

Taxon: <i>Kalanchoe pinnata</i>	Family: Crassulaceae
Common Name(s): airplant cathedral bells life plant	Synonym(s): Bryophyllum calycinum Salisb. Bryophyllum pinnatum (Lam.) Oken Cotyledon pinnata Lam. Crassula pinnata L. f.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 23 Mar 2015
WRA Score: 16.0	Designation: H(Hawai'i)	Rating: High Risk

Keywords: Environmental Weed, Herbaceous, Toxic, Dense Cover, Spreads Vegetatively

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)		
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	y
303	Agricultural/forestry/horticultural weed		
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	y=1, n=0	y
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals	y=1, n=0	y
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans		
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y
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		
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant		
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)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	n
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
	Eggle, U. (ed.). 2003. Illustrated Handbook of Succulent Plants: Crassulaceae. Springer-Verlag, Berlin - Heidelberg - New York	[No evidence of domestication] "Today, it is found cultivated and as a neophyte throughout the tropics of the world."

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
	Eggle, U. (ed.). 2003. Illustrated Handbook of Succulent Plants: Crassulaceae. Springer-Verlag, Berlin - Heidelberg - New York	"D: Madagascar, now widely distributed as a garden escape throughout the tropics of Africa, Asia and America." ... "This is the best-known species of the genus. It is certainly native to Madagascar, as it is a typical member of the Madagascan Sect. Bryophyllum. Today, it is found cultivate and as a neophyte throughout the tropics of the world."

202	Quality of climate match data	High
	Source(s)	Notes
	Eggle, U. (ed.). 2003. Illustrated Handbook of Succulent Plants: Crassulaceae. Springer-Verlag, Berlin - Heidelberg - New York	

203	Broad climate suitability (environmental versatility)	
	Source(s)	Notes
	Dave's Garden. 2015. PlantFiles: Air Plant, Lifeplant, Cathedral Bells, Floppers, Mexican Love Plant, Mother-in-Law Plant - <i>Kalanchoe pinnata</i> . http://davesgarden.com/guides/pf/go/68271/ . [Accessed 23 Mar 2015]	"Hardiness: USDA Zone 10a: to -1.1 °C (30 °F) USDA Zone 10b: to 1.7 °C (35 °F) USDA Zone 11: above 4.5 °C (40 °F)"
	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.	[Restricted to lower elevations of Hawaiian Islands] "in Hawai'i naturalized and sometimes very abundant in low elevation, dry to mesic, disturbed areas on all of the main islands except Ni'ihau and Kaho'olawe."

Qsn #	Question	Answer
	Tropicos.org. 2015. Tropicos [Online Database]. Missouri Botanical Garden. http://www.tropicos.org/ . [Accessed 23 Mar 2015]	Collected at an elevation range of 0 m (5°56'20"N latitude) to 2500m (01°34'00"S latitude). At latitudes comparable to the Hawaiian Islands (ca. 18°54' N to 22°13' N), collected at elevations primarily below 1000 m.

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Eggl, U. (ed.). 2003. Illustrated Handbook of Succulent Plants: Crassulaceae. Springer-Verlag, Berlin - Heidelberg - New York	"D: Madagascar, now widely distributed as a garden escape throughout the tropics of Africa, Asia and America."
	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 range unknown, now widely established in many tropical and subtropical areas; in Hawai'i naturalized and sometimes very abundant in low elevation, dry to mesic, disturbed areas on all of the main islands except Ni'ihau and Kaho'olawe."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Eggl, U. (ed.). 2003. Illustrated Handbook of Succulent Plants: Crassulaceae. Springer-Verlag, Berlin - Heidelberg - New York	"D: Madagascar, now widely distributed as a garden escape throughout the tropics of Africa, Asia and America." ... "This is the best-known species of the genus. It is certainly native to Madagascar, as it is a typical member of the Madagascan Sect. Bryophyllum. Today, it is found cultivated and as a neophyte throughout the tropics of the world."

301	Naturalized beyond native range	y
	Source(s)	Notes
	Wardah & Brink, M., 1999. <i>Bryophyllum pinnatum</i> (Lamk) Oke [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 20 Mar 2015]	"Distribution <i>Bryophyllum pinnatum</i> has a pantropical distribution. In Malesia it is naturalized throughout the region. In many places it is a weed; on the other hand it is reported to be cultivated in Indonesia, Malaysia, the Philippines and Indo-China."
	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 and sometimes very abundant in low elevation, dry to mesic, disturbed areas on all of the main islands except Ni'ihau and Kaho'olawe. Naturalized prior to 1871 on Hawai'i (Hillebrand, 1888), and noted as naturalized only in Ka'u."

302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	"Air plant is normally cultivated for landscaping, but in parts of the archipelago it has escaped to open, disturbed areas such as roadsides and fields." ... "The species can also be an extreme nuisance to greenhouse owners, who find that vigilance and frequent weeding are necessary to control its spread."

Qsn #	Question	Answer
303	Agricultural/forestry/horticultural weed	
	Source(s)	Notes
	CABI, 2015. <i>Kalanchoe pinnata</i> [original text by J. Rojas-Sandoval & P. Acevedo-Rodríguez]. In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. www.cabi.org/isc	[Possibly] "In the Galapagos Islands, <i>K. pinnata</i> has been reported to displace crops (Soria et al., 2002). It has also been reported as a host for crop pests, including <i>Scirtothrips aurantii</i> , <i>Athelia rolfsii</i> and <i>Xiphinema brevicolle</i> (see Notes on Natural Enemies for more details). Other economic impacts are associated with the costs of control."

304	Environmental weed	y
	Source(s)	Notes
	US Fish and Wildlife Service. 2012. 50 CFR Part 17. Endangered and Threatened Wildlife and Plants; Listing 38 Species on Molokai, Lanai, and Maui as Endangered and Designating Critical Habitat on Molokai, Lanai, Maui, and Kahoolawe for 135 Species; Proposed Rule. Federal Register Vol. 77, No. 112	"Nonnative plant species that threaten <i>Pittosporum halophilum</i> and <i>Canavalia pubescens</i> , the two species proposed for listing in this rule that inhabit the coastal ecosystem on Molokai and Lanai, include the understory and subcanopy species <i>Cenchrus ciliaris</i> (buffelgrass), <i>Kalanchoe pinnata</i> (air plant), <i>Lantana camara</i> (lantana), <i>Leucaena leucocephala</i> (koa haole), and <i>Pluchea carolinensis</i> (sourbush) (HBMP 2008)." ... " <i>Kalanchoe pinnata</i> (air plant), a perennial herb, is widely established in many tropical and subtropical areas. In Hawaii, it was naturalized prior to 1871, and is abundant in low-elevation, disturbed areas on all the main islands except Niihau and Kahoolawe (Wagner et al. 1999t, p. 568). The air plant can reproduce vegetatively at indents along the leaf, usually after the leaf has broken off the plant and is lying on the ground, where a new plant can take root (Motooka et al. 2003a). <i>Kalanchoe pinnata</i> can form dense stands that prevent reproduction of native species (Motooka et al. 2003a; Randall 2007— Global Compendium of Weeds Database)."
	Queensland Government. 2011. Weeds of Australia - Resurrection plant - <i>Bryophyllum pinnatum</i> . http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Bryophyllum_pinnatum.htm . [Accessed 22 Mar 2015]	"Resurrection plant (<i>Bryophyllum pinnatum</i>) is an environmental weed in New South Wales and Queensland. It is regarded to be among the top 50 most invasive plant species in south-eastern Queensland and is on environmental weed lists for north-eastern New South Wales and the wider Sydney and Blue Mountains regions. It can form dense populations in natural habitats (i.e. in open woodlands and wetter forests, in coastal environs and along waterways) and these populations replace native species and prevent their regeneration."
	CABI, 2015. <i>Kalanchoe pinnata</i> [original text by J. Rojas-Sandoval & P. Acevedo-Rodríguez]. In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. www.cabi.org/isc	"The major impact of <i>K. pinnata</i> is the formation of thick stands that displace existing vegetation, reducing local biodiversity. On the island of St John, US Virgin Islands, <i>K. pinnata</i> forms dense stands crowding out native herbaceous vegetation (Ting, 1989), and in the Galapagos Islands, <i>K. pinnata</i> not only replaces the herb layer with a monospecific stand, but forms a dense carpet that inhibits the regeneration of the shrub and tree layers (Tye, 2001). Allelopathic chemicals released from roots and fallen leaves may facilitate this invasion and displacement of native flora."

305	Congeneric weed	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Herrera, I., Hernandez, M. J., Lampo, M., & Nassar, J. M. 2012. Plantlet recruitment is the key demographic transition in invasion by <i>Kalanchoe daigremontiana</i> . <i>Population Ecology</i> , 54(1): 225-237	"Biological invasions have a great impact on biodiversity and ecosystem functioning worldwide. <i>Kalanchoe daigremontiana</i> is a noxious invasive plant in arid zones. Besides being toxic for domestic animals and wildlife, this species inhibits the growth of native plants. Its rapid proliferation in Cerro Saroche National Park (Venezuela) is of great concern because this area hosts several species endemic to the scarce arid zones in the Caribbean. The traits of <i>K. daigremontiana</i> that contribute to its invasive success are unknown."

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] "Glabrous, ± glaucous perennial herbs; stems hollow, 5-20 dm long, rarely branched, producing vegetatively by adventitious shoots from base. Lower and uppermost leaves simple, the middle ones usually pinnately compound with 3-5 leaflets, opposite, blades flat, elliptic, 5-20 cm long, 2-10 cm wide, margins crenate, sometimes producing bulbils, petioles 2-10 cm long."

402	Allelopathic	y
	Source(s)	Notes
	CABI, 2015. <i>Kalanchoe pinnata</i> [original text by J. Rojas-Sandoval & P. Acevedo-Rodríguez]. In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. www.cabi.org/isc	"Allelopathic chemicals released from roots and fallen leaves may facilitate this invasion and displacement of native flora."
	Bär, W., Pfeifer, P., & Dettner, K. (1997). Intra- and interspecific allelochemical effects in three <i>Kalanchoe</i> -species (Crassulaceae). <i>Zeitschrift fur Naturforschung C- Journal of Biosciences</i> , 52(7), 441-449	"The intra- and interspecific acting allelochemicals of <i>Kalanchoe daigremontiana</i> , <i>K. tubiflora</i> and <i>K. pinnata</i> (Crassulaceae) were isolated and could be identified as p-hydroxybenzoic-, protocatechuic-, gallic-, p-coumaric- and coffeic acid. By measuring length of stems and primary roots of <i>Kalanchoe</i> -daughter plants the intra- and interspecific inhibitory activities of authentic compounds could be demonstrated."

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.	"Glabrous, ± glaucous perennial herbs; stems hollow, 5-20 dm long, rarely branched, producing vegetatively by adventitious shoots from base." [No evidence. Crassulaceae]

404	Unpalatable to grazing animals	n
	Source(s)	Notes

Qsn #	Question	Answer
	Reppas, G. P. (1995). Bryophyllum pinnatum poisoning of cattle. Australian Veterinary Journal, 72(11), 425-427	[Presumably palatable, which results in poisoning of animals] "Two adult cattle died within 48 h of being fed a large amount of Bryophyllum pinnatum plants collected from a house garden. Clinical signs became apparent the day after feeding and included hypersalivation, ataxia, severe cardiac arrhythmia and laboured respiration. The main necropsy findings were acute rumenitis, reduction of bronchiolar lumens and emphysema."
	McKenzie, R. A., & Armstrong, T. R. (1986). Poisoning of cattle by Bryophyllum plants. Queensland Agricultural Journal, 112(3), 105 108	[Presumably palatable, which results in poisoning of livestock] "B. tubiflorum, B. pinnatum, B. proliferum, B. daigremontianum and the hybrid B. daigremontianum X B. tubiflorum are found in Queensland, Australia where they have been responsible for over 40 cases of cattle poisoning since 1960. The plants are described, as are the symptoms of cattle poisoning and a recently developed cure. Chemical and cultural methods for controlling these weeds are discussed.\B. tubiflorum, B. pinnatum, B. proliferum, B. daigremontianum and the hybrid B. daigremontianum X B. tubiflorum are found in Queensland, Australia where they have been responsible for over 40 cases of cattle poisoning since 1960. The plants are described as are the symptoms of cattle poisoning and a recently developed cure. Chemical and cultural methods for controlling these weeds are discussed."

405	Toxic to animals	y
	Source(s)	Notes
	Sparkes, E. C., Grace, S., & Panetta, F. D. (2002). The effects of various herbicides on Bryophyllum pinnatum (Lam.) Pers in Nudgee Wetlands Reserve, Queensland. Plant Protection Quarterly, 17(2): 77-80	"Bryophyllum pinnatum [<i>Kalanchoe pinnata</i>] is an invasive succulent weed that has often been blamed for stock poisoning, especially in drier seasons when there is limited alternative feed."
	CABI, 2015. <i>Kalanchoe pinnata</i> [original text by J. Rojas-Sandoval & P. Acevedo-Rodríguez]. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Four species of <i>Kalanchoe</i> , including <i>K. pinnata</i> were responsible for 41 recorded poisoning incidents affecting 379 cattle in Queensland, Australia, between 1960 and 1984 (McKenzie and Armstrong, 1986). In New South Wales, Australia, two cattle reportedly died from ingestion of <i>K. pinnata</i> (Reppas, 1995)."
	Smith, G. (2004). Toxicology Brief: <i>Kalanchoe</i> species poisoning in pets. Veterinary Medicine 99: 933-936	" <i>Kalanchoe</i> species contain cardiac glycosides and are toxic to animals. In South Africa and Australia, where these plants are found in the wild, cattle and sheep poisonings are common."

Qsn #	Question	Answer
406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Wardah & Brink, M., 1999. <i>Bryophyllum pinnatum</i> (Lamk) Oke [Internet] Record from Proseabase. de Padua, L.S., Bunyaphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 23 Mar 2015]	"Diseases and pests In India, <i>Bryophyllum pinnatum</i> is reported to be susceptible to the fungi <i>Alternaria alternata</i> , <i>Glomerella cingulata</i> and <i>Colletotrichum dematium</i> ."
	CABI, 2015. <i>Kalanchoe pinnata</i> [original text by J. Rojas-Sandoval & P. Acevedo-Rodríguez]. In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. www.cabi.org/isc	"In the Galapagos Islands, <i>K. pinnata</i> has been reported to displace crops (Soria et al., 2002). It has also been reported as a host for crop pests, including <i>Scirtothrips aurantii</i> , <i>Athelia rolfsii</i> and <i>Xiphinema brevicolle</i> "

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	Notes
	Fuller, T.C. & McClintock, E.M. 1986. <i>Poisonous plants of California: Issue 53 of California natural history guides</i> . University of California Press, Berkeley and Los Angeles, CA	"Reported as poisonous in Australia." [Poisoning of animals occurs after ingestion of plant. Toxicity to humans unknown. Unlikely to be consumed by people]

Qsn #	Question	Answer
	<p>Wardah & Brink, M., 1999. <i>Bryophyllum pinnatum</i> (Lamk) Oke [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org. [Accessed 23 Mar 2015]</p>	<p>[Used medicinally] "Uses The main medicinal use of <i>Bryophyllum pinnatum</i> in South-East Asia is in the treatment of boils, wounds, burns and scalds. In Indonesia, pounded leaves are used as a diuretic, and leaves are used externally to treat sores and pain in back and feet; a poultice is sometimes applied on sore eyes or to relieve headache; a decoction is used internally to treat fever and oedema; an extraction of dried pounded leaves in water is used against haemorrhoids. In Malaysia, the crushed leaves are applied to the forehead to treat headache and to the chest to treat coughs and pains. In Brunei, a leaf infusion is drunk as a febrifuge. In the Philippines, the leaves are used as an astringent, antiseptic, and against insect bites. Fresh, pounded leaves are applied to burns and as poultices on boils. Leaf juice is used (mixed with lard) to treat diarrhoea, dysentery, cholera and phthisis. The leaves are also used as topicals to treat dislocations, equimosis and callosities. In Papua New Guinea, young leaves are heated over a fire and placed on sores, or applied as a poultice to boils, sores and swellings. In Vietnam, Cambodia, Laos and Thailand, fresh leaves are applied to burns, scalds, wounds, boils, skin diseases and corns and to treat ophthalmia, phlegm, rheumatism, neuralgia and pain. The use of <i>Bryophyllum pinnatum</i> for medicinal purposes is also widespread outside South-East Asia. In India, the leaves are applied to wounds, bruises, boils and, in the form of poultice or powder, to ulcers, whereas leaf juice is given to treat bilious diarrhoea and lithiasis. In West Africa, the juice is used as a diuretic and for the treatment of earache and ophthalmia. The leaves are rubbed or tied on the head against headache, and the roots are used to make a cough medicine. In Brazil, the leaves are used as an emollient and refrigerant over a face swollen from neuralgia or tooth trouble, and in Puerto Rico leaf juice is used to treat acute nephritis. <i>Bryophyllum pinnatum</i> is also used as an ornamental plant and in ceremonies. <i>Bryophyllum proliferum</i> is sometimes cultivated in South-East Asia as a hedge plant, but there are no reports of medicinal uses."</p>

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	<p>Weber, E. 2003. <i>Invasive Plant Species of the World. A Reference Guide to Environmental Weeds</i>. CABI Publishing, Wallingford, UK</p>	<p>[No evidence. Unlikely given succulent habit] "A glabrous somewhat succulent herb with erect stems of 50-200 cm height and up to 2 cm width, woody at the base."</p>

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	<p>CABI, 2015. <i>Kalanchoe pinnata</i> [original text by J. Rojas-Sandoval & P. Acevedo-Rodríguez]. In: <i>Invasive Species Compendium</i>. Wallingford, UK: CAB International. www.cabi.org/isc</p>	<p>"...In tropical East Africa, <i>K. pinnata</i> is found in riverine areas, amongst rocks and also in the shade of trees in areas ranging in altitude from 10 to 1600 m (Wickens, 1987)."</p>

Qsn #	Question	Answer
	Wardah & Brink, M., 1999. Bryophyllum pinnatum (Lamk) Oke [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 23 Mar 2015]	"In South-East Asia, Bryophyllum pinnatum is found up to 1000 m altitude, in sunny or slightly shaded locations."
	Moreira, N. S., Nascimento, L. B. S., Leal-Costa, M. V., & Tavares, E. S. (2012). Comparative anatomy of leaves of <i>Kalanchoe pinnata</i> and <i>K. crenata</i> in sun and shade conditions, as a support for their identification. <i>Revista Brasileira de Farmacognosia</i> , 22(5), 929-936	[Growing in shade results in anatomical differences] " <i>Kalanchoe pinnata</i> (Lam.) Pers. and <i>K. crenata</i> (Andrews) Haw., Crassulaceae, plants grown in sun were taller, although sun plants are usually taller when grown in shade (Taiz & Zeiger, 2009). In both species, the sun plants had larger and thicker leaves than the shade ones (Figure 1)."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	eHow. 2015. <i>Kalanchoe Pinnata Care</i> . http://www.ehow.com/info_12021006_kalanchoe-pinnata-care.html . [Accessed 23 Mar 2015]	" <i>Kalanchoe pinnata</i> prefers well-draining, sandy soil without much organic matter. It is adaptable to a wide range of soil types. Fertilize with a low-nitrogen fertilizer once a year in early spring. It does not like to be over-fertilized."
	Dave's Garden. 2015. PlantFiles: Air Plant, Lifeplant, Cathedral Bells, Floppers, Mexican Love Plant, Mother-in-Law Plant - <i>Kalanchoe pinnata</i> . http://davesgarden.com/guides/pf/go/68271/ . [Accessed 23 Mar 2015]	"Soil pH requirements: 6.1 to 6.5 (mildly acidic) 6.6 to 7.5 (neutral) 7.6 to 7.8 (mildly alkaline)"
	CABI, 2015. <i>Kalanchoe pinnata</i> [original text by J. Rojas-Sandoval & P. Acevedo-Rodríguez]. In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. www.cabi.org/isc	"Soil texture: heavy, light, medium"

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. <i>Manual of the flowering plants of Hawaii</i> . Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Glabrous, ± glaucous perennial herbs; stems hollow, 5-20 dm long, rarely branched, producing vegetatively by adventitious shoots from base."

412	Forms dense thickets	y
	Source(s)	Notes
	Weber, E. 2003. <i>Invasive Plant Species of the World. A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	"It is a drought tolerant species that often forms dense stands and displaces native species. The plant spreads rapidly due to vegetative growth."
	McMullen, C.K. 1999. <i>Flowering plants of the Galápagos</i> . Cornell University Press, Ithaca, NY	"One of this plant's well-known features is its ability to reproduce vegetatively by forming tiny rootlets in the notches of its leaf margins. When the leaves fall to the ground, they can immediately begin to form new adults. This is such a successful strategy that they can eventually dominate the areas they inhabit. This is happening in parts of the highlands of Volcan Sierra Negra (Isabela)."

Qsn #	Question	Answer
	Gardener, M. R., Tye, A., & Wilkinson, S. R. 1999. Control of introduced plants in the Galapagos Islands. Pp. 396-400 in A.C. Bishop, M. Boersma & C.D. Barnes (eds.). Twelfth Australian Weeds Conference Proceedings. Tasmanian Weed Society, Hobart, Tasmania	[Herbicide treatments applied to dense infestations in Galapagos] "In the case of <i>K. pinnata</i> , three 10 by 10 m plots in dense infestation were sprayed per treatment. The dose given in Table 1 is per 100 m ² ."
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 herb] "in Hawai'i naturalized and sometimes very abundant in low elevation, dry to mesic, disturbed areas"
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 22 Mar 2015]	"Family: Crassulaceae subfamily Sedoideae tribe Kalanchoeae"
503	Nitrogen fixing woody plant	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.	"Glabrous, ± glaucous perennial herbs; stems hollow, 5-20 dm long, rarely branched, producing vegetatively by adventitious shoots from base." [Crassulaceae]
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.	"Glabrous, ± glaucous perennial herbs; stems hollow, 5-20 dm long, rarely branched, producing vegetatively by adventitious shoots from base." [No evidence of bulbs, corms or tubers]
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	CABI, 2015. <i>Kalanchoe pinnata</i> [original text by J. Rojas-Sandoval & P. Acevedo-Rodríguez]. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[No evidence] " <i>K. pinnata</i> is native to Madagascar where it is fairly abundant along the coast growing in sandy soils and along granite outcrops. It is also found in the temperate humid and subhumid climates of the central highlands of Madagascar, with annual rainfall between 1000 and 2000 mm (Paulian, 1984)."
602	Produces viable seed	y

Qsn #	Question	Answer
	Source(s)	Notes
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	"Fruit a follicle; seeds numerous."
	Dave's Garden. 2015. PlantFiles: Air Plant, Lifeplant, Cathedral Bells, Floppers, Mexican Love Plant, Mother-in-Law Plant - <i>Kalanchoe pinnata</i> . http://davesgarden.com/guides/pf/go/68271/ . [Accessed 23 Mar 2015]	"Seed Collecting: N/A: plant does not set seed, flowers are sterile, or plants will not come true from seed"
	Queensland Government. 2011. Weeds of Australia - Resurrection plant - <i>Bryophyllum pinnatum</i> . http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Bryophyllum_pinnatum.htm . [Accessed 22 Mar 2015]	"This plant reproduces by seed and also produces plantlets along the edges of its leaves."
	Gardener, M. R., Tye, A., & Wilkinson, S. R. 1999. Control of introduced plants in the Galapagos Islands. Pp. 396-400 in A.C. Bishop, M. Boersma & C.D. Barnes (eds.). Twelfth Australian Weeds Conference Proceedings. Tasmanian Weed Society, Hobart, Tasmania	[Regeneration from seeds] " <i>Kalanchoe pinnata</i> The two concentrations of Roundup (5 and 2.5%) worked equally well, killing most of the existing plants in the first 45 days. However, there was some regeneration from seeds and leaf fragments after 193 days."

603	Hybridizes naturally	
	Source(s)	Notes
	Raadts, E. 1977. The genus <i>Kalanchoe</i> (Crassulaceae) in tropical East Africa. <i>Willdenowia</i> 8: 101-157	[Unknown for <i>K. pinnata</i> . Hybridization recorded in genus] " <i>K. densiflora</i> ROLFE X <i>K. lanceolata</i> (FORSSKP.E) RS." ... "Note. The hybrid was found among <i>K. densiflora</i> and <i>K. lanceolata</i> on the same spot. It combines characters of the two species."

604	Self-compatible or apomictic	
	Source(s)	Notes
	Kubitzki, K., Bayer, C. & Stevens, P.F. 2007. The families and genera of vascular plants: Volume IX. Flowering Plants. Eudicots. Springer-Verlag, Berlin, Heidelberg, New York	[Family Description. Uncertain for <i>K. pinnata</i>] "Crassulaceae appear to be usually self-incompatible but <i>Sedum</i> sect. <i>Gormania</i> shows self-compatibility in varying degrees (Denton 1979)."

Qsn #	Question	Answer
605	Requires specialist pollinators	
	Source(s)	Notes
	Kato, M., Shibata, A., Yasui, T., & Nagamasu, H. 1999. Impact of introduced honeybees, <i>Apis mellifera</i> , upon native bee communities in the Bonin (Ogasawara) Islands. <i>Researches on Population Ecology</i> , 41(2): 217-228	"Table 4. Plant species observed to be visited by honeybees in the Bonin Islands, with the months when flowering and honeybee visits were observed" [<i>Bryophyllum pinnatum</i> - honeybee visits observed in July, but not in May, June or August, when plants were also flowering]
	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.	[Maroon color may be an adaptation for butterfly, or bird pollination] "Flowers in paniculate cymes 20-80 cm long, each one pendent on pedicels 1-2.5 cm long; sepals pale yellow, streaked with red, connate, cylindrical, inflated and papery, the tube 2.5-4.5 cm long, the lobes ca. 1 cm long; corolla 3-6 cm long, the exerted part maroon, sparsely glandular pubescent."

606	Reproduction by vegetative fragmentation	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.	"Glabrous, ± glaucous perennial herbs; stems hollow, 5-20 dm long, rarely branched, producing vegetatively by adventitious shoots from base."
	Whistler, W.A. 2000. <i>Tropical Ornamentals: A Guide</i> . Timber Press, Portland, OR	"Propagate by the plantlets that form on the edges of the leaves." ... "It is also grown as a novelty because of its ability to form new plants from leaves fallen on the ground, hence the common name."
	Weber, E. 2003. <i>Invasive Plant Species of the World. A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	"The plant is suckering from the base and spreads vegetatively by forming young plantlets on the leaf margins." ... "The plant spreads rapidly due to vegetative growth."

607	Minimum generative time (years)	2
	Source(s)	Notes
	Wadhi, M., & Mohan Ram, H. Y. (1967). Shortening the juvenile phase for flowering in <i>Kalanchoe pinnata</i> PERS. <i>Planta</i> , 73(1), 28-36	"Plants of <i>Kalanchoe pinnata</i> flower normally at the end of 2 years. Flowering in the juvenile phase (3- and 9-month-old plants) has been induced by application of gibberellin (GA) either to the shoot tip and the youngest pair of leaves, or to the third leaf."

Qsn #	Question	Answer
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Langeland, K.A.& Stocker, R.K. 2001. Control of Non-native Plants in Natural Areas of Florida. SP 242. Institute of Food & Agricultural Sciences, University of Florida, Gainesville, FL	"Often found along edges of natural areas, generally as a result of discarded landscape material."
	CABI, 2015. <i>Kalanchoe pinnata</i> [original text by J. Rojas-Sandoval & P. Acevedo-Rodríguez]. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Spread accidentally as garden waste] "This species has appeared along the sand dunes of Peregrin Beach, Sunshine Coast, southeast Queensland, Australia, as a consequence of dumping of garden trash into bush adjoining the beach. <i>K. pinnata</i> was not present in transects at this site in 1982 but was present in 1997 (Batianoff and Franks, 1998). This corresponds to a period of rapid urban development in this holiday/tourist area. Plants also invade bushland from abandoned homesteads."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	CABI, 2015. <i>Kalanchoe pinnata</i> [original text by J. Rojas-Sandoval & P. Acevedo-Rodríguez]. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Deliberate introductions of this plant are quite likely because it is such a popular garden ornamental and has medicinal properties."
	Whistler, W.A. 2000. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"widely cultivated in the tropic and subtropics"

703	Propagules likely to disperse as a produce contaminant	
	Source(s)	Notes
	McMullen, C.K. 1999. Flowering plants of the Galápagos. Cornell University Press, Ithaca, NY	[As a nursery weed, could possibly be distributed as a contaminant of other potted plants] "The species can also be an extreme nuisance to greenhouse owners, who find that vigilance and frequent weeding are necessary to control its spread."

Qsn #	Question	Answer
704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	NParks Flora&FaunaWeb. 2013. <i>Kalanchoe pinnata</i> . https://florafauanaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=3323 . [Accessed 23 Mar 2015]	"Seed / Spore Dispersal : Abiotic (Wind; Explosive Dehiscence)"
	Queensland Government. 2011. Weeds of Australia - Resurrection plant - <i>Bryophyllum pinnatum</i> . http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Bryophyllum_pinnatum.htm . [Accessed 23 Mar 2015]	"The fruit are papery and membranous (about 15 mm long), with four slender compartments (i.e. carpels). They generally remain enclosed within the old flower parts and contain numerous minute, slender, brownish-coloured seeds (less than 1 mm long)." ... "This plant reproduces by seed and also produces plantlets along the edges of its leaves. "
	Kubitzki, K., Bayer, C. 7 Stevens, P.F. 2007. The families and genera of vascular plants: Volume IX. Flowering Plants. Eudicots. Springer-Verlag, Berlin, Heidelberg, New York	[Family description for Crassulaceae] "Most seeds are dispersed over short distances as anemochorous seed rain around the mother plant (Parra et al. 1993). Anemochorous long-distance dispersal appears to be rare"

705	Propagules water dispersed	
	Source(s)	Notes
	CABI, 2015. <i>Kalanchoe pinnata</i> [original text by J. Rojas-Sandoval & P. Acevedo-Rodríguez]. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Water may be able to move detached leaves, or small seeds, if they are produced]"Propagation is either by seeds, suckers from the base of the plant or by the formation of daughter plantlets along the edges of detached leaves (epiphyllous buds) and inflorescences. As plantlets fall to the ground, they rapidly colonize the surrounding area."

706	Propagules bird dispersed	n
	Source(s)	Notes
	CABI, 2015. <i>Kalanchoe pinnata</i> [original text by J. Rojas-Sandoval & P. Acevedo-Rodríguez]. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Not fleshy-fruited] "Fruits have four slender papery tubes enclosed in the base of the corolla tube and the seeds are ellipsoid-oblong approximately 0.5 mm long, obscurely longitudinally striate and brown (Stanley and Ross, 1986; Wickens, 1987; Evett and Norris, 1990; Wagner et al., 1999)."
	WRA Specialist. 2015. Personal Communication	Not fleshy-fruited. Seeds, if produced, presumably adapted for wind dispersal

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	CABI, 2015. <i>Kalanchoe pinnata</i> [original text by J. Rojas-Sandoval & P. Acevedo-Rodríguez]. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[No means of external attachment] "Propagation is either by seeds, suckers from the base of the plant or by the formation of daughter plantlets along the edges of detached leaves (epiphyllous buds) and inflorescences. As plantlets fall to the ground, they rapidly colonize the surrounding area."

708	Propagules survive passage through the gut	n
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Qsn #	Question	Answer
	Source(s)	Notes
	CABI, 2015. <i>Kalanchoe pinnata</i> [original text by J. Rojas-Sandoval & P. Acevedo-Rodríguez]. In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. www.cabi.org/isc	[No evidence] "Propagation is either by seeds, suckers from the base of the plant or by the formation of daughter plantlets along the edges of detached leaves (epiphyllous buds) and inflorescences. As plantlets fall to the ground, they rapidly colonize the surrounding area."

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	McMullen, C.K. 1999. <i>Flowering plants of the Galápagos</i> . Cornell University Press, Ithaca, NY	"Fruit a follicle; seeds numerous." [Densities unknown]

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Weber, E. 2003. <i>Invasive Plant Species of the World. A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	"Plants can be hand pulled or dug out, the root crown should be removed to prevent regrowth."
	Royal Botanic Gardens Kew. 2008. <i>Seed Information Database (SID)</i> . Version 7.1. http://data.kew.org/sid/ . [Accessed 23 Mar 2015]	"Storage Behaviour: No data available for species. Of 31 known taxa of genus <i>Kalanchoe</i> , 100.00% Orthodox(p/?)"

803	Well controlled by herbicides	y
	Source(s)	Notes
	Sparkes, E. C., Grace, S., & Panetta, F. D. (2002). The effects of various herbicides on <i>Bryophyllum pinnatum</i> (Lam.) Pers in Nudgee Wetlands Reserve, Queensland. <i>Plant Protection Quarterly</i> , 17(2): 77-80	" <i>Bryophyllum pinnatum</i> [<i>Kalanchoe pinnata</i>] is an invasive succulent weed that has often been blamed for stock poisoning, especially in drier seasons when there is limited alternative feed. A trial examining various control options was undertaken in a wetland reserve in Boondall, a suburb of Brisbane, Queensland, Australia. Four herbicides, hand pulling and a standard control were included. Since the waxy cuticle of <i>Bryophyllum</i> spp. requires a wetter-spreader adjuvant, the anionic surfactant BS 1000 (alcohol alkoxylate) was added to all spray solutions. 2,4-D (present as dimethylamine salt) at 250 and 500 g/100 litres were the most effective treatments, with kill rates in excess of 90% in both cases. Fluroxypyr as methylheptyl ester at 150 and 300 g/100 litres showed comparable efficacy, 2,4-D was the most appropriate herbicide because of its low off target damage and low environmental impact. The higher rate (500 g/100 litres) would be appropriate when plants are in a hardened condition, e.g. immediately following winter. Hand pulling would prove far too expensive unless performed by conservation volunteers. Damage to adjacent species indicated that care must be exercised in the application of some herbicides, specifically fluroxypyr, picloram, and triclopyr, as coastal heath vegetation often has well developed surface root systems that can be damaged by herbicides. This phenomenon, in conjunction with a high water table and sparse vegetation, resulted in severe damage to non target species such as <i>Casuarina equisetifolia</i> ."

Qsn #	Question	Answer
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"Effective chemical control is done by applying 2,4-D together with a surfactant."
	CABI, 2015. <i>Kalanchoe pinnata</i> [original text by J. Rojas-Sandoval & P. Acevedo-Rodríguez]. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"In efficacy tests (Sparkes et al., 2002), 2,4-D and fluroxypyr gave best control of <i>K. pinnata</i> with >90% kill rates. Metsulfuron and triclopyr/picloram did not give good control. Sparkes et al. (2002) conjectured that these poor results may have been due to insufficient wetting agent and poor penetration of these herbicides through the plant's waxy cuticle. Sparkes et al. (2002) recommended 2,4-D for <i>K. pinnata</i> control because this has the lowest cost, non-target damage and environmental impact of the herbicides trialled. Foliar application of glyphosate is used for the control of <i>K. pinnata</i> in the Galapagos Islands (Soria et al., 2002)."
	Gardener, M. R., Tye, A., & Wilkinson, S. R. 1999. Control of introduced plants in the Galapagos Islands. Pp. 396-400 in A.C. Bishop, M. Boersma & C.D. Barnes (eds.). Twelfth Australian Weeds Conference Proceedings. Tasmanian Weed Society, Hobart, Tasmania	" <i>Kalanchoe pinnata</i> The two concentrations of Roundup (5 and 2.5%) worked equally well, killing most of the existing plants in the first 45 days. However, there was some regeneration from seeds and leaf fragments after 193 days." ... "Roundup Foliar applications of Roundup were extremely effective at killing herbaceous and shrub species such as <i>K. pinnata</i> and <i>R. niveus</i> . Both concentrations (5% and 2.5%) yielded similar results and it is probable that concentrations between 1 and 1.5% would have been just as effective."
	Langeland, K.A.& Stocker, R.K. 2001. Control of Non-native Plants in Natural Areas of Florida. SP 242. Institute of Food & Agricultural Sciences, University of Florida, Gainesville, FL	"Treatment: Hand pull or treat with direct application of 3% Roundup and surfactant. Roundup is an effective treatment because it kills individual leaves that otherwise may produce new plants along leaf margins. Follow-up hand removal of leaves is necessary to prevent leaves from producing new plants. Basal stem treatments with 10% Garlon 4 is NOT recommended. This causes the leaves to drop, resulting in hundreds of new plantlets."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	CABI, 2015. <i>Kalanchoe pinnata</i> [original text by J. Rojas-Sandoval & P. Acevedo-Rodríguez]. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	" <i>K. pinnata</i> can be controlled manually provided that the whole plant, especially the leaves and roots, are removed completely (Soria et al., 2002). A hand weeding exercise to remove <i>K. pinnata</i> was costed at Au\$2095/ha (Sparkes et al., 2002). It was noted that the difficulty in removing plants with their root systems intact and the avoidance of leaf fall made this method less effective and more expensive than treatment with 2,4-D (approximately Aus\$160/ha)."
	Naughton, M. & Bourke, C. 2005. Mother of millions (<i>Bryophyllum delagoense</i>). PRIMEFACT 45. NSW Department of Primary Industries. www.dpi.nsw.gov.au	[Related taxa, <i>Bryophyllum delagoense</i> , controlled by fire. <i>Kalanchoe pinnata</i> unlikely to tolerate fire] "For large infestations, fire is the most economical control option available and will kill the plants and much of the seed stored in the soil. Using fire first will reduce the cost of any spray applications."
	WRA Specialist. 2015. Personal Communication	Probably intolerant of fire, as is the case with related taxa, but mechanical damage & attempts at mechanical control may result in the inadvertent propagation of additional plants from the leaves and plant fragments

Qsn #	Question	Answer
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 if any natural enemies impact <i>K. pinnata</i> in the Hawaiian Islands] "in Hawai'i naturalized and sometimes very abundant in low elevation, dry to mesic, disturbed areas on all of the main islands except Ni'ihau and Kaho'olawe."

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in tropical climates
- Widely naturalized
- A greenhouse, & disturbance weed
- A potential agricultural weed
- An environmental weed
- Other *Kalanchoe* species have become invasive
- Allelopathic
- Toxic to animals, & possibly people
- Shade tolerant
- Tolerates many soil types
- Forms dense cover that excludes other vegetation
- Produces viable seeds in parts of introduced range (unclear for Hawaiian Islands)
- Suckers from base and spreads vegetatively by forming young plantlets on the leaf margins
- Reaches sexual maturity in 2 years (but likely able to reproduce vegetatively at an earlier age)
- Accidental dispersal in garden waste
- Seeds, if produced, tiny & probably wind-dispersed
- Damage to plant may allow for vegetative reproduction

Low Risk Traits

- Unarmed (no spines, thorns or burrs)
- Palatable, but toxic, to livestock
- Ornamental
- Seed production may be limited, or lacking, in parts of introduced range
- Herbicides, & fire, may provide effective control)