

Taxon: Zingiber ottensii	Family: Zingiberaceae
Common Name(s): berseh hitam bunglai hantu phlai dam	Synonym(s):

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 23 Jun 2016
WRA Score: 3.0	Designation: L	Rating: Low Risk

Keywords: Naturalized, Perennial Herb, Ornamental, Medicinal, Rhizomatous

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	n
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	?
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)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle		

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets		
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed		
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)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed		
706	Propagules bird dispersed		
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut		
801	Prolific seed production (>1000/m ²)	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	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
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence, Used medicinally

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	NA

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	High
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 22 Jun 2016]	"Native: Asia-Tropical Malesia: Indonesia - Java, - Sumatra; Malaysia Naturalized: Asia-Tropical Indo-China: Thailand"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 22 Jun 2016]	

Qsn #	Question	Answer
203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Dave's Garden. 2016. Ginger - <i>Zingiber ottensii</i> . http://davesgarden.com/guides/pf/go/157335/ . [Accessed 22 Jun 2016]	"Hardiness: USDA Zone 8b: to -9.4 °C (15 °F) USDA Zone 9a: to -6.6 °C (20 °F) USDA Zone 9b: to -3.8 °C (25 °F) 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)"

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 22 Jun 2016]	"Native: Asia-Tropical Malesia: Indonesia - Java, - Sumatra; Malaysia Naturalized: Asia-Tropical Indo-China: Thailand"

205	Does the species have a history of repeated introductions outside its natural range?	?
	Source(s)	Notes
	Jansen, P.C.M., 1999. <i>Zingiber ottensii</i> Valetton [Internet] Record from Proseabase. de Guzman, C.C. and Siemonsma, J.S. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 22 Jun 2016]	"A popular plant, cultivated in home gardens."
	Imada, C.T., Staples, G.W. & Herbst, D.R. 2005. Annotated Checklist of Cultivated Plants of Hawai'i. http://www2.bishopmuseum.org/HBS/botany/cultivatedplants/ . [Accessed 22 Jun 2016]	"Locations: Waimea Arboretum & Botanical Garden"
	Hawaiian Tropical Plant Nursery. 2016. Gingers. http://www.hawaiiantropicalplants.com/ginger.html . [Accessed 22 Jun 2016]	[Cultivated & sold commercially in the Hawaiian Islands] " <i>Zingiber ottensii</i> - Common Name: unknown. Similar in appearance to <i>Z. zerumbet</i> . The inflorescence is longer and narrower. It secretes a thick juice. I suspect that it could be used like shampoo ginger. Brief dormant period in the winter stems may die back to the ground usually in January and February; some years it doesn't go dormant. "

Qsn #	Question	Answer
301	Naturalized beyond native range	y
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 22 Jun 2016]	"Naturalized: Asia-Tropical Indo-China: Thailand"
302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence
303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence
304	Environmental weed	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence
305	Congeneric weed	y
	Source(s)	Notes
	CABI. 2015. <i>Zingiber montanum</i> in: Invasive Species Compendium. www.cabi.org/isc	" <i>Z. montanum</i> is listed as 'moderately invasive' in northeastern Bangladesh, based on a 2010 forest undergrowth vegetation survey undertaken in a protected national park (Rahman et al., 2010), with the potential to compete for space and resources and thus negatively impact local and native biodiversity. In Puerto Rico and the Greater Antilles, <i>Z. montanum</i> is considered a naturalized weed and cultivation escape (Acevedo-Rodríguez and Strong, 2005, Randall, 2012)."
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	Several <i>Zingiber</i> species included in references of naturalized or weedy plants

Qsn #	Question	Answer
401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[No evidence] "Herb, rhizomatous, leafy shoots, rhizome purplish smelling, inflorescence spiciform, spike ellipsoidal to cylindrical, corolla cream to yellow, labellum pale yellow with red-brown markings, fruit a red cylindrical capsule"

402	Allelopathic	
	Source(s)	Notes
	Han, C. M., Pan, K. W., Wu, N., Wang, J. C., & Li, W. 2008. Allelopathic effect of ginger on seed germination and seedling growth of soybean and chive. <i>Scientia Horticulturae</i> , 116(3): 330-336	[Unknown. Allelopathic chemicals present in other <i>Zingiber</i> species] "The rhizome, stem and leaf aqueous extracts of ginger were assayed at 10, 20, 40, and 80 g /1 for their effects on seed germination and early seedling growth of soybean and chive. All aqueous extracts at all concentrations inhibited seed germination, seedling growth, water uptake and lipase activity of soybean and chive compared with the control, and the degree of inhibition increased with the incremental extracts concentration. The degree of toxicity of different ginger plant parts can be classified in order of decreasing inhibition as stem > leaf > rhizome. The results of this study suggest that rhizome, stem and leaf of ginger contain water soluble allelochemicals which could inhibit seed germination and seedling growth of soybean and chive. The rhizome is the main harvested part of ginger. The residue (mainly stems and leaves) of the ginger plant should be removed from the field so as to diminish its inhibitory effect. Further work is needed to specify and verify the allelochemicals produced by this plant. The results of this study suggest that ginger allelochemicals are heterotoxic, and thus intercropping should not be practiced using ginger."

403	Parasitic	n
	Source(s)	Notes
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[No evidence] "Herb, rhizomatous, leafy shoots, rhizome purplish smelling, inflorescence spiciform, spike ellipsoidal to cylindrical, corolla cream to yellow, labellum pale yellow with red-brown markings, fruit a red cylindrical capsule" [Zingiberaceae]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

405	Toxic to animals	n
	Source(s)	Notes
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

Qsn #	Question	Answer
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[No evidence] "Rhizomes pungent, sedative, tonic, pounded into a poultice and used by women after childbirth. Plant decoction a postpartum remedy.)"
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Jansen, P.C.M., 1999. <i>Zingiber ottensii</i> Valetton[Internet] Record from Proseabase. de Guzman, C.C. and Siemonsma, J.S. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 22 Jun 2016]	[No evidence. Fleshy, herbaceous plant] "Rhizomatous, perennial herb with leafy shoots up to 1.5 m tall. Rhizome purplish inside and with a very pungent smell."

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Dave's Garden. 2016. Ginger - <i>Zingiber ottensii</i> . http://davesgarden.com/guides/pf/go/157335/ . [Accessed 22 Jun 2016]	"Sun Exposure: Sun to Partial Shade"
	Globinmed. 2016. <i>Zingiber ottensii</i> . http://globinmed.com/index.php?option=com_content&view=article&id=79260:zingiber-ottensii-valetton&catid=8&Itemid=113 . [Accessed 22 Jun 2016]	" <i>Zingiber ottensii</i> is commonly found in moist, partially shaded evergreen and monsoon forests on soils rich in organic matter..."

Qsn #	Question	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	Notes
	Globinmed. 2016. <i>Zingiber ottensii</i> . http://globinmed.com/index.php?option=com_content&view=article&id=79260:zingiber-ottensii-valeton&catid=8&Itemid=113 . [Accessed 22 Jun 2016]	" <i>Zingiber ottensii</i> is commonly found in moist, partially shaded evergreen and monsoon forests on soils rich in organic matter, but also in secondary forests, open habitats at forest edges, disturbed sites and bamboo thickets on rocky soils."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Herb, rhizomatous, leafy shoots, rhizome purplish smelling, inflorescence spiciform, spike ellipsoidal to cylindrical, corolla cream to yellow, labellum pale yellow with red-brown markings, fruit a red cylindrical capsule"

412	Forms dense thickets	
	Source(s)	Notes
	Globinmed. 2016. <i>Zingiber ottensii</i> . http://globinmed.com/index.php?option=com_content&view=article&id=79260:zingiber-ottensii-valeton&catid=8&Itemid=113 . [Accessed 22 Jun 2016]	[Unknown] " <i>Zingiber ottensii</i> is commonly found in moist, partially shaded evergreen and monsoon forests on soils rich in organic matter, but also in secondary forests, open habitats at forest edges, disturbed sites and bamboo thickets on rocky soils."

501	Aquatic	n
	Source(s)	Notes
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Terrestrial] "Herb, rhizomatous"

502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 22 Jun 2016]	Family: Zingiberaceae Subfamily: Zingiberoideae Tribe: Zingibereae

Qsn #	Question	Answer
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 22 Jun 2016]	Family: Zingiberaceae Subfamily: Zingiberoideae Tribe: Zingibereae

Qsn #	Question	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Jansen, P.C.M., 1999. <i>Zingiber ottensii</i> Valeton [Internet] Record from Proseabase. de Guzman, C.C. and Siemonsma, J.S. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 22 Jun 2016]	"Rhizomatous, perennial herb with leafy shoots up to 1.5 m tall. Rhizome purplish inside and with a very pungent smell. Leaves elliptical, 35-40 cm x 6-8 cm."
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. 2010). Guidance for addressing the Australian Weed Risk Assessment questions. <i>Plant Protection Quarterly</i> , 25(2): 56-74	"This question addresses taxa that have specialized organs and should not include plants with just rhizomes/ stolons"

Qsn #	Question	Answer
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Holttum, R.E. 1950. The Zingiberaceae of the Malay Peninsula. <i>The Garden's Bulletin Singapore</i> . Vol. XIII. Part 1. Government Printing Office, Singapore	"Z. ottensii is a village plant, the rhizome being used medicinally; whether truly wild in Malaya is uncertain. The rhizome has a very pungent smell."
	Jansen, P.C.M., 1999. <i>Zingiber ottensii</i> Valeton [Internet] Record from Proseabase. de Guzman, C.C. and Siemonsma, J.S. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 22 Jun 2016]	"Zingiber ottensii is only known from cultivation and can easily be distinguished by its purplish rhizome flesh."

Qsn #	Question	Answer
602	Produces viable seed	
	Source(s)	Notes
	Jansen, P.C.M., 1999. <i>Zingiber ottensii</i> Valeton [Internet] Record from Proseabase. de Guzman, C.C. and Siemonsma, J.S. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 22 Jun 2016]	[Unknown. No description of seeds given] "Fruit a red cylindrical capsule. Zingiber ottensii is only known from cultivation and can easily be distinguished by its purplish rhizome flesh."

Qsn #	Question	Answer
603	Hybridizes naturally	
	Source(s)	Notes

Qsn #	Question	Answer
	Ravindran, P. N. & Nirmal Babu, K. (eds.). 2005. Ginger: The Genus Zingiber. CRC Press, Boca Raton, FL	[Unknown] "Ramachandran (1969) studied the cytology of five species of Zingiber (<i>Z. macrostachyum</i> , <i>Z. roseum</i> , <i>Z. wightianum</i> , <i>Z. zerumbet</i> , and <i>Z. officinale</i>) and found a diploid number of $2n = 22$ in all species. He found evidence of structural hybridity involving interchanges and inversions in ginger. Mahanty (1970) studied the cytology of Zingiberales. He reported $2n = 22$ for <i>Z. spectabile</i> and <i>Z. cylindricum</i> and concluded that the genus Zingiber appears to be much more correctly placed in Hydychieae than in the Zingibereae."

604	Self-compatible or apomictic	
	Source(s)	Notes
	Ravindran, P. N. & Nirmal Babu, K. (eds.). 2005. Ginger: The Genus Zingiber. CRC Press, Boca Raton, FL	[Possibly] "Dhamayanthi et al. (2003) investigated the self-incompatibility system in ginger. They reported that heterostyly with a gametophytically controlled self-incompatibility system exists in ginger. Flowers are distylous, there are long ("pin") and short ("thrum") styles. The "pin" type has a slender style that protrudes out of the floral parts, which are short, covering not even half the length of the style."
	Holttum, R.E. 1950. The Zingiberaceae of the Malay Peninsula. The Garden's Bulletin Singapore. Vol. XIII. Part 1. Government Printing Office, Singapore	[Related species may be self-compatible] "But self-sterility cannot be universal, as I have found seeds produced by an isolated inflorescence of <i>Zingiber zerumbet</i> ."

605	Requires specialist pollinators	
	Source(s)	Notes
	Momose, K., Yumoto, T., Nagamitsu, T., Kato, M., Nagamasu, H., Sakai, S., Rhatt, Harrison, D., Itioka, T., Hamid, A. A. & Inoue, T. 1998. Pollination biology in a lowland dipterocarp forest in Sarawak, Malaysia. I. Characteristics of the plant-pollinator community in a lowland dipterocarp forest. American Journal of Botany, 85(10): 1477-1501	[Possibly] "TABLE 1. Numbers of genera and species, and main pollination systems of the 73 plant families observed in a lowland dipterocarp forest in Sarawak, Malaysia." [Zingiberaceae - Pollination systems = Amegilla, Nomia, bird] "Amegilla pollination—Seventeen species in six families (Costaceae, Gesneriaceae, Marantaceae, Pentaphragmataceae, Polygalaceae, and Zingiberaceae) were pollinated only by the trap-lining long-tongued bees," ... "Twenty-one species in nine families (Zingiberaceae, Verbenaceae, Acanthaceae, etc.) were pollinated by smaller trap-lining bees, <i>Nomia</i> spp." ... "Bird pollination—Nineteen species in seven families were pollinated by birds"
	Ravindran, P. N. & Nirmal Babu, K. (eds.). 2005. Ginger: The Genus Zingiber. CRC Press, Boca Raton, FL	[Unknown] "The flowers are usually cross-pollinated. The pollination in the species of Zingiber is rather simple because of the specially modified anther structure and nature of staminodes. An insect visiting a flower first lands on the labellum and moves to the throat of the corolla tube. When the insect's front portion pushes the base of the anther, the anther bends forward and dusts the pollen grains on the backside of the insect. As it bends forward, the stigma protrudes and arches through the long anther crest and presses against the proboscis of the insect. Thus, pollen grains from other flowers deposited on the back of the insect stick to the stigma, and pollination is effected."

606	Reproduction by vegetative fragmentation	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Jansen, P.C.M., 1999. <i>Zingiber ottensii</i> Valetton[Internet] Record from Proseabase. de Guzman, C.C. and Siemonsma, J.S. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 22 Jun 2016]	[Presumably Yes] "Rhizomatous, perennial herb with leafy shoots up to 1.5 m tall. Rhizome purplish inside and with a very pungent smell. "

607	Minimum generative time (years)	
	Source(s)	Notes
	Jansen, P.C.M., 1999. <i>Zingiber ottensii</i> Valetton[Internet] Record from Proseabase. de Guzman, C.C. and Siemonsma, J.S. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 22 Jun 2016]	[Unknown. Likely spreads vegetatively] "Rhizomatous, perennial herb with leafy shoots up to 1.5 m tall. Rhizome purplish inside and with a very pungent smell. "

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Jansen, P.C.M., 1999. <i>Zingiber ottensii</i> Valetton[Internet] Record from Proseabase. de Guzman, C.C. and Siemonsma, J.S. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 22 Jun 2016]	[No evidence, and seeds, if produced, are small but lack means of external attachment] "Fruit a red cylindrical capsule. <i>Zingiber ottensii</i> is only known from cultivation and can easily be distinguished by its purplish rhizome flesh."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Hawaiian Tropical Plant Nursery. 2016. Gingers. http://www.hawaiiantropicalplants.com/ginger.html . [Accessed 22 Jun 2016]	" <i>Zingiber ottensii</i> - Common Name: unknown. Similar in appearance to <i>Z. zerumbet</i> . The inflorescence is longer and narrower. It secretes a thick juice. I suspect that it could be used like shampoo ginger. Brief dormant period in the winter stems may die back to the ground usually in January and February; some years it doesn't go dormant." [Sold commercially]

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	The Garden Geeks. 2016. <i>Zingiber ottensii</i> . http://www.thegardengeeks.com . [Accessed 23 Jun 2016]	"Propagation: divide bulbs, cuttings" [Seeds may be uncommon or absent]
	Jansen, P.C.M., 1999. <i>Zingiber ottensii</i> Valetton[Internet] Record from Proseabase. de Guzman, C.C. and Siemonsma, J.S. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 23 Jun 2016]	[No evidence, and no description of seeds. Presumably cultivated from rhizome division] "Fruit a red cylindrical capsule. <i>Zingiber ottensii</i> is only known from cultivation and can easily be distinguished by its purplish rhizome flesh."

704	Propagules adapted to wind dispersal	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Jansen, P.C.M., 1999. <i>Zingiber ottensii</i> Valetton[Internet] Record from Proseabase. de Guzman, C.C. and Siemonsma, J.S. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 23 Jun 2016]	"Rhizomatous, perennial herb with leafy shoots up to 1.5 m tall. Rhizome purplish inside and with a very pungent smell." ... "Fruit a red cylindrical capsule." [Fruit & seeds, if produced, not adapted to wind dispersal]
705	Propagules water dispersed	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown. If growing or cultivated near streams, water may aid in dispersal of rhizome fragments, or seeds, if produced.
706	Propagules bird dispersed	
	Source(s)	Notes
	Jansen, P.C.M., 1999. <i>Zingiber ottensii</i> Valetton[Internet] Record from Proseabase. de Guzman, C.C. and Siemonsma, J.S. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 23 Jun 2016]	[Unknown if seeds are produced. Red color may serve to attract birds] "Fruit a red cylindrical capsule."
707	Propagules dispersed by other animals (externally)	
	Source(s)	Notes
	Jansen, P.C.M., 1999. <i>Zingiber ottensii</i> Valetton[Internet] Record from Proseabase. de Guzman, C.C. and Siemonsma, J.S. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 23 Jun 2016]	"Fruit a red cylindrical capsule." [No seed description. Other <i>Zingiber</i> species produce arillate seeds that may suggest ant dispersal]
708	Propagules survive passage through the gut	
	Source(s)	Notes
	Jansen, P.C.M., 1999. <i>Zingiber ottensii</i> Valetton[Internet] Record from Proseabase. de Guzman, C.C. and Siemonsma, J.S. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 23 Jun 2016]	[Unknown if seeds are produced. Red color may serve to attract birds & could suggest adaptations for internal seed dispersal] "Fruit a red cylindrical capsule."
801	Prolific seed production (>1000/m²)	n
	Source(s)	Notes
	Jansen, P.C.M., 1999. <i>Zingiber ottensii</i> Valetton[Internet] Record from Proseabase. de Guzman, C.C. and Siemonsma, J.S. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 23 Jun 2016]	"Fruit a red cylindrical capsule. <i>Zingiber ottensii</i> is only known from cultivation and can easily be distinguished by its purplish rhizome flesh." [No description of seeds. Apparently propagated from rhizomes. Seeds, if produced, unlikely to achieve high densities]

Qsn #	Question	Answer
802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Jansen, P.C.M., 1999. <i>Zingiber ottensii</i> Valetton[Internet] Record from Proseabase. de Guzman, C.C. and Siemonsma, J.S. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 23 Jun 2016]	"Fruit a red cylindrical capsule." [No description of seeds. Longevity & persistence unknown]

803	Well controlled by herbicides	y
	Source(s)	Notes
	Motooka, P., Ching, L. & Nagai, G. 2002. Herbicidal Weed Control Methods for Pasture and Natural Areas of Hawaii. CTAHR free publication WC-8. CTAHR, UH Manoa, Honolulu, HI	[Likely Yes. Herbicides are effective at controlling invasive <i>Hedychiium</i> species] "Metsulfuron Escort®, 60% dry flowable(DuPont) Ally®, 60% dry flowable (DuPont)...Use: Selective control of dicots in pastures and noncropland. Kahili ginger, yellow ginger and white ginger very sensitive (0.5 oz. product / acre). Application: Foliar spray 0.06-0.45 oz active/acre, with an effective surfactant, in 20-100 gal/acre. Very low doses effective. Extreme precautions should be taken to prevent drift and in cleaning equipment. Weeds can develop cross resistance between sulfonylureas (e.g., metsulfuron, sulfometuron) and imidazolinones (e.g., imazapyr) if any one or combination of these types of chemicals are used repeatedly over 4-6 years."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Jansen, P.C.M., 1999. <i>Zingiber ottensii</i> Valetton[Internet] Record from Proseabase. de Guzman, C.C. and Siemonsma, J.S. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 22 Jun 2016]	[Presumably Yes. Regeneration from rhizomes is common in this genus] "Rhizomatous, perennial herb with leafy shoots up to 1.5 m tall. Rhizome purplish inside and with a very pungent smell. "

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Paret, M. L., de Silva, A. S., Criley, R. A., & Alvarez, A. M. 2008. <i>Ralstonia solanacearum</i> race 4: Risk assessment for edible ginger and floricultural ginger industries in Hawaii. HortTechnology, 18(1): 90-96	[Possibly Yes] "Fourteen species of ginger belonging to Zingiberaceae and Costaceae were evaluated for susceptibility to the bacterial wilt pathogen <i>Ralstonia solanacearum</i> (Rs) race 4 (ginger strains) by several methods of inoculation, including tests to simulate natural infection." ... "The kahili ginger strain of Rs (A4679) wilted all 11 ginger species tested when plants were inoculated without wounding (Fig. 2). Shampoo ginger, beehive ginger, spiral ginger, and kahili ginger were highly susceptible and died within 38 d."

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in tropical climates
- Naturalized in Thailand
- Other Zingiber species are regarded as invasive
- Shade tolerant
- Tolerates many soil types
- Seeds, if produced, may be dispersed by birds or other animals
- Spreads by rhizomes
- Limited ecological information makes accurate risk prediction difficult

Low Risk Traits

- Unarmed (no spines, thorns or burrs)
- Non-toxic
- Ornamental
- Seed production may be limited or absent, minimizing risk of long distance dispersal
- Herbicides may provide effective control

Second Screening Results for Low Stature Shrubby Life Form

(A) Reported as a weed of cultivated lands? No

Outcome = Accept (Low Risk)