

Taxon: Zingiber longipedunculatum Ridl.

Family: Zingiberaceae

Common Name(s): ligun
tubu abang

Synonym(s): Z. l. var. lambirense S.Sakai & Nagam.

Assessor: Chuck Chimera

Status: Assessor Approved

End Date: 29 Jul 2016

WRA Score: 2.0

Designation: L

Rating: Low Risk

Keywords: Tropical, Perennial, Herb, Ornamental, 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)		
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	n
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	y=1, n=0	y

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)	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	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)		
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
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	[No evidence of domestication] "Habitat & Ecology — The species is often found abundant in swampy secondary forests. Bright red inflorescences are very conspicuous on the forest floor."

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
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	"Distribution — Borneo, Sarawak, Lambir Hills."

202	Quality of climate match data	High
	Source(s)	Notes
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	

203	Broad climate suitability (environmental versatility)	
	Source(s)	Notes
	rarepalmseeds.com. 2016. <i>Zingiber longipedunculatum</i> . http://www.rarepalmseeds.com/pix/ZinLon.shtml . [Accessed 28 Jul 2016]	"A ginger from rainforests on the island of Borneo between sea level and 800 m with beehive-like, bright red inflorescences on long stalks. The actual flowers are small and white and appear between the scale-like bracts of the inflorescence."
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	"Habitat & Ecology — The species is often found abundant in swampy secondary forests."

Qsn #	Question	Answer
204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	"Distribution — Borneo, Sarawak, Lambir Hills."
205	Does the species have a history of repeated introductions outside its natural range?	?
	Source(s)	Notes
	Singh, R.J. 2012. Genetic Resources, Chromosome Engineering, and Crop Improvement: Medicinal plants. CRC Press, Boca Raton, FL	"Cultivated in Australia, this species is a valuable garden plant used for cut-flower purposes and often used in floral arrangements."
301	Naturalized beyond native range	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence
	Wagner, W.L., Herbst, D.R.& Lorence, D.H. 2016. Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/ . [Accessed 28 Jul 2016]	No evidence to date
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

Qsn #	Question	Answer
	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

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	[No evidence] "Perennial herb 1–1.5 m tall, up to 21 leaves per shoot. Lamina up to 27 by 6.5 cm, oblong to lanceolate, apex acuminate to 1.5 cm, base cuneate, glabrous above, sparsely hairy below; petiole short to 5 mm long, pubescent; ligule to 3 mm long, shallowly 2-lobed, more or less hairy, margin thinner, sometimes ciliate; sheath sparsely hairy to glabrous but with somewhat dense hairs below ligules near the margin, margin otherwise membranous."

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
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Qsn #	Question	Answer
	Source(s)	Notes
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	"Perennial herb 1–1.5 m tall, up to 21 leaves per shoot." [Zingiberaceae. No evidence]

404	Unpalatable to grazing animals	
	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	[Edible to humans. Palatability to animals unknown] "Borneo. Herb, shrub-like, creeping rhizomes, white flowers, ripe fruits cooked and eaten" ... "(Stalk pith eaten to treat dysentery; pith decoction drunk for diarrhea and dysentery. Veterinary medicine, inflorescence nectar applied as an ointment to treat dog mange.)"

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
	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
	Wolff, X.Y., Astuti, I.P. & Brink, M., 1999. Zingiber G.R. Boehme [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 28 Jul 2016]	"Udaspes sp. and Kerranadiocles sp. are reported as diseases on Zingiber and can be controlled with fungicides. Zingiber is attacked by several insect pests, including Tribolium sp., which bores into the stem, and Agrotis ipsilon grubs attacking the underground organs." [Possibly]

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] "Borneo. Herb, shrub-like, creeping rhizomes, white flowers, ripe fruits cooked and eaten" ... "(Stalk pith eaten to treat dysentery; pith decoction drunk for diarrhea and dysentery. Veterinary medicine, inflorescence nectar applied as an ointment to treat dog mange.)"
	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
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Qsn #	Question	Answer
	Source(s)	Notes
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	[No evidence. Growth habit and habitat would likely prevent fire] "Perennial herb 1–1.5 m tall, up to 21 leaves per shoot" ... "The species is often found abundant in swampy secondary forests."
409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	[Presumably Yes] "Habitat & Ecology — The species is often found abundant in swampy secondary forests."
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	Notes
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	"Habitat & Ecology — The species is often found abundant in swampy secondary forests." [Soil requirements unknown]
411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	"Perennial herb 1–1.5 m tall, up to 21 leaves per shoot."
412	Forms dense thickets	
	Source(s)	Notes
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	[Unknown] "Habitat & Ecology — The species is often found abundant in swampy secondary forests."
501	Aquatic	n
	Source(s)	Notes
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	[Terrestrial, but in wet habitats] "The species is often found abundant in swampy secondary forests."
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 28 Jul 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 28 Jul 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
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	"Perennial herb 1–1.5 m tall, up to 21 leaves per shoot. Lamina up to 27 by 6.5 cm, oblong to lanceolate, apex acuminate to 1.5 cm, base cuneate, glabrous above, sparsely hairy below; petiole short to 5 mm long, pubescent; ligule to 3 mm long, shallowly 2-lobed, more or less hairy, margin thinner, sometimes ciliate; sheath sparsely hairy to glabrous but with somewhat dense hairs below ligules near the margin, margin otherwise membranous."
	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
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	"Distribution — Borneo, Sarawak, Lambir Hills. Habitat & Ecology — The species is often found abundant in swampy secondary forests. Bright red inflorescences are very conspicuous on the forest floor. The white flowers open around noon and are frequently visited by medium-sized <i>Amegilla</i> bees collecting pollen (Sakai et al., 1999)." [No evidence]

Qsn #	Question	Answer
602	Produces viable seed	
	Source(s)	Notes
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	"Capsules unknown."

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

Qsn #	Question	Answer
	Ravindran, P. N. & Nirmal Babu, K. (eds.). 2005. <i>Ginger: The Genus Zingiber</i> . CRC Press, Boca Raton, FL	[Unknown] "Ramachandran (1969) studied the cytology of five species of <i>Zingiber</i> (<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 <i>Zingiber</i> 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. <i>Ginger: The Genus Zingiber</i> . 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 σ pin and short σ thrum styles. The σ 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. <i>The Zingiberaceae of the Malay Peninsula</i> . 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
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	"Inflorescence radical, c. 5.5–10 by 2.5–4.5 cm, ovoid, with a peduncle of up to 40 cm, prostrate on the ground, peduncular scales to 6 cm long, tubular at the base up to 1.2 cm, pubescent on both surfaces, hairs are more sparse on inner surface; bracts up to 4 by 1.8 cm at the base of inflorescence, oblong, hairy on both surfaces, denser at the base of the outer surface, lower margin membranous, apical margin densely ciliate especially when young, apex obtuse and occasionally very shortly acuminate and ciliate, not reflexed when alive, although rarely slightly open outwards when dried (Fig. 7d); bracteole c. 26 by 7 mm, oblong, open to the base, pubescent outside, glabrous inside except ciliate apex. Flower borne singly, white; calyx c. 22 mm long, tubular, unilaterally fissured in the upper half, pubescent outside in the lower 5 mm, otherwise glabrous, apex acute or 2-lobed for 3 mm, minutely ciliate; corolla tube 35–40 mm long, glabrous outside, hairy at the throat inside; corolla lobes glabrous, laterals c. 26 by 4.5 mm, linear, connate to the labellum and each other for basal c. 8 mm, dorsal c. 25 by 10 mm, lanceolate; labellum c. 20 by 17.5 mm, 3-lobed, central lobe c. 15 by 10 mm, ovate, shallowly 2-lobed at the apex, side lobes 4 by 3 mm, oblong and entire, glabrous; anther with c. 1 mm long filament, thecae c. 12 mm long, 2.5 mm wide each, glabrous, dehiscing throughout their length, anther crest c. 8 mm long, triangular, enfolding the style; style c. 6 cm long, glabrous, stigma c. 0.7 mm wide, cup-shaped fringed by long hairs, placed slightly higher than the tip of the anther crest; ovary c. 4 mm, hairy; epigynous glands c. 7 mm, linear, 2-lobed."

Qsn #	Question	Answer
	Kittipanangkul, N., & Ngamriabsakul, C. (2011). Pollen and pollinator limitation of seed initiation in <i>Etilingera littoralis</i> (J. König) Giseke (Zingiberaceae) in Klong Klai Basin, Khao Nan National Park, Thailand. <i>Walailak Journal of Science and Technology</i> , 3(2), 207-217	" <i>Zingiber longipedunculatum</i> and the rest of Alpinieae) were pollinated by <i>Amegilla</i> bees."
	Ravindran, P. N. & Nirmal Babu, K. (eds.). 2005. <i>Ginger: The Genus Zingiber</i> . CRC Press, Boca Raton, FL	[Possibly] "The flowers are usually cross-pollinated. The pollination in the species of <i>Zingiber</i> 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
	Source(s)	Notes
	Kubitzki, K. (ed.). 1998. <i>The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae)</i> . Springer-Verlag, Berlin, Heidelberg, New York	[Presumably Yes. Generic description] "Herbs with creeping, fleshy rhizome."

607	Minimum generative time (years)	2
	Source(s)	Notes
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	"Perennial herb 1–1.5 m tall, up to 21 leaves per shoot." [Likely spreads vegetatively]
	Ravindran, P. N. & Nirmal Babu, K. (eds.). 2005. <i>Ginger: The Genus Zingiber</i> . CRC Press, Boca Raton, FL	[Likely 2+ years] "The plants are perennial, medium-sized herbs with stout rhizomes. Most of the species produce the inflorescence on a separate shoot directly from the rhizome, at the tips of a short or long peduncle."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Kubitzki, K. (ed.). 1998. <i>The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae)</i> . Springer-Verlag, Berlin, Heidelberg, New York	"Capsule first fleshy, later leathery, subglobose, dehiscent; seeds with white, lacerate aril." [No evidence, and seeds, if produced, are small but lack means of external attachment]

Qsn #	Question	Answer
702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Singh, R.J. 2012. Genetic Resources, Chromosome Engineering, and Crop Improvement: Medicinal plants. CRC Press, Boca Raton, FL	"Cultivated in Australia, this species is a valuable garden plant used for cut-flower purposes and often used in floral arrangements."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	"Capsules unknown." [No evidence. Propagation is typically by rhizome division. Seeds may be limited or absent in cultivation]

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Kubitzki, K. (ed.). 1998. The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae). Springer-Verlag, Berlin, Heidelberg, New York	"Capsule first fleshy, later leathery, subglobose, dehiscent; seeds with white, lacerate aril." [Seeds, if produced, lack adaptations for wind dispersal]

705	Propagules water dispersed	
	Source(s)	Notes
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	"The species is often found abundant in swampy secondary forests." [Seeds or rhizome fragments might be moved by water in swampy habitats]

706	Propagules bird dispersed	
	Source(s)	Notes
	Kubitzki, K. (ed.). 1998. The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae). Springer-Verlag, Berlin, Heidelberg, New York	"Capsule first fleshy, later leathery, subglobose, dehiscent; seeds with white, lacerate aril." [Arillate seed, if produced, may promote dispersal by birds]

707	Propagules dispersed by other animals (externally)	
	Source(s)	Notes
	Kubitzki, K. (ed.). 1998. The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae). Springer-Verlag, Berlin, Heidelberg, New York	"Capsule first fleshy, later leathery, subglobose, dehiscent; seeds with white, lacerate aril." [No seed description. Other Zingiber species produce arillate seeds that may suggest ant dispersal]
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	"Capsules unknown."

708	Propagules survive passage through the gut	
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Qsn #	Question	Answer
	Source(s)	Notes
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	"Capsules unknown."
	Kubitzki, K. (ed.). 1998. The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae). Springer-Verlag, Berlin, Heidelberg, New York	[Unknown. Generic description. Arillate seed, if produced, may promote internal dispersal by birds] "Capsule first fleshy, later leathery, subglobose, dehiscent; seeds with white, lacerate aril."

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	"Capsules unknown."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Sakai, S., & Nagamasu, H. (2006). Systematic studies of Bornean Zingiberaceae V. Zingiberoideae of Lambir Hills, Sarawak. <i>Blumea</i> , 51(1), 95-115	[Unknown] "Capsules 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
	WRA Specialist. 2016. Personal Communication	Presumably Yes. Regeneration from rhizomes is common in this genus

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes

Qsn #	Question	Answer
	<p>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</p>	<p>[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."</p>

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in tropical climates
- Other *Zingiber* species are regarded as invasive
- Potentially shade tolerant
- 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)