

Taxon: <i>Porophyllum ruderale</i>	Family: Asteraceae
Common Name(s): papaloquelite Bolivian coriander quillquiña tepegua yerba porosa	Synonym(s): Kleinia ruderalis Jacq. P. ruderale var. macrocephalum (DC.) <i>Porophyllum ellipticum</i> Cass. <i>Porophyllum macrocephalum</i> DC.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 5 Jun 2015
WRA Score: 8.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Annual Herb, Disturbance Weed, Malodorous, Edible, 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)	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	?
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	y
303	Agricultural/forestry/horticultural weed		
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed		
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
408	Creates a fire hazard in natural ecosystems		
409	Is a shade tolerant plant at some stage of its life cycle		
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	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant		
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed		
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut		
801	Prolific seed production (>1000/m ²)		
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
	Johnson, R. R. 1969. Monograph of the Plant Genus <i>Porophyllum</i> (Compositae, Helenieae). The University of Kansas Science Bulletin 48: 225-267	[Consumed as a food source, but no evidence of widespread cultivation or domestication] " <i>Porophyllum ruderale</i> subsp. <i>macrocephalum</i> , and probably <i>P. tagetoides</i> , is old as a green vegetable in markets in Veracruz."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2015. 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, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 4 Jun 2015]	"Native: NORTHERN AMERICA (Check conservation status in U.S. & Canada in NatureServe Explorer database) South-Central U.S.A.: United States - New Mexico [s.w.], Texas Southwestern U.S.A.: United States - Arizona [s.] Northern Mexico: Mexico - Baja Sur, Chihuahua, Coahuila, Durango, Nuevo Leon, San Luis Potosi, Sinaloa, Sonora, Tamaulipas Southern Mexico: Mexico - Chiapas, Guanajuato, Guerrero, Jalisco, Mexico, Michoacan, Morelos, Nayarit, Oaxaca, Puebla, Queretaro, Veracruz, Yucatan SOUTHERN AMERICA Caribbean: Antigua and Barbuda - Antigua; Bahamas; Cayman Islands; Cuba; Dominica; Grenada; Guadeloupe; Hispaniola; Jamaica; Martinique; Montserrat; Netherlands Antilles; Puerto Rico; St. Kitts and Nevis - St. Kitts; St. Lucia; St. Vincent and Grenadines Mesoamerica: Costa Rica; Guatemala; Honduras; Panama Northern South America: French Guiana; Guyana; Suriname; Venezuela Western South America: Bolivia; Colombia; Ecuador [incl. Galapagos]; Peru Southern South America: Argentina; Paraguay; Uruguay"

Qsn #	Question	Answer
202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 4 Jun 2015]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 18+ vols. New York and Oxford	"Ephemerally wet sites in desert mountains; 1000-1500 m;"
	Johnson, R. R. 1969. Monograph of the Plant Genus <i>Porophyllum</i> (Compositae, Helenieae). The University of Kansas Science Bulletin 48: 225-267	[Species elevation range exceeds 1000 m. Subspecies more restricted in distribution] "Subspecies <i>runderale</i> is common as a weed in low, flat areas, such as fields and vacant lots, through much of its range. It usually is found at elevations below 1,300 m but may occur up to 2,500 m or more. In contrast, subsp. <i>macrocephalum</i> occurs more commonly at higher elevations in rocky terrain although it is sometimes found in weedy situations, such as in roadside clearings, and even forms thickets near Progreso, Yucatan (Standley, 1931)."
	Tropicos.org. 2015. Tropicos [Online Database]. Missouri Botanical Garden. http://www.tropicos.org/ . [Accessed 4 Jun 2015]	Collected in Bolivia at 300 m, 18°21'00"S up to 1250 -1300 m, 18°06'30"S, latitudes which are roughly comparable to the Hawaiian Islands (in addition to several other locations across a broad latitudinal and elevation range). Demonstrates environmental versatility

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Woodson, Jr., R.E., Schery, R.W., D'Arcy, W.G. et al.1975. Flora of Panama. Part IX. Family 184. Compositae. Annals of the Missouri Botanical Garden 62(4): 835-1321	"The range of <i>Porophyllum ruderale</i> nearly equals that of the genus, extending from the southwestern United States and the West Indies south to northern Argentina. Two widespread varieties occur within this broad range, both of which are found in Panama." ... "Porophyllum <i>runderale</i> var. <i>runderale</i> ranges from Costa Rica to Argentina and is also found on several Caribbean islands." ... "Porophyllum <i>runderale</i> var. <i>macrocephalum</i> occurs from Arizona and Texas south through Mexico and Central America and in South America from Colombia to Bolivia."

205	Does the species have a history of repeated introductions outside its natural range?	?
	Source(s)	Notes
	Parker, J. 2015. BIISC Early Detection Botanist. Pers. Comm. 28 May	"Found in abandoned nursery in Keahole Ag Park in Kailua-Kona."

Qsn #	Question	Answer
	Dave's Garden 2015. Papalo, Papaloquelite. <i>Porophyllum ruderale</i> subsp. <i>macrocephalum</i> http://davesgarden.com/guides/pf/go/99940/ . [Accessed 5 Jun 2015]	"This plant has been said to grow in the following regions: Davis, California Los Angeles, California Hawthorne, Florida Melbourne, Florida Savannah, Georgia"
	Guerrero, A. M., Pozo, P., Chamorro, S., Guezou, A., & Buddenhagen, C. E. (2008). Baseline data for identifying potentially invasive plants in Puerto Ayora, Santa Cruz Island, Galapagos. <i>Pacific Conservation Biology</i> , 14(2), 93-107	[Introduced to Galapagos] " <i>Porophyllum ruderale</i> ssp. <i>macrocephalum</i> ... Status (Gal) = Ac: Accidental (naturalized, introduction believed to be accidental),"
	WRA Specialist. 2015. Personal Communication	Broad native range. Regarded as a useful weed in much of native range. Information on cultivation outside native range is limited

301	Naturalized beyond native range	y
	Source(s)	Notes
	Parker, J. 2015. BIISC Early Detection Botanist. Pers. Comm. 28 May	"We're seeing it spreading like crazy, but still mostly in one relatively small area." ... "Found in abandoned nursery in Keahole Ag Park in Kailua-Kona. When crushed, the leaves give off a VERY acrid, hard-to-describe odor, like turpentine or lacquer but not exactly."
	Guerrero, A. M., Pozo, P., Chamorro, S., Guezou, A., & Buddenhagen, C. E. (2008). Baseline data for identifying potentially invasive plants in Puerto Ayora, Santa Cruz Island, Galapagos. <i>Pacific Conservation Biology</i> , 14(2), 93-107	[Accidental introduction and naturalization] "Table 1. List of introduced plant taxa recorded during the inventory of plants on properties in Puerto Ayora , Galapagos" ... " <i>Porophyllum ruderale</i> ssp. <i>macrocephalum</i> ... Status (Gal) = Ac: Accidental (naturalized, introduction believed to be accidental),"

302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	De Marinis, G., Lemos, A., Friebolin, L. P., & Musa, R. A. M. 1980. Capacidade reprodutiva de <i>Porophyllum ruderale</i> (Jacq.) Cass. <i>Planta Daninha</i> , 3(1): 55-57	"A population of <i>Porophyllum ruderale</i> (Jacq.) Cass., a weed of the Compositae family, occurring in a fallow area near São Jose do Rio Preto (State of São Paulo, Brazil) was studied in regard to: a) height, b) dry epigeous biomass, c) number of branches, d) number of heads per branch, e) number of heads per plant, f) number of achenes per head and g) output of achenes per plant."
	Wiggins, I.L., Porter, D.M., & Anderson, E.F. (1971). <i>Flora of the Galápagos Islands</i> . Stanford University Press, Stanford, CA	"A weed in disturbed soil, widespread in tropical America, extending north through Mexico into Arizona."
	Takahashi, H. T., Novello, C. R., Ueda-Nakamura, T., Palazzo de Mello, J. C., & Nakamura, C. V. (2011). Thiophene derivatives with antileishmanial activity isolated from aerial parts of <i>Porophyllum ruderale</i> (Jacq.) Cass. <i>Molecules</i> , 16(5), 3469-3478	" <i>Porophyllum ruderale</i> (Jacq.) Cass. (Asteraceae) is a medium-sized ruderal aromatic herb shrub with a strong fragrance [9]. It is native to Brazil, where it is considered invasive because it adapts to many soil types, including poor and sandy ones, and is common in the southeastern region of the country [10]."
	Johnson, R. R. 1969. Monograph of the Plant Genus <i>Porophyllum</i> (Compositae, Helenieae). <i>The University of Kansas Science Bulletin</i> 48: 225-267	"Subspecies <i>runderale</i> is common as a weed in low, flat areas, such as fields and vacant lots, through much of its range. It usually is found at elevations below 1,300 m but may occur up to 2,500 m or more. In contrast, subsp. <i>macrocephalum</i> occurs more commonly at higher elevations in rocky terrain although it is sometimes found in weedy situations, such as in roadside earings, and even forms thickets near Progreso, Yucatan (Standley, 1931)."

Qsn #	Question	Answer
	Gonzalez-Insuasti, M. S., & Caballero, J. (2007). Managing plant resources: How intensive can it be?. <i>Human Ecology</i> , 35(3), 303-314	[A tolerated weed] "Herbaceous plants such as <i>Solanum nigrescens</i> , <i>Porophyllum ruderale</i> , and <i>Amaranthus hybridus</i> grow as weeds in agricultural fields. They are frequently eaten and are removed only when their abundance threatens the main crop. According to De Wet and Harlan (1965), a degree of management that depends on plants competing with the other crops, or their usefulness for other purposes, can be recognized in the case of weeds. According to this classification, we can consider that these species are "tolerated" weeds, and due to the manner of its management, <i>Porophyllum ruderale</i> would be a "weed encouraged" to grow in the cultivation areas or home gardens."
	Mesquita, M. L. R., Andrade, L. A., & Pereira, W. E. (2015). Soil weed seed bank in situ and ex situ at a smallholder field in Maranhão State, northeastern Brazil. <i>Acta Scientiarum. Agronomy</i> , 37(1), 93-100	[Regarded as a weed in corn fields, but no impacts described] "The objective of this research was to assess the density, floristic composition, phytosociology and diversity of a soil weed seed bank ex situ by germination in a greenhouse and in situ by weed sampling on a smallholder corn field located in Lago Verde County, Maranhão State." ... "Eighteen species were common both in the field and in the greenhouse: <i>A. conyzoides</i> , <i>E. mollis</i> , <i>E. coccinea</i> , <i>P. ruderale</i> , <i>C. iria</i> , <i>S. juncoides</i> , <i>C. hirta</i> , <i>H. suaveolens</i> , <i>U. lobata</i> , <i>L. octovalvis</i> , <i>P. niruri</i> , <i>L. crustacea</i> , <i>E. indica</i> , <i>E. ciliaris</i> , <i>P. maximum</i> , <i>O. corymbosa</i> , <i>S. verticilata</i> and <i>T. subulata</i> ."

303	Agricultural/forestry/horticultural weed	
	Source(s)	Notes
	Jepson Flora Project (eds.). 2015. Jepson eFlora, http://ucjeps.berkeley.edu/IJM.html . [Accessed 5 Jun 2015]	"Agricultural weed" [No details provided]
	Mohamad, R., Wibawa, W., Mohayidin, M. G., Puteh, A., Juraimi, A. S., Awang, Y., & Mohd Lassim, M. (2010). Management of mixed weeds in young oil-palm plantation with selected broad-spectrum herbicides. <i>Pertanika Journal of Tropical Agricultural Science</i> , 3(2), 193-203	"Weed species composition of the experimental locality" [Porophyllum ruderale included in a list of weeds, but no impacts specified for this species]
	FAO. 2015. Database of Weed Species in Crops and Countries. FAO, Rome, Italy. http://www.fao.org/agriculture/crops/thematic_sitemap/theme/biodiversity/weeds/db-countries/b/en/ . [Accessed 4 Jun 2015]	Porophyllum ruderale listed as a weed of sugar cane in Brazil. No description of impacts provided
	Moody, K. 1989. Weeds Reported in Rice in South and Southeast Asia. International Rice Research Institute, Manila, Philippines	Reported as a weed or rice in Indonesia. No impacts specified

304	Environmental weed	n
	Source(s)	Notes
	Gardener, M. R., Trueman, M., Buddenhagen, C., Heleno, R., Jäger, H., Atkinson, R., & Tye, A. (2013). A pragmatic approach to the management of plant invasions in Galapagos. Pp. 349-374 In: L.C. Foxcroft et al. (eds.), <i>Plant Invasions in Protected Areas</i> . Springer Science+Business Media, Dordrecht, Netherlands	[Not of major concern in the Galapagos] "Most of the species on the uninhabited islands are herbaceous, annual or short lived perennials, probably accidentally introduced and unlikely to cause great impact (e.g. <i>Porophyllum ruderale</i> , ruda gallinazo)."

Qsn #	Question	Answer
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

305	Congeneric weed	
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	Other <i>Porophyllum</i> species cited in weed publications or references include: <i>Porophyllum lanceolatum</i> , <i>Porophyllum linaria</i> , <i>Porophyllum panctatum</i> , <i>Porophyllum punctatum</i> . [Impacts for each taxa are difficult to determine]

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Woodson, Jr., R.E., Schery, R.W., D'Arcy, W.G. et al.1975. Flora of Panama. Part IX. Family 184. Compositae. Annals of the Missouri Botanical Garden 62(4): 835-1321	"Stout, malodorous, tap-rooted, annual herbs; stems erect, 0.15-1.5 m tall, often much branched above, terete, striate, leafy, green or purplish, often glaucous, glabrous. Leaves opposite or alternate, slender-petiolate, simple, ovate, elliptical or obovate, cuneate, crisped-undulate or crenate, pinnately veined, glabrous, often glaucous, punctate with conspicuous, crescent-shaped or oblong marginal oil glands and sometimes with additional scattered glands."

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	Unknown

403	Parasitic	n
	Source(s)	Notes
	Woodson, Jr., R.E., Schery, R.W., D'Arcy, W.G. et al.1975. Flora of Panama. Part IX. Family 184. Compositae. Annals of the Missouri Botanical Garden 62(4): 835-1321	"Stout, malodorous, tap-rooted, annual herbs" [Asteraceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Johnson, R. R. 1969. Monograph of the Plant Genus <i>Porophyllum</i> (Compositae, Helenieae). The University of Kansas Science Bulletin 48: 225-267	"The inhabitants of the southwestern United States and Mexico call species in these regions "hierba del venado" (Martinez, 1937) or yerba del venado" (Santamaria, 1942) , meaning deer weed. Wildlife and cattle browse several species of <i>Porophyllum</i> (Kearney and Peebles 1951) ."
	Barrosa, O. A. V. E., Vierab, R. G., Hernández, J. E. H., Ronquillo, J. C. C., Domínguez, J. A. G., & Arcos-García, J. L. 2015. Diversity and botanic composition of the diet of the white tailed deer (<i>Odocoileus virginianus</i>), Rio Balsas Depression, Puebla, Mexico. International Journal of Plant, Animal and Environmental Sciences 5(1): 32-42	[Palatable to deer] "Table 1. Species of wild flora consumed by the Mexican white tail deer, in the Rio Balsas Depression, Puebla, Mexico" ... " <i>Porophyllum ruderale</i> - Vegetative parts - Stems and leaves"

Qsn #	Question	Answer
405	Toxic to animals	n
	Source(s)	Notes
	Johnson, R. R. 1969. Monograph of the Plant Genus <i>Porophyllum</i> (Compositae, Helenieae). The University of Kansas Science Bulletin 48: 225-267	"The inhabitants of the southwestern United States and Mexico call species in these regions "hierba del venado" (Martinez, 1937) or yerba del venado" (Santamaria, 1942) , meaning deer weed. Wildlife and cattle browse several species of <i>Porophyllum</i> (Kearney and Peebles 1951) ."
	Barrosa, O. A. V. E., Vierab, R. G., Hernández, J. E. H., Ronquillo, J. C. C., Domínguez, J. A. G., & Arcos-García, J. L. 2015. Diversity and botanic composition of the diet of the white tailed deer (<i>Odocoileus virginianus</i>), Rio Balsas Depression, Puebla, Mexico. International Journal of Plant, Animal and Environmental Sciences 5(1): 32-42	[No evidence. Consumed by deer] "Table 1. Species of wild flora consumed by the Mexican white tail deer, in the Rio Balsas Depression, Puebla, Mexico" ... " <i>Porophyllum ruderale</i> - Vegetative parts - Stems and leaves"

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Lordello, L. G. E., Fazuoli, L. C., Aranha, C., & Lordello, R. R. (1975). Host plants of root-knot nematodes. Anais da Escola Superior de Agricultura Luiz de Queiroz, 32, 527-530	"Root-knot nematodes were found attacking <i>Coffea</i> spp. and also roots of a few weed species usually found in the coffee orchards in São Paulo." [<i>Porophyllum ruderale</i> among the many alternate hosts]
	Standen, J.H. 1952. Host index of plant pathogens of Venezuela. Plant Diseases Reporter Supplement 212. Plant Disease Survey, Division of Mycology and Disease Survey, USDA, Beltsville, Maryland	Host of <i>Puccinia porophylli</i> P. Henn.

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Tucker, A.O. & DeBaggio, T. 2009. The Encyclopedia of Herbs: A Comprehensive Reference to Herbs of Flavor and Fragrance. Timber Press, Portland, OR	[No evidence. Consumed by humans] "Papaloquelite is used in Mexico and Texas for flavoring foods. Branches are kept in glasses of water on the tables of cafes, and the leaves are torn up fresh on beans or eaten with tortillas and garlic. The leaves impart a unique cilantro-green pepper-cucumber flavor."
	Quattrocchi, U.. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Used medicinally] "(Leaf decoction for stomach complaints, nausea during menstruation. A snakebite remedy, antispasmodic, sudorific, Eye wash for children.)"
	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	
	Source(s)	Notes

Qsn #	Question	Answer
	Johnson, R. R. 1969. Monograph of the Plant Genus <i>Porophyllum</i> (Compositae, Helenieae). The University of Kansas Science Bulletin 48: 225-267	[Unknown. Probably no, as it is an annual species that would be unlikely to contribute significantly to the fuel load] "Subspecies <i>runderale</i> is common as a weed in low, flat areas, such as fields and vacant lots, through much of its range. It usually is found at elevations below 1,300 m but may occur up to 2,500 m or more. In contrast, subsp. <i>macrocephidum</i> occurs more commonly at higher elevations in rocky terrain although it is sometimes found in weedy situations, such as in roadside earings, and even forms thickets near Progreso, Yucatan (Standley, 1931)."

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Herbalpedia. 2015. Papalo. http://www.herbnet.com/Papalo.pdf . [Accessed 5 Jun 2015]	"Grows best in full sun but can take some shade."
	Klein, A. L., & Felipe, G. M. (1991). Efeito da luz na germinação de sementes de ervas invasoras. <i>Pesquisa Agropecuária Brasileira</i> , 26(7), 955-966	" <i>Porophyllum ruderale</i> foi a unica especie da famflia das Compositae em que as sementes foram indiferentes a luz para a germinacao" [Translation from Portuguese: <i>Porophyllum ruderale</i> was the only species the family of Compositae in which the seeds were indifferent to light for germination]
	Dave's Garden 2015. Papalo, Papaloquelite. <i>Porophyllum ruderale</i> subsp. <i>macrocephalum</i> http://davesgarden.com/guides/pf/go/99940/ . [Accessed 5 Jun 2015]	"Sun Exposure: Full Sun"
	Appalachian Feet. 2015. How to Grow and Use Papalo (w/Recipes & Sources). http://www.appalachianfeet.com/2010/05/07/how-to-grow-and-use-papalo-wrecipes/ . [Accessed 5 Jun 2015]	[Tolerates partial shade throughout day] "Papalo prefers full sun but I had great luck in spots that only got about 4 hours of sun a day."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Takahashi, H. T., Novello, C. R., Ueda-Nakamura, T., Palazzo de Mello, J. C., & Nakamura, C. V. (2011). Thiophene derivatives with antileishmanial activity isolated from aerial parts of <i>Porophyllum ruderale</i> (Jacq.) Cass. <i>Molecules</i> , 16(5), 3469-3478	"It is native to Brazil, where it is considered invasive because it adapts to many soil types, including poor and sandy ones, and is common in the southeastern region of the country [10]."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Woodson, Jr., R.E., Schery, R.W., D'Arcy, W.G. et al.1975. Flora of Panama. Part IX. Family 184. Compositae. <i>Annals of the Missouri Botanical Garden</i> 62(4): 835-1321	"Stout, malodorous, tap-rooted, annual herbs; stems erect, 0.15-1.5 m tall, often much branched above, terete, striate, leafy, green or purplish, often glaucous, glabrous."

412	Forms dense thickets	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Johnson, R. R. 1969. Monograph of the Plant Genus <i>Porophyllum</i> (Compositae, Helenieae). The University of Kansas Science Bulletin 48: 225-267	"In contrast, subsp. <i>macrocephalum</i> occurs more commonly at higher elevations in rocky terrain although it is sometimes found in weedy situations, such as in roadside clearings, and even forms thickets near Progreso, Yucatan (Standley, 1931)."

501	Aquatic	n
	Source(s)	Notes
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	[Terrestrial] "Habitat: Arid lowlands"

502	Grass	n
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 4 Jun 2015]	"Family: Asteraceae (alt. Compositae)"

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	Woodson, Jr., R.E., Schery, R.W., D'Arcy, W.G. et al. 1975. Flora of Panama. Part IX. Family 184. Compositae. Annals of the Missouri Botanical Garden 62(4): 835-1321	[Asteraceae] "Stout, malodorous, tap-rooted, annual herbs; stems erect, 0.15-1.5 m tall, often much branched above, terete, striate, leafy, green or purplish, often glaucous, glabrous."

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Woodson, Jr., R.E., Schery, R.W., D'Arcy, W.G. et al. 1975. Flora of Panama. Part IX. Family 184. Compositae. Annals of the Missouri Botanical Garden 62(4): 835-1321	[Tap-rooted, but not a geophyte] "Stout, malodorous, tap-rooted, annual herbs; stems erect, 0.15-1.5 m tall, often much branched above, terete, striate, leafy, green or purplish, often glaucous, glabrous."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	No evidence. A widespread plant with a broad native range; often regarded as a weed within its native range

602	Produces viable seed	y
	Source(s)	Notes
	Tucker, A.O. & DeBaggio, T. 2009. The Encyclopedia of Herbs: A Comprehensive Reference to Herbs of Flavor and Fragrance. Timber Press, Portland, OR	"Propagation: seeds in spring"

Qsn #	Question	Answer
	De Marinis, G., Lepos, A., Friebolin, L. P., & Musa, R. A. M. 1980. Capacidade reprodutiva de <i>Porophyllum ruderale</i> (Jacq.) Cass. <i>Planta Daninha</i> , 3(1): 55-57	"The number of heads and achenes per plant showed correlation with height and biomass, while the number of achenes per head (on an average of 53) showed no correlation with height, biomass and number of heads and achenes per plant, revealing to be a character little affected by vegetative vigours."

603	Hybridizes naturally	
	Source(s)	Notes
	Johnson, R. R. 1969. Monograph of the Plant Genus <i>Porophyllum</i> (Compositae, Helenieae). The University of Kansas Science Bulletin 48: 225-267	[Unknown. Hybridization documented in genus] "This study entailed the examination of more than 3000 specimens from 22 herbaria, extensive field studies in the south western United States and Mexico, and studies of hybridization with <i>P. gracile</i> , <i>P. scoparium</i> , <i>P. amplexicaule</i> and <i>P. X fruticosum</i> (a natural hybrid between <i>P. amplexicaule</i> X <i>P. scoparium</i>)."

604	Self-compatible or apomictic	
	Source(s)	Notes
	Jaimes, I., & Ramírez, N. (1999). Breeding systems in a secondary deciduous forest in Venezuela: the importance of life form, habitat, and pollination specificity. <i>Plant Systematics and Evolution</i> , 21(1-4), 23-36	[Another species, <i>Porophyllum leiocarpum</i> , is listed as autogamous, or capable of self-fertilization] "Appendix 1. Sexuality, life form, habitat, origin and mating system of 51 plant species from the secondary deciduous forest"
	Torres, C., & Galetto, L. (2008). Relevance of pollinators in the reproduction of Asteraceae of central Argentina. <i>Acta Botanica Venezuelica</i> , 31(2): 473-493	[Unknown] "Tabla 2. Capacidad de autopolinización espontánea y fructificación en especies de Asteraceae. / Capacity for spontaneous self-pollination and fruiting species of Asteraceae" [<i>Porophyllum ruderale</i> = sd = sin datos/no data]

605	Requires specialist pollinators	n
	Source(s)	Notes
	Woodson, Jr., R.E., Schery, R.W., D'Arcy, W.G. et al. 1975. <i>Flora of Panama</i> . Part IX. Family 184. Compositae. <i>Annals of the Missouri Botanical Garden</i> 62(4): 835-1321	[No evidence from floral morphology] "Inflorescence corymbiform; peduncles 3-5 cm long, terminating leafy branches, glabrous, often glaucous. Heads discoid; involucre cylindrical at anthesis, 13-22 mm long, 5-10 mm diam., the bracts 5, linear-oblong, acute, flat, glabrous, glaucous, streaked with elongate glands, the margin thin, hyaline; florets 30-60, the corollas greenish to purplish, 10-13 mm long, sparsely puberulent, the tube slender, 8-10 mm long, the throat short, abruptly expanded, equally 5-lobed, the anthers 1.5-2 mm long with short acute to acuminate, rhombic appendages, the style branches long, slender, curved."
	Torres, C., & Galetto, L. (2008). Relevance of pollinators in the reproduction of Asteraceae of central Argentina. <i>Acta Botanica Venezuelica</i> , 31(2): 473-493	[Visited, and likely pollinated, by honeybees] "The diversity of floral visitors (DFV) and the frequency of visits (FV) were related to some reproductive traits, in 30 co-occurring Asteraceae species of Chaco forests from Córdoba (Argentina). DFV and FV were very different between species and <i>Apis mellifera</i> was the most frequent visitor of flowers."

606	Reproduction by vegetative fragmentation	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Dave's Garden 2015. Papalo, Papaloquelite. <i>Porophyllum ruderale</i> subsp. <i>macrocephalum</i> http://davesgarden.com/guides/pf/go/99940/ . [Accessed 5 Jun 2015]	"Propagation Methods: From seed"
	Tucker, A.O. & DeBaggio, T. 2009. The Encyclopedia of Herbs: A Comprehensive Reference to Herbs of Flavor and Fragrance. Timber Press, Portland, OR	"Propagation: seeds in spring"
	Woodson, Jr., R.E., Schery, R.W., D'Arcy, W.G. et al. 1975. Flora of Panama. Part IX. Family 184. Compositae. <i>Annals of the Missouri Botanical Garden</i> 62(4): 835-1321	[Annual. No evidence of vegetative spread] "Stout, malodorous, tap-rooted, annual herbs; stems erect, 0.15-1.5 m tall, often much branched above, terete, striate, leafy, green or purplish, often glaucous, glabrous."

607	Minimum generative time (years)	1
	Source(s)	Notes
	Woodson, Jr., R.E., Schery, R.W., D'Arcy, W.G. et al. 1975. Flora of Panama. Part IX. Family 184. Compositae. <i>Annals of the Missouri Botanical Garden</i> 62(4): 835-1321	[Annual] "Stout, malodorous, tap-rooted, annual herbs"

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	Notes
	Johnson, R. R. 1969. Monograph of the Plant Genus <i>Porophyllum</i> (Compositae, Helenieae). The University of Kansas Science Bulletin 48: 225-267	[Unknown. A weed plant of disturbed areas that may thrive along roadsides & may be accidentally dispersed by traffic. Pappus bristles may allow achenes to adhere to clothing] "Subspecies <i>runderale</i> is common as a weed in low, flat areas, such as fields and vacant lots, through much of its range. It usually is found at elevations below 1,300 m but may occur up to 2,500 m or more. In contrast, subsp. <i>macrocephalum</i> occurs more commonly at higher elevations in rocky terrain although it is sometimes found in weedy situations, such as in roadside earings, and even forms thickets near Progreso, Yucatan (Standley, 1931)."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	Seeds available for purchase through a number of websites

703	Propagules likely to disperse as a produce contaminant	
	Source(s)	Notes
	Jepson Flora Project (eds.). 2015. Jepson eFlora, http://ucjeps.berkeley.edu/IJM.html . [Accessed]	[Unknown. As an agricultural weed throughout its native range, it may become accidentally dispersed with other produce, or agricultural commodities] " <i>P. ruderale</i> (Jacq.) Cass. var. <i>macrocephalum</i> (DC.) Cronquist" ... "Agricultural weed"

704	Propagules adapted to wind dispersal	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Woodson, Jr., R.E., Schery, R.W., D'Arcy, W.G. et al.1975. Flora of Panama. Part IX. Family 184. Compositae. Annals of the Missouri Botanical Garden 62(4): 835-1321	[Pappus would aid in wind dispersal] "Achenes cylindrical, black or brownish, densely hispidulous, 7-12 mm long; carpodium conspicuous; pappus of many slender, scabrid, tawny bristles 7-11 mm long."

705	Propagules water dispersed	
	Source(s)	Notes
	Woodson, Jr., R.E., Schery, R.W., D'Arcy, W.G. et al.1975. Flora of Panama. Part IX. Family 184. Compositae. Annals of the Missouri Botanical Garden 62(4): 835-1321	[Adapted for wind dispersal. Buoyancy of achenes unknown, but may allow for secondary movement by water] "Achenes cylindrical, black or brownish, densely hispidulous, 7-12 mm long; carpodium conspicuous; pappus of many slender, scabrid, tawny bristles 7-11 mm long."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Woodson, Jr., R.E., Schery, R.W., D'Arcy, W.G. et al.1975. Flora of Panama. Part IX. Family 184. Compositae. Annals of the Missouri Botanical Garden 62(4): 835-1321	[No evidence. Adapted for wind dispersal] "Achenes cylindrical, black or brownish, densely hispidulous, 7-12 mm long; carpodium conspicuous; pappus of many slender, scabrid, tawny bristles 7-11 mm long."

707	Propagules dispersed by other animals (externally)	
	Source(s)	Notes
	Woodson, Jr., R.E., Schery, R.W., D'Arcy, W.G. et al.1975. Flora of Panama. Part IX. Family 184. Compositae. Annals of the Missouri Botanical Garden 62(4): 835-1321	[Unknown. Pappus bristles may aid in adherence to animal fur] "Achenes cylindrical, black or brownish, densely hispidulous, 7-12 mm long; carpodium conspicuous; pappus of many slender, scabrid, tawny bristles 7-11 mm long."

708	Propagules survive passage through the gut	
	Source(s)	Notes
	Johnson, R. R. 1969. Monograph of the Plant Genus <i>Porophyllum</i> (Compositae, Heleniaceae). The University of Kansas Science Bulletin 48: 225-267	[Unknown. Probably unlikely, but it may be possible that viable seeds could be ingested and passed after consumption by wildlife] "Wildlife and cattle browse several species of <i>Porophyllum</i> (Kearney and Peebles 1951) ."

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes

Qsn #	Question	Answer
	<p>Mesquita, M. L. R., Andrade, L. A., & Pereira, W. E. (2015). Soil weed seed bank in situ and ex situ at a smallholder field in Maranhão State, northeastern Brazil. <i>Acta Scientiarum. Agronomy</i>, 37(1), 93-100</p>	<p>[Combined seed bank of 18 species, including <i>P. ruderale</i>, does not exceed 1000 seeds/m² in greenhouse or field] "Eighteen species were common both in the field and in the greenhouse: <i>A. conyzoides</i>, <i>E. mollis</i>, <i>E. coccinea</i>, <i>P. ruderale</i>, <i>C. iria</i>, <i>S. juncoides</i>, <i>C. hirta</i>, <i>H. suaveolens</i>, <i>U. lobata</i>, <i>L. octovalvis</i>, <i>P. niruri</i>, <i>L. crustacea</i>, <i>E. indica</i>, <i>E. ciliaris</i>, <i>P. maximum</i>, <i>O. corymbosa</i>, <i>S. verticilata</i> and <i>T. subulata</i>. The greatest density was observed when the weed seed bank was assessed in the greenhouse, with 372 plants m⁻². This exceeded by more than two times the density observed when it was assessed in the field, which was 183 plants m⁻²."</p>
	<p>Chapla, T. E., & Campos, J. B. (2011). Soil seed bank during succession at an abandoned pasture in the upper Paraná river-floodplain. <i>Acta Scientiarum. Biological Sciences</i>, 33 (1): 59-69</p>	<p>[<i>P. ruderale</i> present at 1 seed/m⁻²] "ABSTRACT. We evaluated density and species composition of the soil seed bank in active pasture and in secondary forest on a 10 year-old abandoned pasture to identify changes in density, richness, diversity and species composition during secondary succession of abandoned pastures." ... "Table 1. Density (seeds m⁻² ± standard error),"</p>
	<p>De Marinis, G., Lepos, A., Friebolin, L. P., & Musa, R. A. M. 1980. Capacidade reprodutiva de <i>Porophyllum ruderale</i> (Jacq.) Cass. <i>Planta Daninha</i>, 3(1): 55-57</p>	<p>[Possibly Yes. 2008 achenes per plant] "A population of <i>Porophyllum ruderale</i> (Jacq.) Cass., a weed of the Compositae family, occurring in a fallow area near São Jose do Rio Preto (State of São Paulo, Brazil) was studied in regard to: a) height, b) dry epigeous biomass, c) number of branches, d) number of heads per branch, e) number of heads per plant, f) number of achenes per head and g) output of achenes per plant. This output was relatively low (on an average of 2510) corresponding to 2008 viable achenes per plant, taking into account a germination percentage of 80%. The observed reproductive capacity is very higher than the number of mature individuals usually found in the field and does not explain, therefore, the widely scattered distribution of <i>P. ruderale</i>."</p>

Qsn #	Question	Answer
802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Baskin, C.C. & Baskin, J.M. 2014. Seeds Ecology, Biogeography, and Evolution of Dormancy and Germination. Second Edition. Academic Press, San Francisco, CA	"TABLE 9.21 Dormancy class or nondormancy (D/ND) in seeds of herbaceous species of tropical deciduous forests." [Porophyllum ruderale - ND = nondormant]
	Mesquita, M. L. R., Andrade, L. A., & Pereira, W. E. (2015). Soil weed seed bank in situ and ex situ at a smallholder field in Maranhão State, northeastern Brazil. Acta Scientiarum. Agronomy, 37(1), 93-100	[Collected in seed bank. No longevity given] "Eighteen species were common both in the field and in the greenhouse: A. conyzoides, E. mollis, E. coccinea, P. ruderale, C. iria, S. juncoides, C. hirta, H. suaveolens, U. lobata, L. octovalvis, P. niruri, L. crustacea, E. indica, E. ciliaris, P. maximum, O. corymbosa, S. verticilata and T. subulata. The greatest density was observed when the weed seed bank was assessed in the greenhouse, with 372 plants m ⁻² . This exceeded by more than two times the density observed when it was assessed in the field, which was 183 plants m ⁻² ."
	Rico-Gray, V., & García-Franco, J. G. (1992). Vegetation and soil seed bank of successional stages in tropical lowland deciduous forest. Journal of Vegetation Science, 3(5), 617-624	[Porophyllum ruderale present in seed bank in year 1 of regrowth. Not recorded afterwards] "Table 1. Abundance values for woody plants with dbh ³ 1.0 cm. p = present; * = in seed bank. S = Slashed; SB = Slashed-and-burned; 1 - 100: successional stages with years of regrowth. Not included are 24 unidentified species of the vegetation, and 26 of the soil seed bank."

803	Well controlled by herbicides	y
	Source(s)	Notes
	Ikeda, H. 2013. Patent Application Publication: US 2013/0274106 A1. Herbicidal composition. US Patent & Trademark Office, Alexandria, VA	[P. ruderale listed among weeds controlled by patent] "To provide a technology for controlling weeds and the like. A herbicidal composition containing at least one compound selected from Group A, dicamba or agronomically acceptable salt thereof and isoxadifen-ethyl as active ingredients has a weed control effect: "

Qsn #	Question	Answer
	<p>Mohamad, R., Wibawa, W., Mohayidin, M. G., Puteh, A., Juraimi, A. S., Awang, Y., & Mohd Lassim, M. (2010). Management of mixed weeds in young oil-palm plantation with selected broad-spectrum herbicides. <i>Pertanika Journal of Tropical Agricultural Science</i>, 3(2), 193-203</p>	<p>[<i>Porophyllum ruderales</i> listed among weed controlled, but no specifics of herbicide efficacy on this species is provided] "A field study to evaluate the efficacy of three broad spectrum herbicides on mixed weed in a young (2 yearold) oil palm plantation was conducted. Experimental plots, with the size of 4.8 x 20.5 m² each, were laid in a randomized complete block design with 4 replications. Weed vegetation analysis was conducted before herbicide treatments were applied. Herbicide treatments used were paraquat and glufosinate ammonium (200, 400, 600, 800 g a.i. ha⁻¹), and glyphosate (400, 800, 1200, 1600 g a.i. ha⁻¹), with untreated control. The experimental locality indicated a composite of mixed weeds of broadleaf and grasses. The growth of broadleaf was more dominant with 25 species (relative dominance of 82.1%) than the grasses with only 7 species (relative dominance of 17%). The three most dominant species were the broadleaves of <i>Croton hirtus</i> and <i>Asystasia gigantea</i>, and a grass, <i>Paspalum commersonii</i>. The percentage of the mixed weed composite killed was found to be significantly affected by the treatments of paraquat, glufosinate–ammonium and glyphosate, relative to the untreated control, with more than 50 percent weed killed taken at 2 and 4 WAT. Meanwhile, glyphosate and glufosinate-ammonium produced greater efficacy (more than 90 percent killed) as compared to paraquat which produced lower total weed killed (50 to 83%). There were positive correlations between the percentages of weed killed and weed growth reduction. Increased percentage of weed killed was followed by the increase in the percentage of weed growth reduction, with the indication that weeds were recovering and began to produce new shoots at 16 WAT. Treatments producing fewer efficacies caused weeds to regrow and recover faster or in a shorter time. Increased rates of paraquat treatments, i.e. from 200 to 600 and 800 g a.i. ha⁻¹, were found to increase the duration of effective weed control. The duration of effective weed control produced by glufosinate-ammonium at 200 to 800 g a.i. ha⁻¹ and glyphosate at 400 to 1600 g a.i. ha⁻¹ ranged from 14.5 to 15 weeks, which were significantly longer than the paraquat treatments. The increased rates of glufosinate-ammonium and glyphosate did not necessarily increase the duration of effective control."</p>
	<p>WRA Specialist. 2015. Personal Communication</p>	<p>A number of patents have been filed for herbicide use on a large number of weeds, including <i>Porophyllum ruderales</i>. Presumably this species is well-controlled by the patented herbicides, although application rates and efficacy have not been provided</p>

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	<p>Woodson, Jr., R.E., Schery, R.W., D'Arcy, W.G. et al.1975. <i>Flora of Panama</i>. Part IX. Family 184. Compositae. <i>Annals of the Missouri Botanical Garden</i> 62(4): 835-1321</p>	<p>[Unknown if able to resprout from taproot if damaged or cut] "Stout, malodorous, tap-rooted, annual herbs"</p>

Qsn #	Question	Answer
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Thrives in tropical climates
- Potentially naturalizing on Hawaii Island; naturalized in the Galapagos
- A weedy species of disturbed sites and of several agricultural crops (although impacts to crops generally unspecified)
- Tolerates many soil types
- Able to form thickets in native range
- Reproduces by seed
- An annual, capable of reaching maturity in one growing season
- Seeds dispersed by wind, people and possibly other vectors
- Missing ecological information limits accuracy of risk prediction

Low Risk Traits

- Despite weediness, evidence of serious negative impacts is lacking
- Unarmed (no spines, thorns or burrs)
- Palatable to browsing & grazing animals
- Non-toxic
- Edible & medicinal uses
- Not reported to spread vegetatively