

Taxon: <i>Physalis peruviana</i> L.	Family: Solanaceae
Common Name(s): obra cabbage bladderberry cape gooseberry goldenberry gooseberry tomato Peruvian cherry Peruvian ground cherry poha	Synonym(s): <i>Physalis edulis</i> Sims

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 24 Oct 2022
WRA Score: 19.0	Designation: H(Hawai'i)	Rating: High Risk

Keywords: Short-Lived Shrub, Naturalized, Toxic Properties, Self-Fertile, Bird-Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed		
303	Agricultural/forestry/horticultural weed		
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		

Qsn #	Question	Answer Option	Answer
405	Toxic to animals		
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	y
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	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	y=1, n=-1	n
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	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	y
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m ²)		
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
803	Well controlled by herbicides		
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
	National Research Council. (1989). <i>Lost Crops of the Incas: Little-Known Plants of the Andes with Promise for Worldwide Cultivation</i> . National Academy Press, Washington, D.C.	[Half-wild. Not highly domesticated] "The goldenberry1 (<i>Physalis peruviana</i>) has long been a minor fruit of the Andes and is found in markets from Venezuela to Chile." ... "In this half-wild plant there is much variation in size, shape, and flavor of the fruits, time of maturity, and plant form."
	Pickersgill, B. (2007). <i>Domestication of Plants in the Americas: Insights from Mendelian and Molecular Genetics</i> . <i>Annals of Botany</i> , 100(5), 925–940	TABLE 1. Regions of plant domestication in the Americas and approximate dates of first appearance in the archaeological record (years before present, uncalibrated) of some of the species domesticated in each region (species marked with an asterisk have not been recorded archaeologically)" [<i>Physalis peruviana</i> considered a minor domesticate and was not recorded in the archaeological record. This paper does not provide evidence that this species is highly domesticated.]
102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	NA
103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2022). 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. (2022). <i>Germplasm Resources Information Network (GRIN-Taxonomy)</i> . National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 19 Oct 2022]	"Native Southern America NORTHERN SOUTH AMERICA: Venezuela WESTERN SOUTH AMERICA: Bolivia, Colombia, Ecuador, Peru"
202	Quality of climate match data	High
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	
203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes

Qsn #	Question	Answer
	Lim, T.K. (2013). Edible Medicinal And Non-Medicinal Plants. Volume 6, Fruits. Springer, Dordrecht	"The cape gooseberry behaves as an annual in temperate regions and a perennial in the tropics from near sea level to 3,000 m elevations. The plant is grown from sea level in New Zealand, for instance, to 3,000 m near the equator in the Andes. In Venezuela, it grows wild in the Andes and the coastal range between 800 and 3,000 m. It has naturalised and grows wild in Hawaii at 300–2,400 m. In northern India, it is not possible to cultivate it above 1,200 m, but in South India it thrives up to 1,800 m. It thrives best in frost free areas with temperatures of 15–30°C. Plants are frost tender and are killed at sub-zero temperatures. In South Africa, plants have been killed to the ground and failed to recover after a temperature drop to –0.75°C. In temperate areas, The plant need frost protection and are easily grown in pots and adapt well to greenhouse culture. Heat apparently does not inhibit fruit setting; in Hawaii, the plant produces fruit where day temperatures are in the range of 27–32°C."
	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.	[Elevation range >1000 m] "Native to Peru, widely cultivated and naturalized in warm temperate areas; in Hawai'i naturalized in disturbed sites in mesic to wet forest, diverse mesic forest, and subalpine woodland, 450-2,020 m,"

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 naturalized in disturbed sites in mesic to wet forest, diverse mesic forest, and subalpine woodland, 450-2,020 m, on all of the main islands except Ni'ihau and Kaho'olawe. Naturalized prior to 1825 (Degener, 1932i)."

Qsn #	Question	Answer
	<p>USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 19 Oct 2022]</p>	<p>"Native Southern America NORTHERN SOUTH AMERICA: Venezuela WESTERN SOUTH AMERICA: Bolivia, Colombia, Ecuador, Peru Cultivated (widely cult.) Naturalized Africa MACARONESIA: Portugal [Azores] NORTHEAST TROPICAL AFRICA: Eritrea, Ethiopia, Somalia EAST TROPICAL AFRICA: Kenya WEST-CENTRAL TROPICAL AFRICA: Cameroon WEST TROPICAL AFRICA: Ghana, Nigeria, Sierra Leone SOUTH TROPICAL AFRICA: Angola, Mozambique, Malawi, Zambia, Zimbabwe SOUTHERN AFRICA: Botswana, Lesotho, Eswatini, South Africa WESTERN INDIAN OCEAN: Reunion Asia-Temperate CHINA: China EASTERN ASIA: Japan Asia-Tropical INDIAN SUBCONTINENT: Bhutan, India, Sri Lanka, Nepal MALESIA: Indonesia, Philippines Australasia AUSTRALIA: Australia NEW ZEALAND: New Zealand Europe NORTHERN EUROPE: United Kingdom, Ireland MIDDLE EUROPE: Austria SOUTHEASTERN EUROPE: Italy, Slovenia SOUTHWESTERN EUROPE: Spain Pacific NORTH-CENTRAL PACIFIC: United States [Hawaii] SOUTH-CENTRAL PACIFIC: French Polynesia SOUTHWESTERN PACIFIC: Fiji, New Caledonia, Niue, Tonga Southern America CARIBBEAN: West Indies WESTERN SOUTH AMERICA: Ecuador [Galápagos]"</p>

205	<p>Does the species have a history of repeated introductions outside its natural range?</p>	<p>y</p>
	<p>Source(s)</p> <p>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.</p> <p>National Research Council. (1989). Lost Crops of the Incas: Little-Known Plants of the Andes with Promise for Worldwide Cultivation. National Academy Press, Washington. D.C.</p>	<p>Notes</p> <p>"Native to Peru, widely cultivated and naturalized in warm temperate areas"</p> <p>"The goldenberry (<i>Physalis peruviana</i>) has long been a minor fruit of the Andes and is found in markets from Venezuela to Chile. It has also been grown in Hawaii, California, South Africa, East Africa, India, New Zealand, Australia, and Great Britain."</p>
301	<p>Naturalized beyond native range</p>	<p>y</p>

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.	"in Hawai'i naturalized in disturbed sites in mesic to wet forest, diverse mesic forest, and subalpine woodland, 450-2,020 m, on all of the main islands except Ni'ihau and Kaho'olawe. Naturalized prior to 1825 (Degener, 1932i)."
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 19 Oct 2022]	"Naturalized Africa MACARONESIA: Portugal [Azores] NORTHEAST TROPICAL AFRICA: Eritrea, Ethiopia, Somalia EAST TROPICAL AFRICA: Kenya WEST-CENTRAL TROPICAL AFRICA: Cameroon WEST TROPICAL AFRICA: Ghana, Nigeria, Sierra Leone SOUTH TROPICAL AFRICA: Angola, Mozambique, Malawi, Zambia, Zimbabwe SOUTHERN AFRICA: Botswana, Lesotho, Eswatini, South Africa WESTERN INDIAN OCEAN: Reunion Asia-Temperate CHINA: China EASTERN ASIA: Japan Asia-Tropical INDIAN SUBCONTINENT: Bhutan, India, Sri Lanka, Nepal MALESIA: Indonesia, Philippines Australasia AUSTRALIA: Australia NEW ZEALAND: New Zealand Europe NORTHERN EUROPE: United Kingdom, Ireland MIDDLE EUROPE: Austria SOUTHEASTERN EUROPE: Italy, Slovenia SOUTHWESTERN EUROPE: Spain Pacific NORTH-CENTRAL PACIFIC: United States [Hawaii] SOUTH-CENTRAL PACIFIC: French Polynesia SOUTHWESTERN PACIFIC: Fiji, New Caledonia, Niue, Tonga Southern America CARIBBEAN: West Indies WESTERN SOUTH AMERICA: Ecuador [Galápagos]"

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Benson, D. & McDougall, L. (2001). Ecology of Sydney plant species. Part 8. Dicotyledon families Rutaceae to Zygophyllaceae. <i>Cunninghamia</i> 7(2): 255-462	"Weed of disturbed sites."
	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 the Hawaiian Islands, primarily a weed in disturbed sites, but may impact endangered species. See 3.04] "in Hawai'i naturalized in disturbed sites in mesic to wet forest, diverse mesic forest, and subalpine woodland"

303	Agricultural/forestry/horticultural weed	
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Qsn #	Question	Answer
	Source(s)	Notes
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). (1983) Handbook of Hawaiian Weeds. University of Hawaii Press, Honolulu, HI	"Common on open mountain slopes and in clearings from 1,500 to 4,000 feet. A weed in cultivated areas and pastures."
	Global Invasive Species Database (2022) Species profile: <i>Physalis peruviana</i> . http://www.iucngisd.org/gisd/species.php?sc=1461 . [Accessed 24 Oct 2022]	"P. peruviana poses an indirect threat to US agriculture when imported as it may harbour introduced plant pests, including a wide range of arthropod (insect) pests and plant pathogenic fungi, viruses and bacteria (USDA 1997)."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Weed of: Cotton, Orchards & Plantations, Pastures"
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. (2003). Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	[A possible problem in pastures if livestock are poisoned] "Distribution: Native of Peru. Found in mesic to wet forests and disturbed sites on mountain slopes at 1400– 6000 ft on all the inhabited islands except Niʻihau. Environmental impact: Suspected to cause livestock poisoning (Burt Smith, Univ. Hawaiʻi, retired)."

Qsn #	Question	Answer
304	Environmental weed	y
	Source(s)	Notes
	Queensland Government. (2022). Weeds of Australia. <i>Physalis peruviana</i> . https://keyserver.lucidcentral.org/weeds . [Accessed 21 Oct 2022]	"Cape gooseberry (<i>Physalis peruviana</i>) is regarded as an environmental weed in Western Australia, New South Wales and Victoria." [Impacts not described]
	CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"The most serious effects of invasion by <i>P. peruviana</i> are reported from Hawaii where it threatens two endangered species, <i>Phyllostegia parviflora</i> and <i>Urera kaalae</i> (US Fish and Wildlife Service, 2008; 2011). <i>P. peruviana</i> is regarded as an environmental weed in Western Australia, New South Wales and Victoria (Weeds of Australia, 2012)."
	US Fish and Wildlife Service. (2003). Endangered and Threatened Wildlife and Plants; Final Designations or Nondesignations of Critical Habitat for 101 Plant Species From the Island of Oahu, HI. Final rule. 50 CFR Part 17. Federal Register Vol. 68, No. 116	[Identified as a weed threat to an endangered Hawaiian mint] "The primary threats to <i>Phyllostegia hirsuta</i> are habitat degradation and/or destruction by feral pigs; potential impacts from military activities; rockslides; predation by rats; and competition with <i>Adiantum raddianum</i> , <i>Athyrium</i> sp. (NCN), <i>Axonopus fissifolius</i> , <i>Blechnum appendiculatum</i> , <i>Buddleia asiatica</i> , <i>Clidemia hirta</i> , <i>Drymaria cordata</i> (pipili), <i>Lantana camara</i> , <i>Melinis minutiflora</i> , <i>Passiflora suberosa</i> , <i>Paspalum conjugatum</i> , <i>Physalis peruviana</i> (poha), <i>Pimenta dioica</i> , <i>Psidium cattleianum</i> , <i>Rubus argutus</i> , <i>Rubus rosifolius</i> , or <i>Schinus terebinthifolius</i> (HINHP Database 2001)."
	U.S. Fish and Wildlife Service. (2011). <i>Urera kaalae</i> (opuhe) 5-Year Review Summary and Evaluation. U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, HI	[Identified as a weed threat to <i>Urera kaalae</i>] "Invasive introduced plant species have altered the habitat and compete for resources with <i>Urera kaalae</i> . These include <i>Ageratina riparia</i> (spreading mist flower), <i>Aleurites moluccana</i> (kukui), <i>Bryophyllum pinnatum</i> (airplant), <i>Buddleia asiatica</i> (dog tail), <i>Clidemia hirta</i> (Koster's curse), <i>Deparia petersonii</i> (NCN), <i>Grevillea robusta</i> (silk oak), <i>Heliocarpus popayaensis</i> (white moho), <i>Lantana camara</i> (lantana), <i>Oplismenus</i> sp. (basketgrass), <i>Passiflora suberosa</i> (corksystem passion flower), <i>Physalis peruviana</i> (Cape gooseberry), <i>Pimenta dioica</i> (allspice tree), <i>Psidium guajava</i> (common guava), <i>Rubus argutus</i> (blackberry), <i>Rubus rosifolius</i> (thimbleberry), <i>Setaria parviflora</i> (yellow foxtail), and <i>Schinus terebinthifolius</i> (Christmas berry)."

305	Congeneric weed	y
	Source(s)	Notes
	Wu, H., Stanton, R., & Lemerle, D. (2019). Seed fecundity, persistence, and germination biology of prairie groundcherry (<i>Physalis hederifolia</i>) in Australia. <i>Weed Science</i> , 67(1), 77-82	[<i>Physalis hederifolia</i>] "Globally, <i>P. hederifolia</i> is a weed in South Africa, Chile, Argentina, Brazil, Uruguay, and the western United States. Within Australia, it is a declared noxious weed in New South Wales, Victoria, and Western Australia. <i>Physalis hederifolia</i> has been assessed as a highly invasive weed (Grice 2002; Kwong 2006) with an invasive score of 0.73 out of a possible score of 1." ... "The horizontal roots "produce new shoots each year, which not only recharges the perennial roots with fresh carbohydrates, but also competes directly with summer-growing crops and pastures for moisture, nutrients, and space. <i>Physalis hederifolia</i> reduces crop and pasture production and stock-carrying capacity and contaminates grains and hays.
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	Several <i>Physalis</i> species are listed as naturalized or weeds

Qsn #	Question	Answer
401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. (1999). Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[No evidence] "Soft-wooded, short-lived shrubs up to ca. 1 m tall, straggly with age, all parts densely pubescent with erect, simple or glandular hairs up to 1 mm long. Leaves simple, alternate, usually geminate, 1 larger than the other, ovate-acuminate, often 6 cm long, 4 cm wide, margins entire or rarely with a few blunt lobes, apex acuminate, base cordate, petioles 2-3 cm long. Flowers perfect, actinomorphic, solitary in the leaf axils, pedicellate; calyx connate in lower ", 5-lobed, veins often prominent, the lobes acuminate-triangular, ca. 1 cm long, distinct at apex; corolla yellow with well-defined purplish brown spots at base, 15-20 mm in diameter, the limb rotate or shallowly 10-lobed, the tube swollen into shallow nectary pouches between the filaments, densely pubescent with pale yellowish dendritic hairs below the spots and around the nectaries; style 5-7 mm long. Berries pale yellow, drying pale brown, aromatic, succulent, globose, 1.5-2 cm in diameter, enclosed in the inflated calyx 3-3.5 cm long. Seeds numerous, pale brown, discoid, 1.75-2 mm long, minutely shallowly reticulate, embryo curved, endosperm present"
402	Allelopathic	
	Source(s)	Notes
	Morikawa, C. I. O., Miyaura, R., Tapia Y Figueroa, M. D. L., Rengifo Salgado, E. L., & Fujii, Y. (2012). Screening of 170 Peruvian plant species for allelopathic activity by using the Sandwich Method. Weed Biology and Management, 12 (1): 1-11	[Potentially yes] "Table 2. Allelopathic activity of the 176 samples (170 species) of Peruvian plants by the Sandwich Method" [Extracts of <i>Physalis peruviana</i> demonstrated significant inhibitory effect on the radicle of lettuce (<i>Lactuca sativa</i>) seedlings]
403	Parasitic	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. (1999). Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Soft-wooded, short-lived shrubs up to ca. 1 m tall, straggly with age, all parts densely pubescent with erect, simple or glandular hairs up to 1 mm long." [Solanaceae. No evidence]
404	Unpalatable to grazing animals	
	Source(s)	Notes

Qsn #	Question	Answer
	Popova, V. T., Ivanova, T. A., Stoyanova, M. A., Mazova, N. N., Panayotov, N. D., & Stoyanova, A. S. (2021). The leaves and stems of Cape gooseberry (<i>Physalis peruviana</i> L.) as an alternative source of bioactive substances. In IOP Conference Series: Materials Science and Engineering (Vol. 1031, No. 1, p. 012094). IOP Publishing	[Leaves and stems might be palatable to livestock] "The results from the study confirmed the assumption that the leaves and stems of Cape gooseberry, currently discarded by-products, could be regarded as alternative sources of bioactive substances. Based on the obtained phytonutrient composition data, the two Bulgarian Cape gooseberry genotypes reveal certain potential for use as minor supplementary ingredients in livestock feed. The presence of aroma-active volatiles and the specific profiles of the extracts from the leaves substantiate their prospective use in perfumery and cosmetics."
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. (2003). Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	[Possibly palatable, if potentially toxic] "Environmental impact: Suspected to cause livestock poisoning (Burt Smith, Univ. Hawai'i, retired)."

405	Toxic to animals	
	Source(s)	Notes
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. (2003). Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Environmental impact: Suspected to cause livestock poisoning (Burt Smith, Univ. Hawai'i, retired)."
	Fuller, T.C. & McClintock, E.M. (1986). Poisonous plants of California: Issue 53 of California natural history guides. University of California Press, Berkeley and Los Angeles, CA	[<i>Physalis peruviana</i> was not identified as toxic to cattle in California, unlike other <i>Physalis</i> species] "Of the native or introduced species in California, only the following groundcherry has been reported as troublesome to livestock." ... " <i>Physalis angulata</i> var. <i>lanceifolia</i> ... In September 1958, dairy cattle exhibited toxicity from plants of Lanceleaf Groundcherry that were abundant in hay."

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Global Invasive Species Database (2022) Species profile: <i>Physalis peruviana</i> . http://www.iucngisd.org/gisd/species.php?sc=1461 . [Accessed 24 Oct 2022]	" <i>P. peruviana</i> poses an indirect threat to US agriculture when imported as it may harbour introduced plant pests, including a wide range of arthropod (insect) pests and plant pathogenic fungi, viruses and bacteria (USDA 1997)."
	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	"Poha is subject to attack by various insect pests and fungal, bacterial, and viral diseases."
	National Research Council. (1989). Lost Crops of the Incas: Little-Known Plants of the Andes with Promise for Worldwide Cultivation. National Academy Press, Washington. D.C.	"The plant's susceptibility to pests and diseases is not well understood, but when plantings are small and separated, pests and diseases are seldom major problems. In fact, once established, the crop requires little attention. However, potential threats (especially in large plantings) include birds, which prey upon the fruits; tobacco mosaic virus and bacterial leaf-spot, which infect the plants; and a number of insects that attack the foliage."

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

Qsn #	Question	Answer
	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 foliage and possibly the unripe green fruits are toxic because of the presence of solanine."
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"The immature fruits contain sufficient solanine to cause gastroenteritis and diarrhea if ingested, children should be discouraged from eating the fruits. Plant diuretic."

408	Creates a fire hazard in natural ecosystems	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.	[Generally does not occur in high fire risk areas] "in Hawai'i naturalized in disturbed sites in mesic to wet forest, diverse mesic forest, and subalpine woodland"
	Weber, E. (2017). Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	Not listed among impacts
	Global Invasive Species Database (2022) Species profile: <i>Physalis peruviana</i> . http://www.iucngisd.org/gisd/species.php?sc=1461 . [Accessed 24 Oct 2022]	Not listed among impacts

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	National Research Council. (1989). Lost Crops of the Incas: Little-Known Plants of the Andes with Promise for Worldwide Cultivation. National Academy Press, Washington. D.C.	"Although it thrives in full sun, some shelter from strong wind is desirable."
	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	"Poha grows best in full sunlight in well-drained soils with a pH between 5.0 and 6.5."
	Lim, T.K. (2013). Edible Medicinal And Non-Medicinal Plants. Volume 6, Fruits. Springer, Dordrecht	"The plant needs full sun but protection from strong winds; plenty of rain throughout its growing season, very little when the fruits are maturing."

Qsn #	Question	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Trade Winds Fruit. (2022). Cape Gooseberry - <i>Physalis peruviana</i> . https://www.tradewindsfruit.com/content/cape-gooseberry.htm . [Accessed 24 Oct 2022]	"Grow in most soil types and will do very well in poor soils and in pots."
	Plants for a Future. (2022). <i>Physalis peruviana</i> . https://pfaf.org . [Accessed 24 Oct 2022]	"Succeeds in a sheltered position in any well-drained soil in full sun or light shade[196, 200]. Prefers a rich loam[38] but tolerates poor soils[196]. If the soil is too rich it encourages leaf production at the expense of fruiting[196]. Plants tolerate a pH in the range 4.5 to 8.2 [196]."

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.	"Soft-wooded, short-lived shrubs up to ca. 1 m tall, straggly with age, all parts densely pubescent with erect, simple or glandular hairs up to 1 mm long."

412	Forms dense thickets	y
	Source(s)	Notes
	Weber, E. (2017). Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"Cape gooseberry has become naturalized in many regions of the world. It grows frequently on disturbed ground and may form dense thickets crowding out native vegetation."

501	Aquatic	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. (1999). Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Terrestrial] "in Hawai'i naturalized in disturbed sites in mesic to wet forest, diverse mesic forest, and subalpine woodland, 450-2,020 m"

502	Grass	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 19 Oct 2022]	"Family: Solanaceae Subfamily: Solanoideae Tribe: Physaleae Subtribe: Physalinae"

503	Nitrogen fixing woody plant	n
	Source(s)	Notes

Qsn #	Question	Answer
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 19 Oct 2022]	"Family: Solanaceae Subfamily: Solanoideae Tribe: Physaleae Subtribe: Physalinae"

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	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.	"Soft-wooded, short-lived shrubs up to ca. 1 m tall, straggly with age, all parts densely pubescent with erect, simple or glandular hairs up to 1 mm long."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Lim, T.K. (2013). Edible Medicinal And Non-Medicinal Plants. Volume 6, Fruits. Springer, Dordrecht	[No evidence] "Cape gooseberry is indigenous to South America in the high altitude tropical Colombia, Chile, Ecuador and Peru where the fruit grows wild. It is cultivated in Central and South America, tropical Africa, India, SE Asia, Australia, also in some parts of Europe and East Asia, and has also naturalized in many of these areas."

602	Produces viable seed	y
	Source(s)	Notes
	Food Plant Solutions. (2018). Potentially Important Food Plants of Tanzania. FPS, Devonport, Tasmania	"Cultivation: Plants are grown from seed that is broadcast over the soil. Seeds should be sown 1.5 cm deep in loose soil. Seed germinate irregularly. Plants should be spaced 45 cm apart. In the tropics, plants keep growing from year to year, but in the subtropics they regrow from seed each year."
	National Research Council. (1989). Lost Crops of the Incas: Little-Known Plants of the Andes with Promise for Worldwide Cultivation. National Academy Press, Washington. D.C.	"Propagation is generally by seed. However, rooted cuttings flower earlier, yield more, and grow true to type."
	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.	"Seeds numerous, pale brown, discoid, 1.75-2 mm long, minutely shallowly reticulate, embryo curved, endosperm present. Self-compatible"

603	Hybridizes naturally	n
	Source(s)	Notes

Qsn #	Question	Answer
	Ramírez, F., & Davenport, T. L. (2021). Uchuva (<i>Physalis peruviana</i> L.) reproductive biology. Springer International Publishing, Cham, Switzerland	"Hybridization among <i>Physalis</i> species has been difficult to obtain. Menzel (1951) reported that hybridization has been unsuccessful among <i>P. peruviana</i> and other related species. <i>P. ixocarpa</i> Rydb was crossed with <i>P. peruviana</i> obtaining mature seeds; however, F1 and F2 progenies from both were uniformly identical with the seed parents, showing no evidence of hybridization. Fruits were not obtained when <i>P. ixocarpa</i> was the seed parent or when <i>ixocarpa</i> pollen was used on flowers of perennial species. Few investigations have reported successful hybrids."
	Azeez, S. O., & Faluyi, J. O. (2018). Hybridization in four Nigerian <i>Physalis</i> (Linn.) species. <i>Notulae Scientia Biologicae</i> , 10(2), 205-210	"No natural hybrid was observed where <i>P. angulata</i> , <i>P. pubescens</i> and <i>P. peruviana</i> were growing sympatrically, whereas <i>P. micrantha</i> was observed to be growing allopatrically in ruderal and waste places. Of all the crosses that were carried out, including the reciprocal crosses (Table 2 and 3), no successful hybrid combination was obtained, except in one cross between <i>P. angulata</i> and <i>P. pubescens</i> " ... "It was observed from the present study that the species that were found growing sympatrically produced no natural hybrids. The lack of hybrids among closely-related sympatrically-distributed species showed that strong pre and post-zygotic isolated mechanism has developed among these species and therefore prevented hybridization (Pringle and Murry, 1991; Pascarella, 2007)."
	Junior, A.D.S., Zeist, A.R., da Silva, D.F. et al. (2022). Reproductive biology and hybridization of <i>Physalis</i> L. species. <i>Brazilian Journal of Botany</i> , 45, 1037–1045	[Artificial hybrids possible] "The hybridization of the species belonging to the <i>Physalis</i> L. genus has been seldom to date, preventing the combination of distinct characteristics. Thus, assessments concerning basic reproductive biology and inter-specific compatibility of crosses are required for breeding. The present study aimed to evaluate pollen viability, stigmatic receptivity, and the compatibility of self-pollinations and inter-specific crosses in <i>Physalis</i> species. <i>P. angulata</i> L., <i>P. ixocarpa</i> Brot., <i>P. pruinosa</i> L., <i>P. peruviana</i> L., <i>P. pubescens</i> L., <i>P. minima</i> L., and <i>P. daturifolia</i> Lam, were investigated, each represented by one accession. The viability of pollen grains was determined through in vitro germination. Stigma receptivity was determined using 3% hydrogen peroxide (H ₂ O ₂) with flower buds in pre-anthesis and anthesis, every two hours, from 6:00 am to 6:00 pm, a'. A total of 50 artificial crosses were performed for each hybrid combination and self-pollination. Pollen germination ranged between 43.65 and 75.30% among <i>Physalis</i> species. Stigma receptivity was greater during anthesis for all species and the time of day influences receptivity. Self-compatibility for all <i>Physalis</i> species was observed, and fruit fixation occurred in most inter-specific crosses, except when <i>P. daturifolia</i> was used in hybrid combinations."

604	Self-compatible or apomictic	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.	"Self-compatible"

Qsn #	Question	Answer
	<p>Junior, A.D.S., Zeist, A.R., da Silva, D.F. et al. (2022). Reproductive biology and hybridization of <i>Physalis</i> L. species. <i>Brazilian Journal of Botany</i>, 45, 1037–1045</p>	<p>"The hybridization of the species belonging to the <i>Physalis</i> L. genus has been seldom to date, preventing the combination of distinct characteristics. Thus, assessments concerning basic reproductive biology and inter-specific compatibility of crosses are required for breeding. The present study aimed to evaluate pollen viability, stigmatic receptivity, and the compatibility of self-pollinations and inter-specific crosses in <i>Physalis</i> species. <i>P. angulata</i> L., <i>P. ixocarpa</i> Brot., <i>P. pruinosa</i> L., <i>P. peruviana</i> L., <i>P. pubescens</i> L., <i>P. minima</i> L., and <i>P. daturifolia</i> Lam, were investigated, each represented by one accession. The viability of pollen grains was determined through in vitro germination. Stigma receptivity was determined using 3% hydrogen peroxide (H₂O₂) with flower buds in pre-anthesis and anthesis, every two hours, from 6:00 am to 6:00 pm, a'. A total of 50 artificial crosses were performed for each hybrid combination and self-pollination. Pollen germination ranged between 43.65 and 75.30% among <i>Physalis</i> species. Stigma receptivity was greater during anthesis for all species and the time of day influences receptivity. Self-compatibility for all <i>Physalis</i> species was observed, and fruit fixation occurred in most inter-specific crosses, except when <i>P. daturifolia</i> was used in hybrid combinations."</p>
	<p>Ramírez, F., & Davenport, T. L. (2021). <i>Uchuva</i> (<i>Physalis peruviana</i> L.) reproductive biology. Springer International Publishing, Cham, Switzerland</p>	<p>"<i>Uchuva</i> plants rely on both self- and cross-pollination. The bell-shaped flowers are pollinated by wind and insects."</p>

605	Requires specialist pollinators	n
	Source(s)	Notes
	<p>Ramírez, F., & Davenport, T. L. (2021). <i>Uchuva</i> (<i>Physalis peruviana</i> L.) reproductive biology. Springer International Publishing, Cham, Switzerland</p>	<p>"Abstract <i>Uchuva</i> plants rely on both self- and cross-pollination. The bell-shaped flowers are pollinated by wind and insects. <i>Apis mellifera</i> has been assumed to be an effective pollinator of field-grown <i>Uchuva</i> plants. Bumblebees visiting <i>Uchuva</i> plants comprise <i>Bombus impatiens</i> and <i>Bombus atratus</i>. Other floral visitors include <i>Xylocopa</i> sp., <i>Bombus</i> sp., the common house fly, Diptera species, stingless bees, wasps, beetles, hemipterans, butterflies, earwigs, and ants. Insect visitor diversity has been observed to be higher in places devoid of insecticide or fungicide applications."</p>

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	<p>National Research Council. (1989). <i>Lost Crops of the Incas: Little-Known Plants of the Andes with Promise for Worldwide Cultivation</i>. National Academy Press, Washington. D.C.</p>	<p>"Propagation is generally by seed. However, rooted cuttings flower earlier, yield more, and grow true to type."</p>
	<p>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</p>	<p>"Propagation is usually by seed, although 6-8" stem cutting can also be used."</p>
	<p>Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). (1983) <i>Handbook of Hawaiian Weeds</i>. University of Hawaii Press, Honolulu, HI</p>	<p>"Propagation: By seed"</p>

Qsn #	Question	Answer
607	Minimum generative time (years)	1
	Source(s)	Notes
	National Research Council. (1989). Lost Crops of the Incas: Little-Known Plants of the Andes with Promise for Worldwide Cultivation. National Academy Press, Washington. D.C.	"Flowering occurs 65–75 days after planting, and harvest may commence 85–100 days after that."
	Benson, D. & McDougall, L. (2001). Ecology of Sydney plant species. Part 8. Dicotyledon families Rutaceae to Zygophyllaceae. Cunninghamia 7(2): 255-462	"Growth form: Short-lived, densely hairy shrub to 100 cm high."
	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	"Plants are usually scarred in flats; young seedlings can be transplanted about seven weeks after sowing, and fruit matures three to five months after transplanting."
	Food Plant Solutions. (2018). Potentially Important Food Plants of Tanzania. FPS, Devonport, Tasmania	"Production: Plants produce fruit in 1 year."
	Kubiak, P. J. (2009). Fire responses of bushland plants after the January 1994 wildfires in northern Sydney. Cunninghamia, 11(1): 131-165	[Reported to first flower from seed following fire in 140 weeks, or 2.7 years] "Appendix 1. Observations on fire responses (after 100% leaf scorch) of vascular plants in the Lane Cove River (LCR) (observations mainly Jan 1994 – Oct 1999) and Narrabeen Lagoon (NL) (Mar – Oct 1994) catchments, following the fires of January 1994." ... "First flowering and fruiting times(or spore production) after the fires are shown for resprouted plants (Resp) and plants from seed." [<i>Physalis peruviana</i> - First flowering - Seed = 140w]

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	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.	"Berries pale yellow, drying pale brown, aromatic, succulent, globose, 1.5-2 cm in diameter, enclosed in the inflated calyx 3-3.5 cm long. Seeds numerous, pale brown, discoid, 1.75-2 mm long, minutely shallowly reticulate, embryo curved, endosperm present." [No means of attachment]
	CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"There is presumed to be dispersal by birds and mammals eating the fruits but no documentation exists."
	Von der Lippe, M., & Kowarik, I. (2007). Long-distance dispersal of plants by vehicles as a driver of plant invasions. Conservation Biology, 21(4), 986-996	[Seed suspected of being dispersed by vehicles] "The detection of seven new species in the seed samples for the flora of Berlin illustrates the capacity of traffic to serve as a vector for the introduction of new species. Cape gooseberry (<i>Physalis peruviana</i> L.), for example, had no record in the flora of Berlin but emerged from samples out of two different tunnels."

702	Propagules dispersed intentionally by people	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.	"Native to Peru, widely cultivated and naturalized in warm temperate areas"

Qsn #	Question	Answer
	National Research Council. (1989). <i>Lost Crops of the Incas: Little-Known Plants of the Andes with Promise for Worldwide Cultivation</i> . National Academy Press, Washington. D.C.	"The goldenberry (<i>Physalis peruviana</i>) has long been a minor fruit of the Andes and is found in markets from Venezuela to Chile. It has also been grown in Hawaii, California, South Africa, East Africa, India, New Zealand, Australia, and Great Britain."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Animals, Flyers, Livestock, Sheep, Vehicles, Escapee"
	Li, J., Song, C., & He, C. (2019). Chinese lantern in <i>Physalis</i> is an advantageous morphological novelty and improves plant fitness. <i>Scientific Reports</i> , 9(1), 1-10	[Related species moved by wind, water and animals] "The origin of morphological novelties is an important but neglected issue of evolutionary biology. The fruit of the genus <i>Physalis</i> , a berry, is encapsulated by a novel morphological feature of the post-floral, accrescent calyx that is referred to as a Chinese lantern. The evolutionary developmental genetics of the Chinese lantern have been investigated in the last decade; however, the selective values of the morphological novelty remain elusive. Here, we measured the photosynthetic parameters of the fruiting calyces, monitored microclimatic variation within the Chinese lanterns during fruit development, performed floral-calyx-removal experiments, and recorded the fitness-related traits in <i>Physalis floridana</i> . Ultimately, we show that the green-fruiting calyx of <i>Physalis</i> has photosynthetic capabilities, thus serving as an energy source for fruit development. Moreover, the developing Chinese lantern provides a microclimate that benefits the development and maturation of berry and seed, and it improves plant fitness in terms of fruit/seed weight and number, and fruit maturation under low temperature environments. Furthermore, the lantern structure facilitates the dispersal of fruits and seeds by water and wind. Our results suggest that the Chinese lantern morphology of <i>Physalis</i> is an evolutionary adaptive trait and improves plant fitness, thus providing new insight into the origin of morphological novelties."

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Li, J., Song, C., & He, C. (2019). Chinese lantern in <i>Physalis</i> is an advantageous morphological novelty and improves plant fitness. <i>Scientific Reports</i> , 9(1), 1-10	[Wind facilitates dispersal of a related species, which possesses similar fruit traits and inflated calyx] "Nonetheless, the nature of the lantern- or balloon-like structure permits other strategies to fulfill long distance dispersal. Long distance dispersal of the intact <i>Physalis</i> fruits is efficiently mediated by wind; however, lantern removal disabled the capability of long distance dispersal. The mobility of tomato berries in wind was severely limited, as was the naked <i>Physalis</i> berries. Consistent with this, wind plays a role in fruit dispersal of <i>Przewalskia tangutica</i> which has a lantern-like structure, the homolog of the Chinese lantern in <i>Physalis</i> ."

705	Propagules water dispersed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Smith, A.C. (1991). Flora Vitiensis Nova: a new flora of Fiji Volume 5. National Tropical Botanical Garden, Lawai, HI	[Distribution along streams suggests water may facilitate dispersal] "As noted in Fiji, <i>Physalis peruviana</i> is a coarse, suffrutescent herb or soft-wooded shrub to 2 m. high, seen at elevations from near sea level to 900 m. in gardens and also naturalized in forest along trails and streams, in clearings, and in cultivated areas."
	Li, J., Song, C., & He, C. (2019). Chinese lantern in <i>Physalis</i> is an advantageous morphological novelty and improves plant fitness. <i>Scientific Reports</i> , 9(1), 1-10	[Related species shares morphological features with <i>Physalis peruviana</i> that facilitate water dispersal] "Furthermore, the lantern structure facilitates the dispersal of fruits and seeds by water and wind. Our results suggest that the Chinese lantern morphology of <i>Physalis</i> is an evolutionary adaptive trait and improves plant fitness, thus providing new insight into the origin of morphological novelties."

706	Propagules bird dispersed	y
	Source(s)	Notes
	Sarmiento, F. O. (1996). Seed dispersal for landscape restoration in the tropandean region of Ecuador. PhD Dissertation. University of Georgia, Athens, GA	"For instance, one observation is that "uvilla" (<i>Physalis peruviana</i> : Solanaceae) always grows on fences visited by birds; farmers tried to sow uvillas without success, hence they knew that only bird-dispersed seeds of <i>Physalis</i> will germinate."
	Benson, D. & McDougall, L. (2001). Ecology of Sydney plant species. Part 8. Dicotyledon families Rutaceae to Zygophyllaceae. <i>Cunninghamia</i> 7(2): 255-462	"Interaction with other organisms: Fruit eaten by Yellow-faced Honeyeater <i>Lichenostomus chrysops</i> (Barker & Vestjens 1990)."
	Lewin, V., & Lewin, G. (1984). The Kalij pheasant, a newly established game bird on the island of Hawaii. <i>The Wilson Bulletin</i> , 96(4): 634-646	"TxABLE 1 Food Items from Crops and Gizzards of Kalij Pheasants from Hawaii Island" [Includes Poha (<i>Physalis peruviana</i>)]

707	Propagules dispersed by other animals (externally)	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.	[Birds, bats, wind and water identified as dispersal vectors. Otherwise, fruit and seeds lack means of external attachment] "Berries pale yellow, drying pale brown, aromatic, succulent, globose, 1.5-2 cm in diameter, enclosed in the inflated calyx 3-3.5 cm long. Seeds numerous, pale brown, discoid, 1.75-2 mm long, minutely shallowly reticulate, embryo curved, endosperm present."

708	Propagules survive passage through the gut	y
	Source(s)	Notes
	Sarmiento, F. O. (1996). Seed dispersal for landscape restoration in the tropandean region of Ecuador. PhD Dissertation. University of Georgia, Athens, GA	"For instance, one observation is that "uvilla" (<i>Physalis peruviana</i> : Solanaceae) always grows on fences visited by birds; farmers tried to sow uvillas without success, hence they knew that only bird-dispersed seeds of <i>Physalis</i> will germinate."

Qsn #	Question	Answer
	García-Herrera, L. V., Ramírez-Fráncel, L. A., & Reinoso-Florez, G. (2019). Consumo de plantas pioneras por murciélagos frugívoros en un fragmento de bosque seco tropical (Colombia). <i>Ciencia en Desarrollo</i> , 10(2), 33-41	[Dispersed by bats] "Seed dispersal is an important process for the regeneration and maintenance of forests; This mechanism allows plants to colonize new sites and maintain the structure of the population. Bats have been recognized as effective dispersers of seeds in several tropical forest ecosystems, due to the ability to defecate in flight, fly over open areas and exert a germination effect on released seeds. In this study was to evaluate diet preference of fruit bats in a tropical dry forest in the department of Tolima. The analysis of 63 dietary records of 14 bat species allowed to identify 11 plant species, three genera and one morphospecies. <i>Bidens pilosa</i> , <i>Piper crassinervium</i> and <i>Physalis peruviana</i> L. showed the highest consumption. <i>Artibeus lituratus</i> had the widest niche breadth, followed by <i>Artibeus planirostris</i> . Low overlaps were present among these bat species, which could reflect a niche segregation as a strategy to avoid competition between sympatric species. The consumption of fruits in a successional shrubs state is highlighted, which reaffirms the key role of bats in the dispersion of pioneer species."

801	Prolific seed production (>1000/m2)	
	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.	"Seeds numerous, pale brown, discoid, 1.75-2 mm long, minutely shallowly reticulate, embryo curved, endosperm present."
	Muñoz Romero, D. S., Morales Pisco, A. F., & González Pinto, A. L. (2017). Germinable seed bank in the terrestrial environment of two urban wetlands. <i>Colombia Forestal</i> , 20(1), 31-44	"Tabla 2." [<i>Physalis peruviana</i> reported at densities of 164 ± 336 seeds/m2 in the La Vaca wetlands]

802	Evidence that a persistent propagule bank is formed (>1 yr)	y
	Source(s)	Notes
	Teketay, D., & Granström, A. (1995). Soil Seed Banks in Dry Afromontane Forests of Ethiopia. <i>Journal of Vegetation Science</i> , 6(6), 777-786	"App. 1. Quantity of viable seeds in soil samples from the four sites (germination trials and soil sieving combined)" [<i>Physalis peruviana</i> described as having a "persistent seed bank". Longevity unspecified]
	Wu, H., Stanton, R., & Lemerle, D. (2019). Seed fecundity, persistence, and germination biology of prairie groundcherry (<i>Physalis hederifolia</i>) in Australia. <i>Weed Science</i> , 67(1), 77-82	[Related species with long-lived seeds] " <i>Physalis hederifolia</i> has the capacity to produce 66 to 86 berries plant – 1, 51 to 74 seeds berry – 1, and approximately 4,500 seeds plant – 1, with the seeds potentially able to persist in the soil seedbank for 20 yr if buried in an intact dry berry pod."

803	Well controlled by herbicides	
	Source(s)	Notes
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. (2003). Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Management: Probably susceptible to hormone-type herbicides, especially when young, and probably to tebuthiuron."

Qsn #	Question	Answer
	CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Unclear] "Lenacil and trifluralin are reportedly safe where <i>P. peruviana</i> is being grown as a crop (Legge, 1974). There is an almost total lack of information on its susceptibility to herbicides. Closely related species have proved to be resistant to many standard herbicide including 2,4-D, though Motooka et al. (2003) suggested it is 'probably susceptible to hormone-type herbicides, especially when young, and probably to tebuthiuron'. Glyphosate is mentioned as a suitable treatment for <i>P. viscosa</i> , also clopyralid and picloram but all these are likely to damage surrounding crops or vegetation"

804	Tolerates, or benefits from, mutilation, cultivation, or fire	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	[Tolerates severe pruning] "After the first crop is harvested, plants may be cut back severely and fertilized to induce a flush of growth; commercial fields are replanted after the second crop is harvested."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. (1999). Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Unknown, but no indication of limiting factors in the Hawaiian Islands] "in Hawai'i naturalized in disturbed sites in mesic to wet forest, diverse mesic forest, and subalpine woodland, 450-2,020 m, on all of the main islands except Ni'ihau and Kaho'olawe."

Summary of Risk Traits:

High Risk / Undesirable Traits

- Broad climate suitability and elevation range
- Grows and spreads in regions with tropical climates
- Naturalized on Kauai, Oahu, Molokai, Lanai, Maui, and Hawaii (Hawaiian Islands) and widely naturalized elsewhere
- A weed of disturbed habitats, and mesic to wet forests
- Identified as a threat to certain endangered plants in the Hawaiian Islands, although not conclusively implicated in specific, detrimental effects
- Other *Physalis* species are invasive weeds
- Suspected to being toxic to grazing animals
- Foliage and green fruits toxic to people
- Tolerates many soil types
- Reported to form dense stands in certain habitats
- Reproduces by seeds
- Self-fertile
- Reaches maturity in one growing season
- Seeds dispersed by birds and other fruit eating mammals, and through intentional cultivation; inflated, balloon-like calyx aids in wind and water dispersal
- Seeds may form a persistent seed bank (longevity unspecified)
- Tolerates heavy pruning and cutting

Low Risk Traits

- Impacts appear to be minimal or inconsequential in most habitats where it occurs
- Valued for its edible fruit
- Unarmed (no spines, thorns, or burrs)
- Grows best in high light environments (dense shade may inhibit spread)
- Herbicides may provide effective control