

Taxon: <i>Zingiber gramineum</i> <i>Noronha ex Blume</i>	Family: Zingiberaceae
Common Name(s): grassy ginger palm ginger tennis ball ginger	Synonym(s): <i>Dymczewiczia graminea</i> (<i>Noronha ex Blume</i>) <i>Zingiber gramineum</i> var. <i>validior</i> (Blume)

Assessor: Chuck Chimera	Status: In Progress	End Date:
WRA Score: 3.0	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)	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	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		

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		
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)		
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		
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/m2)		
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
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	[No evidence of domestication] "Ecology: Common in wet evergreen forests, teak forests, mixed deciduous forest and bamboo thickets, 500- 800 m."

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
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	"Distribution: Thailand, Cambodia, Vietnam, Java and Sumatra. Thailand: South-western: Kanchanaburi. South-eastern: Chon Buri, Rayong."

202	Quality of climate match data	High
	Source(s)	Notes
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	

203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	"Distribution: Thailand, Cambodia, Vietnam, Java and Sumatra." ... "Ecology: Common in wet evergreen forests, teak forests, mixed deciduous forest and bamboo thickets, 500-800 m." [Tropical species with narrow elevation range]
	GingersRus. 2016. <i>Zingiber gramineum</i> . http://www.gingersrus.com/cart/index.php?productID=230 . [Accessed 8 Jul 2016]	"It is one of the deciduous species of the genus <i>Zingiber</i> , thus making it potentially hardy throughout zone 8. I have grown it here in zone 8B Tallahassee for several years and found that it is not especially difficult - not as prone to rotting of the rhizomes as <i>Z. collinsii</i> and others. "

Qsn #	Question	Answer
204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	"Distribution: Thailand, Cambodia, Vietnam, Java and Sumatra. Thailand: South-western: Kanchanaburi. South-eastern: Chon Buri, Rayong."

205	Does the species have a history of repeated introductions outside its natural range?	?
	Source(s)	Notes
	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 8 Jul 2016]	"Locations: Harold L. Lyon Arboretum (Confirmed) Waimea Arboretum & Botanical Garden"
	GingersRus. 2016. <i>Zingiber gramineum</i> . http://www.gingersrus.com/cart/index.php?productID=230 . [Accessed 8 Jul 2016]	Sold commercially at this & other websites. Cultivated as an ornamental

301	Naturalized beyond native range	n
	Source(s)	Notes
	Randall, R.P. 2012. <i>A Global Compendium of Weeds</i> . 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence
	Wagner, W.L., Herbst, D.R. & Lorence, D.H. 2016. <i>Flora of the Hawaiian Islands</i> . Smithsonian Institution, Washington, D.C. http://botany.si.edu/ . [Accessed]	No evidence

302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Randall, R.P. 2012. <i>A Global Compendium of Weeds</i> . 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. 2012. <i>A Global Compendium of Weeds</i> . 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

Qsn #	Question	Answer
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

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	[No evidence] "Leafy shoots 1.0 to 1.5 m tall. Leaf sheaths villous. Petiole yellowish velutinous. Ligule bilobed, 5 mm, velutinous. Leaves linear, 25-35 by 2.5 cm, villous below, base rounded, apex rostrate. Inflorescence radical or terminal on a leafy stem. Peduncle 30-70 cm long; sheaths pubescent."

Qsn #	Question	Answer
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
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	"Leafy shoots 1.0 to 1.5 m tall." [Zingiberaceae. No evidence]

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. <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	No evidence
	Wagstaff, D.J. 2008. <i>International poisonous plants checklist: an evidence-based reference</i> . CRC Press, Boca Raton, FL	No evidence

Qsn #	Question	Answer
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
	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
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	"Leafy shoots 1.0 to 1.5 m tall." ... "Ecology: Common in wet evergreen forests, teak forests, mixed deciduous forest and bamboo thickets, 500- 800 m." [No evidence. Growth habit and habitat would likely prevent fire]

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	GingersRus. 2016. <i>Zingiber gramineum</i> . http://www.gingersrus.com/cart/index.php?productID=230 . [Accessed 8 Jul 2016]	"I have found that it grows best in light shade, well drained, but regularly moist soil."
	Top Tropicals. 2016. <i>Zingiber gramineum</i> . http://toptropicals.com/catalog/uid/zingiber_gramineum.htm . [Accessed 8 Jul 2016]	"semi-shade"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	Notes
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	"Common in wet evergreen forests, teak forests, mixed deciduous forest and bamboo thickets, 500- 800 m."
	GingersRus. 2016. <i>Zingiber gramineum</i> . http://www.gingersrus.com/cart/index.php?productID=230 . [Accessed 8 Jul 2016]	"well drained, but regularly moist soil."

411	Climbing or smothering growth habit	n
	Source(s)	Notes

Qsn #	Question	Answer
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	"Leafy shoots 1.0 to 1.5 m tall. Leaf sheaths villous. Petiole yellowish velutinous. Ligule bilobed, 5 mm, velutinous. Leaves linear, 25-35 by 2.5 cm, villous below, base rounded, apex rostrate. Inflorescence radical or terminal on a leafy stem. Peduncle 30-70 cm long; sheaths pubescent."

412	Forms dense thickets	
	Source(s)	Notes
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	[Unknown] "Common in wet evergreen forests, teak forests, mixed deciduous forest and bamboo thickets, 500- 800 m."

501	Aquatic	n
	Source(s)	Notes
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	[Terrestrial]"Ecology: Common in wet evergreen forests, teak forests, mixed deciduous forest and bamboo thickets, 500- 800 m."

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 8 Jul 2016]	Family: Zingiberaceae Subfamily: Zingiberoideae Tribe: Zingibereae

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 8 Jul 2016]	Family: Zingiberaceae Subfamily: Zingiberoideae Tribe: Zingibereae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	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	"Herbs with creeping, fleshy rhizome." [Generic Description]
	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	
	Source(s)	Notes
	Nontasit, N., Kanlayanapaphon, C., Mekanawakul, M., & Nualmangsar, O. (2014). Taxonomic Studies and Traditional Uses of Zingiberaceae in Khao Luang National Park, Nakhon Si Thammarat Province, Thailand. <i>Walailak Journal of Science and Technology</i> , 12(8), 643-658	"Table 1 Distribution, phenology and IUCN assesement of Zingiberaceae plants in southern part of Khao Luang National Park." [Zingiber gramineum - DD = Data deficient]

602	Produces viable seed	y
	Source(s)	Notes
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	"Capsule 2.0 cm long, light brown, pubescent. Seeds maroon. Pollen globose with reticulate sculpturing."

603	Hybridizes naturally	
	Source(s)	Notes
	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 Zingiberaceae."

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 ("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. <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

Qsn #	Question	Answer
	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. <i>American Journal of Botany</i> , 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, Nomia spp." ... "Bird pollination - Nineteen species in seven families were pollinated by birds"
	Ravindran, P. N. & Nirmal Babu, K. (eds.). 2005. <i>Ginger: The Genus Zingiber</i> . 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
	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	"Herbs with creeping, fleshy rhizome." [Presumably Yes]

607	Minimum generative time (years)	
	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	"Herbs with creeping, fleshy rhizome." [Unknown. May be able to reproduce vegetatively prior to reproductive maturity]

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	"Capsule 2.0 cm long, light brown, pubescent. Seeds maroon." [No means of external attachment]

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes

Qsn #	Question	Answer
	GingersRus. 2016. <i>Zingiber gramineum</i> . http://www.gingersrus.com/cart/index.php?productID=230 . [Accessed 8 Jul 2016]	[Sold commercially online] "When I first bought a rhizome of this plant several years ago from a shipment from Thailand, it was simply labeled "palm ginger" and I did not even know what genus it was. As it grew I could see it had the distinctive look of a <i>Zingiber</i> species, but still did not know anything else about it. Finally I found the right place for it and it burst forth with beautiful blooms to complement the arching palm-like foliage. It is now one of my favorite gingers. The foliage is graceful but tropical, growing to about 5 ft. tall and arching. The inflorescence shoots appear well above ground level with fuzzy green bracts and creamy yellow flowers. "

703	Propagules likely to disperse as a produce contaminant	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown. Other members of this genus not known to become contaminants of produce

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	"Capsule 2.0 cm long, light brown, pubescent. Seeds maroon."

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
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	[Unknown. Maroon seed color may serve to attract birds] "Capsule 2.0 cm long, light brown, pubescent. Seeds maroon."

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." [Unknown. Generic description. Some <i>Zingiber</i> species produce arillate seeds that may suggest ant dispersal]

Qsn #	Question	Answer
708	Propagules survive passage through the gut	
	Source(s)	Notes
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	"Capsule 2.0 cm long, light brown, pubescent. Seeds maroon." [Unknown. Color may serve to attract birds & could suggest adaptations for internal seed dispersal]
801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	Theilade, I. (1999). A synopsis of the genus <i>Zingiber</i> (Zingiberaceae) in Thailand. <i>Nordic Journal of Botany</i> , 19 (4), 389-410	"Capsule 2.0 cm long, light brown, pubescent. Seeds maroon." [Unknown. High densities not documented in this genus]
802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Royal Botanic Gardens Kew. (2016) Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/ . [Accessed 8 Jul 2016]	Unknown
803	Well controlled by herbicides	y
	Source(s)	Notes
	Motooka, P., Ching, L. & Nagai, G. 2002. <i>Herbicide Weed Control Methods for Pasture and Natural Areas of Hawaii</i> . 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
	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. Regeneration from rhizomes is common in this genus] "Herbs with creeping, fleshy rhizome."
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. <i>HortTechnology</i>, 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)