceolata</i> . http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=j880 . [Accessed 7 Mar 2014]	"Sun: Full sun "

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Gardner, H.W. 2010. Tallgrass Prairie Restoration in the Midwestern and Eastern United States: A Hands-On Guide. Springer, New York	"If one minimizes competition from other plants, this plant is easily cultivated in many soils."
	Holmes, R. & Walheim, L.. 2010. Western Home Landscaping. Creative HomeownerCreative Homeowner	"Tolerates most soil types and has very few pest problems."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Clumped perennial herbs 2-7 dm tall, villous or sometimes glabrous."

412	Forms dense thickets	n
	Source(s)	Notes
	Michael, P. (ed.). 2012. The Master Weed Wackers Manual. A compilation of the most common weeds found on Port Macquarie Landcare sites. Port Macquarie Landcare Group, Inc., Port Macquarie, NSW	"Ecology: A short lived perennial herb which produces abundant seed that germinates readily under high light and heat conditions; well suited to road-sides, burned heath, dunes, compacted turf or recreation areas, overstocked/degraded pasture on poor soils. Coreopsis is now a widespread environmental weed on poor soils and in open grassland and woodland. It is spread rapidly by wind and forms interconnected root mats." [No evidence]
	BMCC Bushcare. 2007. Weeds of Blue Mountains Bushland - Garden Plants Going Wild - A Guide To Identification and Control. www.weedsbluemountains.org.au	"Perennial herbaceous yellow daisy from North America, forming dense clumps up to 1m x 1m. Dies down after seeding until the following spring." ... "Clumping and rapid spread crowd out native plants and reduce the germination of native seed." [Competitive exclusion through dense growth habit]

501	Aquatic	n
	Source(s)	Notes
	Wu, Z. Y., Raven, P. H. & Hong, D. Y., (eds.). 2011. Flora of China Volume 20-21 (Asteraceae). Science Press, Beijing & Missouri Botanical Garden Press, St. Louis	"Perennials, 10–30(–60+) cm." ... "Sandy soils, ditches and roadsides, other disturbed sites."

502	Grass	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.	Asteraceae

503	Nitrogen fixing woody plant	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Clumped perennial herbs 2-7 dm tall, villous or sometimes glabrous." [Asteraceae]

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Csurhes, S. & Edwards, R. 1998. Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	"An erect annual or short-lived perennial herb (c. 1 m tall). Produces yellow flowers on long, leafless stalks. Seeds c. 2-3 mm long, black and wind-dispersed (Kleinschmidt and Johnson 1987). Can also reproduce from rhizomes."
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. 2010). Guidance for addressing the Australian Weed Risk Assessment questions. Plant Protection Quarterly, 25(2): 56-74	"This question is specifically to deal with plants that have specialized organs and should not include plants merely with rhizomes/ stolons (see 6.06)."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 7 Mar 2014]	No evidence. Widespread distribution

602	Produces viable seed	y
	Source(s)	Notes
	Michael, P. (ed.). 2012. The Master Weed Wackers Manual. A compilation of the most common weeds found on Port Macquarie Landcare sites. Port Macquarie Landcare Group, Inc., Port Macquarie, NSW	"Dispersal: Its tiny seeds are spread rapidly by wind along roads and railway lines." ... "Seeds are long lived, so new seedlings will need to be weeded out every year."
	Missouri Botanical Garden. 2014. <i>Coreopsis lanceolata</i> . http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=j880 . [Accessed 7 Mar 2014]	"Freely self-seeds, and in optimum growing conditions will naturalize to form large colonies."
	Csurhes, S. & Edwards, R. 1998. Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	"Seeds c. 2-3 mm long, black and wind-dispersed (Kleinschmidt and Johnson 1987). Can also reproduce from rhizomes."

603	Hybridizes naturally	
	Source(s)	Notes

Qsn #	Question	Answer
	Smith, E. B. 1975. The chromosome numbers of North American <i>Coreopsis</i> with phyletic interpretations. <i>Botanical Gazette</i> , 136(1): 78-86	"I have produced an intersexual artificial hybrid between <i>C. tinctoria</i> and <i>C. gladiata</i> . It is vegetatively vigorous but almost completely sterile" [Unknown for <i>C. lanceolata</i> . Other species are capable of artificial hybridization]

604	Self-compatible or apomictic	n
	Source(s)	Notes
	Banovetz, S. J., & Scheiner, S. M. 1994. The effects of seed mass on the seed ecology of <i>Coreopsis lanceolata</i> . <i>American Midland Naturalist</i> , 131(1): 65-74	" <i>Coreopsis lanceolata</i> is self-incompatible"
	Hao, J. H., Qiang, S., Chrobok, T., van Kleunen, M., & Liu, Q. Q. 2011. A test of baker's law: breeding systems of invasive species of Asteraceae in China. <i>Biological Invasions</i> , 13(3): 571-580	"The two species without autonomous seed set, <i>Coreopsis lanceolata</i> and <i>Solidago canadensis</i> , were self-incompatible."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Buckley, K. D. 2011. Native Bee Visitation on Florida Native Wildflowers. MS Thesis. University of Florida, Gainesville, FL	"During spring, honey bees visited <i>C. lanceolata</i> significantly more so than the other flower species ..."
	Wu, Z. Y., Raven, P. H. & Hong, D. Y., (eds.). 2011. <i>Flora of China</i> Volume 20-21 (Asteraceae). Science Press, Beijing & Missouri Botanical Garden Press, St. Louis	"Peduncles (8-)12-20(-35+) cm; calycular bracts ovate-lanceolate to linear-lanceolate or linear, 4-8(-12) mm; phyllaries deltate to dentate-lanceolate, 8-12+ mm. Ray limbs yellow, 15-30+ mm. Disk corollas 6-7.5 mm, apices yellow." [No evidence]
	Tuell, J. K., Fiedler, A. K., Landis, D., & Isaacs, R. 2008. Visitation by wild and managed bees (Hymenoptera: Apoidea) to eastern US native plants for use in conservation programs. <i>Environmental Entomology</i> , 37(3): 707-718	"The plants most attractive to wild bees using either sampling method and in their peak bloom order were as follows: <i>Fragaria virginiana</i> , <i>Zizia aurea</i> , <i>Penstemon hirsutus</i> L., <i>Coreopsis lanceolata</i> , ... etc."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Csurhes, S. & Edwards, R. 1998. Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	"Can also reproduce from rhizomes."
	Hao, J. H., Qiang, S., Chrobok, T., van Kleunen, M., & Liu, Q. Q. 2011. A test of baker's law: breeding systems of invasive species of Asteraceae in China. <i>Biological Invasions</i> , 13(3): 571-580	"The two species without autonomous seed set, <i>Coreopsis lanceolata</i> and <i>Solidago canadensis</i> , were self-incompatible. These two species are, however, capable of vegetative reproduction through vigorous rhizomatous growth."

607	Minimum generative time (years)	1
	Source(s)	Notes

Qsn #	Question	Answer
	Norcini, J.G. 2012. Native Wildflowers -- <i>Coreopsis lanceolata</i> L. ENH 147. Revised. Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. http://edis.ifas.ufl.edu . [Accessed]	"The Florida ecotype will flower in late spring if it is directly seeded in the winter or previous autumn. However, flowering of the common garden variety is sporadic at best the first year after it is seeded, although its flowers are two to three times larger than the Florida ecotype. Mature plants of the Florida ecotype or the common garden variety that overwinter will start flowering in mid to late March, with peak bloom soon after. Moderate to sparse flowering will likely continue into August. Plants rebloom well if faded flowers are removed." [Capable of flowering within first year]

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Richardson, F. J., Richardson, R. G., & Shepherd, R. C. H. 2011. Weeds of the South-East: An Identification Guide for Australia. Second Edition. RG and FJ Richardson, Victoria, Australia	"Common along roadsides, railway lines, in wasteland and other disturbed sites, especially in sandy soils." [Presence along heavily trafficked disturbed corridors could facilitate inadvertent dispersal]
	Michael, P. (ed.). 2012. The Master Weed Wackers Manual. A compilation of the most common weeds found on Port Macquarie Landcare sites. Port Macquarie Landcare Group, Inc., Port Macquarie, NSW	"Dispersal: Its tiny seeds are spread rapidly by wind along roads and railway lines. Also spreads vegetatively via underground rhizomes. To a lesser degree in dumped garden waste and as a contaminant in soil ('clean fill') on farms and civil construction."
	Haines, A. 2011. New England Wild Flower Society's Flora Novae Angliae: A Manual for the Identification of Native and Naturalized Higher Vascular Plants of New England. Yale University Press, Yale, CT	"Fields, roadsides, dry clearings." [Presence along roadsides could facilitate inadvertent dispersal]
	BMCC Bushcare. 2007. Weeds of Blue Mountains Bushland - Garden Plants Going Wild - A Guide To Identification and Control. www.weedsbluemountains.org.au	"Spreads by means of wind and water, the movement of soil contaminated with seed, and garden waste dumping."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Fosberg, F. R. & Sachet, M-H. 1980. Flora of Micronesia, 4: Caprifoliaceae-Compositae. Smithsonian Contributions to Botany 46: 1-71	"Native of eastern United States, widely planted as an ornamental; very rarely cultivated in Micronesia (Palau)."
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Native to the central U.S. from Michigan southward to New Mexico and Florida, <i>C. lanceolata</i> is widely cultivated."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	BMCC Bushcare. 2007. Weeds of Blue Mountains Bushland - Garden Plants Going Wild - A Guide To Identification and Control. www.weedsbluemountains.org.au	"Spreads by means of wind and water, the movement of soil contaminated with seed, and garden waste dumping." [No evidence]

704	Propagules adapted to wind dispersal	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Wu, Z. Y., Raven, P. H. & Hong, D. Y., (eds.). 2011. Flora of China Volume 20-21 (Asteraceae). Science Press, Beijing & Missouri Botanical Garden Press, St. Louis	"Achenes 2.6–4 mm, wings ± spreading, ± papery, entire." [Yes if winged and papery]
	Csurhes, S. & Edwards, R. 1998. Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	"Seeds c. 2-3 mm long, black and wind-dispersed (Kleinschmidt and Johnson 1987)."

705	Propagules water dispersed	y
	Source(s)	Notes
	BMCC Bushcare. 2007. Weeds of Blue Mountains Bushland - Garden Plants Going Wild - A Guide To Identification and Control. www.weedsbluemountains.org.au	"Spreads by means of wind and water, the movement of soil contaminated with seed, and garden waste dumping."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Harrison, M. 2006. Groundcovers for the South. Pineapple Press Inc., Sarasota, FL	"Coreopsis seeds are a favorite food of goldfinches and other seed-eating birds." [Seeds depredated]
	Csurhes, S. & Edwards, R. 1998. Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	"Seeds c. 2-3 mm long, black and wind-dispersed (Kleinschmidt and Johnson 1987)." [No evidence, and lacks adaptations for internal dispersal by birds]

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Michael, P. (ed.). 2012. The Master Weed Wackers Manual. A compilation of the most common weeds found on Port Macquarie Landcare sites. Port Macquarie Landcare Group, Inc., Port Macquarie, NSW	"Fruit: An achene (hard-coated) with 2 papery 'wings', small (1-2mm)." ... "Dispersal: Its tiny seeds are spread rapidly by wind along roads and railway lines. Also spreads vegetatively via underground rhizomes. To a lesser degree in dumped garden waste and as a contaminant in soil ('clean fill') on farms and civil construction." [No evidence & achenes lack means of external attachment, although small size may allow for adherence to fur or mud]
	BMCC Bushcare. 2007. Weeds of Blue Mountains Bushland - Garden Plants Going Wild - A Guide To Identification and Control. www.weedsbluemountains.org.au	"Spreads by means of wind and water, the movement of soil contaminated with seed, and garden waste dumping." [No evidence]

Qsn #	Question	Answer
708	Propagules survive passage through the gut	n
	Source(s)	Notes
	BMCC Bushcare. 2007. Weeds of Blue Mountains Bushland - Garden Plants Going Wild - A Guide To Identification and Control. www.weedsbluemountains.org.au	"Produces copious black flattened seeds 2-3mm long with two papery wings. Germination rates are high." ... "Spreads by means of wind and water, the movement of soil contaminated with seed, and garden waste dumping." [No evidence]
801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	Michael, P. (ed.). 2012. The Master Weed Wackers Manual. A compilation of the most common weeds found on Port Macquarie Landcare sites. Port Macquarie Landcare Group, Inc., Port Macquarie, NSW	""Ecology: A short lived perennial herb which produces abundant seed that germinates readily under high light and heat conditions..." [Potentially Yes]
	BMCC Bushcare. 2007. Weeds of Blue Mountains Bushland - Garden Plants Going Wild - A Guide To Identification and Control. www.weedsbluemountains.org.au	"Produces copious black flattened seeds 2-3mm long with two papery wings. Germination rates are high."
802	Evidence that a persistent propagule bank is formed (>1 yr)	y
	Source(s)	Notes
	Banovetz, S. J., & Scheiner, S. M. 1994. The effects of seed mass on the seed ecology of <i>Coreopsis lanceolata</i> . American Midland Naturalist, 131(1): 65-74	"ABSTRACT.-We examined the effects of seed mass on seed survival and germination in the herbaceous perennial <i>Coreopsis lanceolata</i> (L.) (Asteraceae)." ... "After 2-yr burial in nylon bags in the field, larger seeds had higher survivorship and viability rates but lower germination rates. The lower germination rates of large seeds after burial in the field may be due to dormancy." ... "Maximal seed longevity in the seed bank, estimated from survival and viability in the 1 st 2 yr, ranged from 2 yr in small seeds to 13 yr in large seeds, with 99% of all seeds surviving for less than a decade. <i>Coreopsis lanceolata</i> is a long-lived rhizomatous perennial."
	Michael, P. (ed.). 2012. The Master Weed Wackers Manual. A compilation of the most common weeds found on Port Macquarie Landcare sites. Port Macquarie Landcare Group, Inc., Port Macquarie, NSW	"Seeds are long lived, so new seedlings will need to be weeded out every year."
803	Well controlled by herbicides	y
	Source(s)	Notes
	Michael, P. (ed.). 2012. The Master Weed Wackers Manual. A compilation of the most common weeds found on Port Macquarie Landcare sites. Port Macquarie Landcare Group, Inc., Port Macquarie, NSW	"Spraying with a glyphosate at 10mL L-1 flowering is successful."
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y

Qsn #	Question	Answer
	Source(s)	Notes
	Missouri Botanical Garden. 2014. <i>Coreopsis lanceolata</i> . http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=j880 . [Accessed 7 Mar 2014]	" Plants may be cut back hard in summer if foliage sprawls or becomes unkempt." [Tolerates "hard" cutting]
	Michael, P. (ed.). 2012. The Master Weed Wackers Manual. A compilation of the most common weeds found on Port Macquarie Landcare sites. Port Macquarie Landcare Group, Inc., Port Macquarie, NSW	"Control: Hand weeding is time consuming but successful. Each sister plant must be traced and removed." [Suggests that entire plant must be removed for effective control]

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	Unknown

Summary of Risk Traits:

High Risk or Undesirable Traits

- Broad climate suitability (Can grow in >5 hardiness zones)
- Widely naturalized
- An agricultural and environmental weed
- Other *Coreopsis* species have become invasive
- Tolerates a wide range of soil conditions
- Seeds freely
- Capable of vegetative reproduction through vigorous rhizomatous growth
- Capable to reach maturity in one growing season
- Seeds dispersed intentionally by people, by wind, water movement, and in soil
- Tolerates cutting and mechanical damage

Low Risk or Desirable Traits

- A temperate to marginally subtropical species (may only be invasive at higher elevation in tropics)
- Unarmed (no spines, thorns or burrs)
- Palatable to goats
- Not reported to be toxic
- Requires full sun
- Self-incompatible
- Used as an ornamental & to attract & benefit pollinators
- Herbicides may provide effective control