

Taxon: <i>Tagetes lucida</i> Cav.	Family: Asteraceae
Common Name(s): Mexican mint marigold Mexican-tarragon sweet marigold sweet-mace Sweet-scented marigold Texas-tarragon	Synonym(s): <i>Tagetes anethina</i> Sessé & Moc. <i>Tagetes florida</i> Sweet <i>Tagetes gillettii</i> De Wild. <i>Tagetes lucida</i> (Sweet) Voss <i>Tagetes pineda</i> La Llave <i>Tagetes schiedeana</i> Less. <i>Tagetes seleri</i> Rydb.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 14 Dec 2020
WRA Score: 2.0	Designation: EVALUATE	Rating: Evaluate

Keywords: Perennial Herb, Naturalized Elsewhere, Herb, Edible, Epizoochorous

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	n
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed		
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
405	Toxic to animals	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems		
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	y=1, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	y
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m ²)	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers. Springer, Dordrecht	[Long history of cultivation, but no evidence of domestication] "The plant is native to Central America (Mexico, Honduras and Guatemala) and South America. It thrives in the south of the United States and in México and is grown in many warm temperate areas worldwide. It is cultivated as an ornamental in the highlands in Java." ... "In Mexico and Guatemala, <i>Tagetes lucida</i> has played an important role in social, cultural and religious rites since the Aztec era till today (Kaplan 1960 ; Neher 1968 ; Diaz et al. 1977)."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2020). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2020). 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. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 11 Dec 2020]	"Native Northern America NORTHERN MEXICO: Mexico [Chihuahua, Coahuila de Zaragoza, Durango, Nuevo León, San Luis Potosí, Sinaloa, Sonora, Tamaulipas, Zacatecas] SOUTHERN MEXICO: Mexico [Aguascalientes, Chiapas, Colima, Guanajuato, Guerrero, Hidalgo, Jalisco, México, Michoacán de Ocampo, Morelos, Nayarit, Oaxaca, Puebla, Querétaro, Tabasco, Tlaxcala, Veracruz de Ignacio de la Llave] Southern America CENTRAL AMERICA: Guatemala, Honduras, El Salvador"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 11 Dec 2020]	

Qsn #	Question	Answer
203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers. Springer, Dordrecht	"It is an aromatic herb distributed naturally from Mexico to Honduras, at elevations between 1,000 and 2,000 m. A robust perennial herb grown as an annual. It requires full sun or partial shade and needs well-drained, moderately fertile soil, growing well in clayey and sandy soils. It is fairly drought tolerant and frost sensitive; hard freezes will kill it to the ground."
	Plants for a Future. (2020). <i>Tagetes lucida</i> . https://pfaf.org [Accessed 14 Dec 2020]	"USDA hardiness 8-11"

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Nash, D.L.& Williams, L.O. 1976. Flora of Guatemala. Fieldiana: Botany. Vol. 24 - Part XII. Field Museum of Natural History	"Mostly in open grassy fields, frequently in oak forest, sometimes on dry rocky hillsides, 1,000-2,000 m.; Peten; Jalapa; Guatemala; Sacatepequez; Chimaltenango; El Quiche; Huehuetenango; San Marcos. Mexico; El Salvador; Honduras."
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers. Springer, Dordrecht	"The plant is native to Central America (Mexico, Honduras and Guatemala) and South America. It thrives in the south of the United States and in México and is grown in many warm temperate areas worldwide. It is cultivated as an ornamental in the highlands in Java."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Ravindran, P. N. (2017). The Encyclopedia of Herbs and Spices. CABI, Wallingford, UK	"Mexican tarragon is widely distributed in mixed oak and pine or oak forests, on open slopes in Mexico and in the Mesoamerican region (Guatemala, Honduras and El Salvador). The plant was introduced into West Africa, the Iberian Peninsula, South Asia, South-east Asia and Far East countries; in all these regions it is cultivated as an ornamental plant (Anon., 2014a)."
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers. Springer, Dordrecht	"The plant is native to Central America (Mexico, Honduras and Guatemala) and South America. It thrives in the south of the United States and in México and is grown in many warm temperate areas worldwide. It is cultivated as an ornamental in the highlands in Java."
	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	[Hawaiian Islands] "Another species grown by some local herb gardeners is <i>Tagetes lucida</i> Cavanilles,"

301	Naturalized beyond native range	y
	Source(s)	Notes

Qsn #	Question	Answer
	Regalado, E. L., Fernández, M. D., Pino, J. A., Mendiola, J., & Echemendia, O. A. (2011). Chemical composition and biological properties of the leaf essential oil of <i>Tagetes lucida</i> Cav. from Cuba. <i>Journal of Essential Oil Research</i> , 23(5), 63-67	" <i>Tagetes lucida</i> Cav. (syn. <i>T. florida</i> Sweet, <i>T. schiedeana</i> Less.), commonly called Pericón, hierbanís, anís, santa María, Mexican mint marigold, Mexican tarragon, Spanish tarragon, or Texas tarragon, is a perennial herb that grows in dry rocky slopes and woods native to Central America and South America and naturalized elsewhere in the tropics and subtropics"
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	[Cited as a weed in some locations] " <i>Tagetes lucida</i> Cav. Asteraceae Total N° of Refs: 7 Toxic - Habit: Herb Preferred Climate/s: Dryland, Mediterranean, Subtropical, Tropical Origin: N Am Major Pathway/s: Crop, Herbal, Ornamental Dispersed by: Humans References: Africa-W-760, Mexico-W-735, Mexico-W-890, Mexico-W-1226, Mexico- W-1510, Democratic Republic of the Congo-W-1977, India-W-1977."
	Imada, C. (2019). <i>Hawaiian Naturalized Vascular Plants Checklist</i> (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence to date

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	[Cited as a weed in some locations] " <i>Tagetes lucida</i> Cav. Asteraceae Total N° of Refs: 7 Toxic - Habit: Herb Preferred Climate/s: Dryland, Mediterranean, Subtropical, Tropical Origin: N Am Major Pathway/s: Crop, Herbal, Ornamental Dispersed by: Humans References: Africa-W-760, Mexico-W-735, Mexico-W-890, Mexico-W-1226, Mexico- W-1510, Democratic Republic of the Congo-W-1977, India-W-1977."
	Pérez-Ortega, G., González-Trujano, M. E., Ángeles-López, G. E., Brindis, F., Vibrans, H., & Reyes-Chilpa, R. (2016). <i>Tagetes lucida</i> Cav.: Ethnobotany, phytochemistry and pharmacology of its tranquilizing properties. <i>Journal of Ethnopharmacology</i> , 181, 221-228	[Common weed, not of conservation concern] " <i>Tagetes lucida</i> Cav. is a native aromatic plant that was and remains being one of the most important ritual plants used frequently in Mexico. Its common names include “pericón”, “yauhtli” (nahuatl), “hierba anís” or “hierba de Santa María”; in English it is called Mexican mint marigold (Duke et al., 2009). It is a common weed and not of conservation concern."

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

Qsn #	Question	Answer
304	Environmental weed	n
	Source(s)	Notes
	Pérez-Ortega, G., González-Trujano, M. E., Ángeles-López, G. E., Brindis, F., Vibrans, H., & Reyes-Chilpa, R. (2016). <i>Tagetes lucida Cav.: Ethnobotany, phytochemistry and pharmacology of its tranquilizing properties. Journal of Ethnopharmacology</i> , 181, 221-228	[Common weed, not of conservation concern] " <i>Tagetes lucida Cav.</i> is a native aromatic plant that was and remains being one of the most important ritual plants used frequently in Mexico. Its common names include "pericón", "yauhtli" (nahuatl), "hierba anís" or "hierba de Santa María"; in English it is called Mexican mint marigold (Duke et al., 2009). It is a common weed and not of conservation concern."
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	[No evidence] "References: Africa-W-760, Mexico-W-735, Mexico-W-890, Mexico-W-1226, Mexico-W-1510, Democratic Republic of the Congo-W-1977, India-W-1977."

305	Congeneric weed	y
	Source(s)	Notes
	CABI. (2020). <i>Tagetes minuta</i> (stinking Roger). In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. www.cabi.org/isc	[<i>Tagetes minuta</i>] " <i>T. minuta</i> is a fast-growing annual weed which competes with crops and interferes with their management or harvest. It has been reported as a weed of 19 crops in 35 countries (Holm et al., 1997). In parts of East Africa, it has been reported as infesting 10% of maize fields, and may be particularly severe in lowgrowing crops such as beans. Its presence in a crop may also lead to skin irritation to agricultural workers, whilst contamination of milk (this can occur as a result of external contact between the plant and cattle udders) imparts an objectionable flavour. <i>T. minuta</i> is a significant crop seed contaminant in East Africa (especially of wheat and some pasture grass seeds) (Holm et al., 1997), and contaminates wool in South Africa (Wells et al., 1986). It is an alternative host to the bean fungus <i>Ascochyta phaseolorum</i> in Australia (Holm et al., 1997). <i>T. minuta</i> may also leave allelopathic residues in soil (Meissner et al., 1986). The roots exude a polyacetylene derivative which delays germination and reduces the yield of crops grown in soil previously infested with the species."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Nash, D.L. & Williams, L.O. 1976. <i>Flora of Guatemala. Fieldiana: Botany. Vol. 24 - Part XII. Field Museum of Natural History</i>	[No evidence] "A glabrous, erect perennial commonly 30-75 cm. high, strong-scented, arising from a short, thick, woody base, cymosely branched above; leaves opposite, sessile, linear or narrowly oblong, 5-10 cm. long, obtuse or acute at each end, densely serrate, with numerous small, scattered glands; heads small, in dense or open, flat-topped cymes; involucre cylindrical, 9-10 mm. long; phyllaries 5- 7, subulate at the apex, with numerous small scattered glands; rays commonly 3, flabelliform, 3 mm. long, truncate; disc flowers 5- 7, the corollas 5-6 mm. long; achenes 6-7 mm. long, striate; pappus squamellae 5-6, two of them setiform, 3 mm. long, the others one-third as long, oblong, obtuse."

402	Allelopathic	
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Qsn #	Question	Answer
	Source(s)	Notes
	Altieri, M. A., & Doll, J. D. (1978). The potential of allelopathy as a tool for weed management in crop fields. <i>Pans</i> , 24(4), 495-502	[Unknown. Allelopathy reported in <i>Tagetes patula</i>] "The increasing emphasis now placed on weed management as opposed to weed control raises the question of the role of allelopathy in agricultural systems. Evidence of allelopathic interactions between crops and weeds is briefly reviewed and two experiments designed to demonstrate the allelopathic effects of plant residues on seed germination are described. From these experiments it can be seen that <i>Tagetes patula</i> , <i>Amaranthus dubius</i> , bean (<i>Phaseolus vulgaris</i>) and cassava residues have widespread inhibitory effects on the germination of seeds of other species, while maize, <i>Cenchrus brownii</i> , <i>Eleusine indica</i> and <i>Portulaca oleracea</i> show considerable tolerance to the presence of such residues. Suggestions are made as to how the potential of allelopathy in weed management can be investigated and how the process can be exploited. A considerable quantity of research remains to be done in this area."

403	Parasitic	n
	Source(s)	Notes
	Nash, D.L.& Williams, L.O. 1976. <i>Flora of Guatemala. Fieldiana: Botany. Vol. 24 - Part XII.</i> Field Museum of Natural History	"A glabrous, erect perennial commonly 30-75 cm. high, strong-scented, arising from a short, thick, woody base, cymosely branched above" [Asteraceae. No evidence]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Neher, R. T. (1968). The Ethnobotany of <i>Tagetes</i> . <i>Economic Botany</i> , 22(4), 317-325	[Possibly. Related species, <i>T. patula</i> , palatable to sheep and goats] "valuable grazing crop for sheep and goats, but harmful to cattle"

405	Toxic to animals	n
	Source(s)	Notes
	Plants for a Future. (2020). <i>Tagetes lucida</i> . https://pfaf.org [Accessed 14 Dec 2020]	"Known Hazards None known"
	Lim, T.K. (2014). <i>Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers.</i> Springer, Dordrecht	"Mexican Tarragon is an attractive landscape ornamental often used in perennial borders. Secretions from the roots of growing plants have an insecticidal effect on the soil and are reported to be effective against nematodes, keeled slugs and couch grass weed. The growing plant also has a repellent effect on various insect pests such as the asparagus beetle and bean weevils. The dried plant is burnt as an incense and to repel insects. A yellow dye obtained from the flowers is used for textile."

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Lim, T.K. (2014). <i>Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers.</i> Springer, Dordrecht	"The growing plant also has a repellent effect on various insect pests such as the asparagus beetle and bean weevils."

Qsn #	Question	Answer
	Flora Fauna Web. (2020). <i>Tagetes lucida</i> . https://www.nparks.gov.sg/florafaunaweb/flora/4/0/4087 . [Accessed 14 Dec 2020]	"Usually a hardy plant that is resistant to pests and disease. However, the plant may become susceptible to leaf miners, leaf spot, whiteflies, spider mites, leaf spot caused by bacterial pathogens, powdery mildew, damping off and botrytis."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Plants for a Future. (2020). <i>Tagetes lucida</i> . https://pfaf.org [Accessed 14 Dec 2020]	"Known Hazards None known"
	Lim, T.K. (2014). <i>Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers</i> . Springer, Dordrecht	"Leaves and flowers are edible (Hedrick 1972 ; Facciola 1990 ; Brown 2011). Petals are used as condiments. Flowers are used in salads. The anise-scented foliage is used in salads, soups, sauces, stews and poultry and fish dishes. Mexican Marigold is good for bouquet garni for flavoured butter and herbed vinegar. The dried leaves and flowering tops are brewed into a pleasant, soothing, anise-flavoured tea which is a very popular drink in Latin America. The leaves were an important flavouring of 'chocolatl', the foaming cocoa-based drink of the Aztecs. The petals are used as a condiment. The natives in Mexico prepare a tea from the shoots."
	Ravindran, P. N. (2017). <i>The Encyclopedia of Herbs and Spices</i> . CABI, Wallingford, UK	"Mexican tarragon when used as an aromatic herb or medicinal plant is absolutely safe. This herb has been in use from very ancient times and is still being used by households and shamans. The most abundant component, methyl chavicol (estragole), has an oral LD50 value of 1250 mg/kg for mice and 5 g/kg for rabbits. It is very unlikely that enough of the herb could be consumed to cause a toxic effect in humans (Anon., 2013b). Its extracted oil should not be used for any medicinal purposes and the oil should be completely avoided by children, pregnant women and nursing mothers. As a herbal medicine, the herb or its infusion/ extract should not be used for more than 3 days because methyl chavicol has induced liver cancer in mice on prolonged administration (T P Report, undated)."
	Staples, G.W. & Herbst, D.R. 2005. <i>A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places</i> . Bishop Museum Press, Honolulu, HI	"The leaves are sometimes used as a substitute for the culinary herb tarragon (<i>Artemisia dracunculul</i>). In Guatemala, <i>T. lucida</i> has numerous medicinal and insecticidal uses. The plant is also reported to have hallucinogenic properties."
	Quattrocchi, U. 2012. <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	[Medicinal uses] "Entire plant for diarrhea, malaria, spitting blood, potion taken internally. Leaves and stems infusion sedative."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	WRA Specialist. (2020). Personal Communication	Unknown, but unlikely. No information found on fire ecology, fire risk or flammability

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes

Qsn #	Question	Answer
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers. Springer, Dordrecht	"A robust perennial herb grown as an annual. It requires full sun or partial shade and needs well drained, moderately fertile soil, growing well in clayey and sandy soils."
	Plants for a Future. (2020). <i>Tagetes lucida</i> . https://pfaf.org [Accessed 14 Dec 2020]	"It cannot grow in the shade."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers. Springer, Dordrecht	"It requires full sun or partial shade and needs well-drained, moderately fertile soil, growing well in clayey and sandy soils."
	Shoot Gardening. (2020). <i>Tagetes lucida</i> (Mexican tarragon). https://www.shootgardening.co.uk/plant/tagetes-lucida . [Accessed 14 Dec 2020]	Soil type - Chalky, Clay, Loamy, Sandy (will tolerate most soil types) Soil drainage - Well-drained Soil pH - Acid, Alkaline, Neutral"

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Nash, D.L.& Williams, L.O. 1976. Flora of Guatemala. Fieldiana: Botany. Vol. 24 - Part XII. Field Museum of Natural History	"A glabrous, erect perennial commonly 30-75 cm. high, strong-scented, arising from a short, thick, woody base, cymosely branched above"

412	Forms dense thickets	n
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers. Springer, Dordrecht	"It is an aromatic herb distributed naturally from Mexico to Honduras, at elevations between 1,000 and 2,000 m."
	Nash, D.L.& Williams, L.O. 1976. Flora of Guatemala. Fieldiana: Botany. Vol. 24 - Part XII. Field Museum of Natural History	"Mostly in open grassy fields, frequently in oak forest, sometimes on dry rocky hillsides, 1,000-2,000 m" [No evidence]

501	Aquatic	n
	Source(s)	Notes
	Nash, D.L.& Williams, L.O. 1976. Flora of Guatemala. Fieldiana: Botany. Vol. 24 - Part XII. Field Museum of Natural History	[Terrestrial] "Mostly in open grassy fields, frequently in oak forest, sometimes on dry rocky hillsides, 1,000-2,000 m."

502	Grass	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 11 Dec 2020]	Family: Asteraceae Subfamily: Asteroideae Tribe: Tageteae

Qsn #	Question	Answer
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 11 Dec 2020]	Family: Asteraceae Subfamily: Asteroideae Tribe: Tageteae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers. Springer, Dordrecht	"A half-hardy semi-woody herb to subshrub that grows 46–76 cm high and 48 cm spread. The plant is bushy with many smooth, upright, unbranched stems."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers. Springer, Dordrecht	[No evidence] "The plant is native to Central America (Mexico, Honduras and Guatemala) and South America. It thrives in the south of the United States and in México and is grown in many warm temperate areas worldwide. It is cultivated as an ornamental in the highlands in Java."

602	Produces viable seed	y
	Source(s)	Notes
	Belsinger, S. & Tucker, A. O. (2016). The Culinary Herbal: Growing and Preserving 97 Flavorful Herbs. Timber Press, Portland, OR	"Mexican tarragon is easily propagated from cuttings, and branches near the base often have adventitious roots (roots not formed from other roots, for example, stems) already formed that can be broken off and planted. Seed is difficult to find and often slow to germinate."
	Plants for a Future. (2020). <i>Tagetes lucida</i> . https://pfaf.org [Accessed 14 Dec 2020]	"Propagation - Seed - sow March in a greenhouse. Only just cover the seed. Germination usually takes place within 2 weeks. When they are large enough to handle, prick the seedlings out into individual pots and plant them out after the last expected frosts. "
	Flora Fauna Web. (2020). <i>Tagetes lucida</i> . https://www.nparks.gov.sg/florafaunaweb/flora/4/0/4087 . [Accessed 14 Dec 2020]	"The fruit including the pappus is about 1 cm long. However, plants grown in Singapore typically do not produce fruits."
	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	"The heads are about 0.4" in diameter with usually 3 bright yellow ray flowers, and the fruit has a pappus of short, broad scales and longer, bristlelike ones."

603	Hybridizes naturally	
	Source(s)	Notes

Qsn #	Question	Answer
	Towner, J. (1961). Cytogenetic Studies on the Origin of <i>Tagetes patula</i> . I. Meiosis and Morphology of Diploid and Allotetraploid <i>T. erecta</i> x <i>T. tenuifolia</i> . American Journal of Botany, 48(9), 743-751	[Unknown. Hybrids possible in genus] "In many respects, the tetraploid species <i>Tagetes patula</i> L. is morphologically intermediate between the diploids <i>Tagetes erecta</i> L. and <i>Tagetes tenuifolia</i> Cav. (- <i>T. signata</i> Bartl.). As reported in this study and by Towner (1956, 1958), crosses among these 3 species are difficult to produce, and the hybrids are almost completely sterile. These facts suggest that <i>T. erecta</i> and <i>T. tenuifolia</i> , or other diploid species closely related to them, might have been involved in the origin of <i>T. patula</i> through amphiploidy"

604	Self-compatible or apomictic	
	Source(s)	Notes
	Towner, J. (1961). Cytogenetic Studies on the Origin of <i>Tagetes patula</i> . I. Meiosis and Morphology of Diploid and Allotetraploid <i>T. erecta</i> x <i>T. tenuifolia</i> . American Journal of Botany, 48(9), 743-751	[Unknown. Other species self-compatible] " <i>Tagetes patula</i> , <i>T. erecta</i> , and the artificial allotetraploid, <i>T. erectatenuifolia</i> , were fully self-compatible"

605	Requires specialist pollinators	n
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers. Springer, Dordrecht	"In summer it bears terminal clusters of small yellow to orange flower heads on the ends of the stems. The flowers are about 1.5 cm in diameter, bisexual comprising a single whorl of 3–5 (–7) ray florets with yellow to orange-yellow corollas, and numerous disc florets in the centre of the capitulum"
	GardenOracle. (2020). Growing Mexican Tarragon: <i>Tagetes lucida</i> . https://gardenoracle.com/images/tagetes-lucida.html . [Accessed 14 Dec 2020]	"Wildlife: Attracts bees, butterflies, and pollinating insects."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers. Springer, Dordrecht	"A robust perennial herb grown as an annual." ... "It is easily propagated through stem cuttings." [But no evidence of natural vegetative spread]
	Shoot Gardening. (2020). <i>Tagetes lucida</i> (Mexican tarragon). https://www.shootgardening.co.uk/plant/tagetes-lucida . [Accessed 14 Dec 2020]	"Propagation methods - Seed"

Qsn #	Question	Answer
607	Minimum generative time (years)	1
	Source(s)	Notes
	Shoot Gardening. (2020). <i>Tagetes lucida</i> (Mexican tarragon). https://www.shootgardening.co.uk/plant/tagetes-lucida . [Accessed 14 Dec 2020]	"1-2 years To maturity"
	Lim, T.K. (2014). <i>Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers</i> . Springer, Dordrecht	"A robust perennial herb grown as an annual. It requires full sun or partial shade and needs well"

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	Notes
	Flora Fauna Web. (2020). <i>Tagetes lucida</i> . https://www.nparks.gov.sg/florafaunaweb/flora/4/0/4087 . [Accessed 14 Dec 2020]	[Possibly, but seed production in cultivation may be rare] "Fruits are classified as cypsela and each contains one seed. The fruits are linear and thin. On one end of the fruit, there is a two-pronged, beige projection known as a pappus that promotes seed dispersal. The fruit including the pappus is about 1 cm long. However, plants grown in Singapore typically do not produce fruits. "

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. 2005. <i>A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places</i> . Bishop Museum Press, Honolulu, HI	"Another species grown by some local herb gardeners is <i>Tagetes lucida</i> Cavanilles, Sweet-Scented Marigold."
	Ravindran, P. N. (2017). <i>The Encyclopedia of Herbs and Spices</i> . CABI, Wallingford, UK	"Mexican tarragon is widely distributed in mixed oak and pine or oak forests, on open slopes in Mexico and in the Mesoamerican region (Guatemala, Honduras and El Salvador). The plant was introduced into West Africa, the Iberian Peninsula, South Asia, South-east Asia and Far East countries; in all these regions it is cultivated as an ornamental plant (Anon., 2014a)."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Belsinger, S. & Tucker, A. O. (2016). <i>The Culinary Herbal: Growing and Preserving 97 Flavorful Herbs</i> . Timber Press, Portland, OR	"Seed is difficult to find and often slow to germinate."
	Flora Fauna Web. (2020). <i>Tagetes lucida</i> . https://www.nparks.gov.sg/florafaunaweb/flora/4/0/4087 . [Accessed 14 Dec 2020]	"The fruit including the pappus is about 1 cm long. However, plants grown in Singapore typically do not produce fruits."
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	[No evidence] "Major Pathway/s: Crop, Herbal, Ornamental Dispersed by: Humans"

704	Propagules adapted to wind dispersal	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Cortés-Flores, J., Andresen, E., Cornejo-Tenorio, G., & Ibarra Manríquez, G. 2013. Fruiting phenology of seed dispersal syndromes in a Mexican Neotropical temperate forest. <i>Forest Ecology and Management</i> , 289: 445-454	"Appendix A" [<i>Tagetes lucida</i> - Dispersal syndrome = Epizoochory]

705	Propagules water dispersed	n
	Source(s)	Notes
	Cortés-Flores, J., Andresen, E., Cornejo-Tenorio, G., & Ibarra Manríquez, G. 2013. Fruiting phenology of seed dispersal syndromes in a Mexican Neotropical temperate forest. <i>Forest Ecology and Management</i> , 289: 445-454	"Appendix A" [<i>Tagetes lucida</i> - Dispersal syndrome = Epizoochory]
	Flora Fauna Web. (2020). <i>Tagetes lucida</i> . https://www.nparks.gov.sg/florafaunaweb/flora/4/0/4087 . [Accessed 14 Dec 2020]	[Fruit rarely produced, and adapted for external dispersal] "Fruits are classified as cypselaes and each contains one seed. The fruits are linear and thin. On one end of the fruit, there is a two-pronged, beige projection known as a pappus that promotes seed dispersal. The fruit including the pappus is about 1 cm long. However, plants grown in Singapore typically do not produce fruits."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Cortés-Flores, J., Andresen, E., Cornejo-Tenorio, G., & Ibarra Manríquez, G. 2013. Fruiting phenology of seed dispersal syndromes in a Mexican Neotropical temperate forest. <i>Forest Ecology and Management</i> , 289: 445-454	"Appendix A" [<i>Tagetes lucida</i> - Dispersal syndrome = Epizoochory]

707	Propagules dispersed by other animals (externally)	y
	Source(s)	Notes
	Cortés-Flores, J., Andresen, E., Cornejo-Tenorio, G., & Ibarra Manríquez, G. 2013. Fruiting phenology of seed dispersal syndromes in a Mexican Neotropical temperate forest. <i>Forest Ecology and Management</i> , 289: 445-454	"Appendix A" [<i>Tagetes lucida</i> - Dispersal syndrome = Epizoochory]
	Flora Fauna Web. (2020). <i>Tagetes lucida</i> . https://www.nparks.gov.sg/florafaunaweb/flora/4/0/4087 . [Accessed 14 Dec 2020]	[Adapted for external dispersal, but fruit rarely produced] "Fruits are classified as cypselaes and each contains one seed. The fruits are linear and thin. On one end of the fruit, there is a two-pronged, beige projection known as a pappus that promotes seed dispersal. The fruit including the pappus is about 1 cm long. However, plants grown in Singapore typically do not produce fruits. "

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Cortés-Flores, J., Andresen, E., Cornejo-Tenorio, G., & Ibarra Manríquez, G. 2013. Fruiting phenology of seed dispersal syndromes in a Mexican Neotropical temperate forest. <i>Forest Ecology and Management</i> , 289: 445-454	"Appendix A" [<i>Tagetes lucida</i> - Dispersal syndrome = Epizoochory]

Qsn #	Question	Answer
801	Prolific seed production (>1000/m²)	n
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers. Springer, Dordrecht	"It is easily propagated through stem cuttings." [No mention of seed propagation, suggesting seed production in cultivation may be limited or absent]
	Belsinger, S. & Tucker, A. O. (2016). The Culinary Herbal: Growing and Preserving 97 Flavorful Herbs. Timber Press, Portland, OR	"Mexican tarragon is easily propagated from cuttings, and branches near the base often have adventitious roots (roots not formed from other roots, for example, stems) already formed that can be broken off and planted. Seed is difficult to find and often slow to germinate."
	Flora Fauna Web. (2020). <i>Tagetes lucida</i> . https://www.nparks.gov.sg/florafaunaweb/flora/4/0/4087 . [Accessed 14 Dec 2020]	"The fruit including the pappus is about 1 cm long. However, plants grown in Singapore typically do not produce fruits."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Royal Botanic Gardens Kew. (2020) Seed Information Database (SID). Version 7.1. Available from: http://data.kew.org/sid/ . [Accessed 14 Dec 2020]	"Storage Behaviour: Orthodox Storage Conditions: 90 % viability following drying to mc's in equilibrium with 15 % RH and freezing for 1 month at -20°C at RBG Kew, WP."

803	Well controlled by herbicides	y
	Source(s)	Notes
	CABI. (2020). <i>Tagetes minuta</i> (stinking Roger). In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Probably Yes. Related taxon effectively controlled] "In screening trials in Brazil, Lorenzi (1986) showed <i>T. minuta</i> to be susceptible to acifluorfen, ametryne, bentazon, bifenoxy, bromacil, cyanazine, dicamba, diphenamid, diquat, diuron, 2,4-D, glyphosate, imazaquin, linuron, metribuzin, molinate, oxadiazon, oxyfluorfen, paraquat and simazine. Current Australian registrations for the control of <i>T. minuta</i> include 2,4-D, MCPA, norflurazon, prometryn, pendimethalin, atrazine, 2,4-D + picloram, linuron, and bromacil + diuron (Hamilton, 1997). The effect of these herbicides can be reduced if the herbicide leaches below the germination zone, e.g. in sandy soil."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	Shoot Gardening. (2020). <i>Tagetes lucida</i> (Mexican tarragon). https://www.shootgardening.co.uk/plant/tagetes-lucida . [Accessed 14 Dec 2020]	"Pruning - Cut back after flowering."
	GardenOracle. (2020). Growing Mexican Tarragon: <i>Tagetes lucida</i> . https://gardenoracle.com/images/tagetes-lucida.html . [Accessed 14 Dec 2020]	[Possibly yes, if cut to the ground] "It dies to the ground and regrows from its roots in spring in regions with freezing temperatures."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
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Qsn #	Question	Answer
	Source(s)	Notes
	WRA Specialist. (2020). Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Native to, and able to spread in, regions with tropical climates
- Naturalized in tropical regions (but no evidence in the Hawaiian Islands to date)
- Reported to be a weed in a number of locations (but impacts are generally not specified)
- Other *Tagetes* species are invasive weeds
- Tolerates many soil types
- Reproduces by seeds (but may be rare in cultivation)
- May reach maturity in one growing season
- Seeds dispersed externally by animals and intentionally by people
- May resprout after cutting or damage

Low Risk Traits

- Unarmed (no spines, thorns, or burrs)
- Non-toxic
- Ornamental
- Not reported to spread vegetatively
- Limited seed production in cultivation may limit spread

Second Screening Results for Herbs or Low stature shrubs

(A) Reported as a weed of cultivated lands?> Possibly. Cited as weedy in a number of locations, but impacts are ambiguous or unspecified

Outcome = Evaluate