Taxon: Aframomum melegueta (Roscoe) K. Schum. **Family:** Zingiberaceae

Common Name(s): alligator pepper
grains of paradise
guinea grain
melegueta pepper

Synonym(s): Amomum melegueta Roscoe

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 24 Mar 2023

WRA Score: 5.0 **Designation:** L **Rating:** Low Risk

Keywords: Cultivated Herb, Probably Naturalized, Spice Plant, Rhizomatous, Arillate Seeds

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	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)	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)	n
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	y=1, n=0	n
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

Qsn #	Question	Answer Option	Answer
409	Is a shade tolerant plant at some stage of its life cycle		
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	n
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	y
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	y=-1, n=0	n
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	y=1, n=-1	n
706	Propagules bird dispersed		
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m2)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides		
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**
	Harris, D.J., Wortley, A.H. & Olander, S.B. (2019). Aframomum melegueta. The IUCN Red List of Threatened Species 2019: e.T117208334A124285350. http://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T117208334A124285350.en. [Accessed 21 Mar 2023]	[Long history of use and cultivation, but no evidence of heavy domestication] "The uses of Aframomum are many and varied and have been traded internationally as "melegueta" or "grains of paradise", with the earliest recorded use in Europe being in 1214 (Harris and Wortley 2018). The most important is the use of the seeds of some species as spices. The fruit of some species are also eaten as a dessert fruit and the leaves are also used as spices. The seeds of some species are used as flavouring ingredients in gin and beer in Europe and the United States (Harris and Wortley 2018). Aframomum species are widely used for medicinal purposes (see Burkhill 2000) and as an aphrodisiac. Dried Aframomum fruits are sold in many markets across central Africa; this combined with the commercialized medicinal uses and presence in globally marketed alcoholic drinks suggest that, although much less important in global trade than it was in the past, the economic importance of this genus is still significant (Harris and Wortley 2018)."

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	NA

Qsn #	Question	Answer
201	**Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"**	**High**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2023). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 20 Mar 2023]	"Native Africa WEST-CENTRAL TROPICAL AFRICA: Cameroon WEST TROPICAL AFRICA: Benin, Côte D'Ivoire, Ghana, Guinea, Liberia, Nigeria, Sierra Leone, Togo Cultivated Africa WEST-CENTRAL TROPICAL AFRICA: Cameroon, Gabon WEST TROPICAL AFRICA: Benin, Côte D'Ivoire, Ghana, Guinea, Nigeria, Sierra Leone SOUTH TROPICAL AFRICA: Angola Asia-Tropical INDIAN SUBCONTINENT: India Southern America NORTHERN SOUTH AMERICA: Guyana, Suriname"

202	Quality of climate match data	High
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2023). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 20 Mar 2023]	

203	Broad climate suitability (environmental versatility)	n
	Source(s)	**Notes**
	Harris, D.J., Wortley, A.H. & Olander, S.B. (2019). Aframomum melegueta. The IUCN Red List of Threatened Species 2019: e.T117208334A124285350. http://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T117208334A124285350.en. [Accessed 21 Mar 2023]	"A rhizomatous herb (1-2 m tall) found growing in seasonally wet forest, often in disturbed forest near villages (which is probably an indication of a naturalized subpopulation rather than a wild subpopulation); occurs from 0-1,160 m asl." [Broad elevation range, but restricted to tropical climates]

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	**Notes**
	Knippers, R. H. M., Gallois, S., & van Andel, T. (2021). Commercialization of Aframomum spp. in Africa: a systematic review of literature and supporting botanical vouchers. Economic Botany, 75, 76-91	"All known cultivated species are classified as Least Concern, with the exception of A. melegueta, which is classified as Data Deficient because the species has been cultivated and subsequently naturalized throughout tropical Africa and its natural range can therefore no longer be established (Harris et al. 2019c)."
	Iwu, M.M. (2014). Handbook of African Medicinal Plants, Second Edition. CRC Press, Boca Raton, FL	"Geographical Distribution — Aframomum occurs throughout tropical Africa, but it is cultivated mainly in West and Central Africa."

Qsn #	Question	Answer
205	**Does the species have a history of repeated introductions outside its natural range?**	**y**
	Source(s)	**Notes**
	Harris, D.J., Wortley, A.H. & Olander, S.B. (2019). Aframomum melegueta. The IUCN Red List of Threatened Species 2019: e.T117208334A124285350. http://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T117208334A124285350.en. [Accessed 21 Mar 2023]	"This species is widely cultivated from Guinea to central Democratic Republic of the Congo; the native distribution and origin of this species are at present unclear (Harris and Wortley 2018). The extent of occurrence is 4,030,250 km2 and the area of occupancy 208 km2, but as it is unclear how much of this range is actually the native wild population, the estimates have to be treated as highly uncertain. The species has been introduced to other areas outside of this range where it has become naturalized, for example in East Africa (Burundi and Uganda), the Caribbean (Martinique and Trinidad and Tobago) and Latin America (French Guiana and Guyana)."

301	Naturalized beyond native range	y
	Source(s)	**Notes**
	Harris, D.J., Wortley, A.H. & Olander, S.B. (2019). Aframomum melegueta. The IUCN Red List of Threatened Species 2019: e.T117208334A124285350. http://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T117208334A124285350.en. [Accessed 21 Mar 2023]	"This is a widespread and abundant species, however, because it has been widely cultivated and then become naturalized, it is not clear which plants are part of the wild native population, hence it is not possible to say anything about population size or trends." ... "The species has been introduced to other areas outside of this range where it has become naturalized, for example in East Africa (Burundi and Uganda), the Caribbean (Martinique and Trinidad and Tobago) and Latin America (French Guiana and Guyana)."
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence
	GBIF Secretariat (2023). Aframomum melegueta K.Schum. GBIF Backbone Taxonomy. Checklist dataset. https://www.gbif.org/species/2758930. [Accessed 20 Mar 2023]	No evidence
	Wagner, W.L., Herbst, D.R.& Lorence, D.H. (2023). Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. https://naturalhistory2.si.edu/botany/hawaiianflora/. [Accessed 20 Mar 2023]	No evidence

302	Garden/amenity/disturbance weed	n
	Source(s)	**Notes**
	Harris, D.J., Wortley, A.H. & Olander, S.B. (2019). Aframomum melegueta. The IUCN Red List of Threatened Species 2019: e.T117208334A124285350. http://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T117208334A124285350.en. [Accessed 21 Mar 2023]	[Occurs in disturbed habitats, but not described as problematic or weedy] "A rhizomatous herb (1-2 m tall) found growing in seasonally wet forest, often in disturbed forest near villages (which is probably an indication of a naturalized subpopulation rather than a wild subpopulation); occurs from 0-1,160 m asl."

Qsn #	Question	Answer
	GBIF Secretariat (2023). Aframomum melegueta K.Schum. GBIF Backbone Taxonomy. Checklist dataset. https://www.gbif.org/species/2758930. [Accessed]	No evidence
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

303	Agricultural/forestry/horticultural weed	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence
	GBIF Secretariat (2023). Aframomum melegueta K.Schum. GBIF Backbone Taxonomy. Checklist dataset. https://www.gbif.org/species/2758930. [Accessed 21 Mar 2023]	No evidence

304	Environmental weed	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence
	GBIF Secretariat (2023). Aframomum melegueta K.Schum. GBIF Backbone Taxonomy. Checklist dataset. https://www.gbif.org/species/2758930. [Accessed 21 Mar 2023]	No evidence

305	Congeneric weed	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

401	Produces spines, thorns or burrs	n
	Source(s)	**Notes**

Qsn #	Question	Answer
	Iwu, M.M. (2014). Handbook of African Medicinal Plants, Second Edition. CRC Press, Boca Raton, FL	[No evidence] "Description — A. melegueta is an aromatic plant cultivated for its edible spicy fruit. It is a perennial herb growing up to 4 m high. The stem is short, marked with the encircling scars of fallen aerial leaves, and it is highly branched. The lower surface bears the roots, which are adventitious and slender. It yields an aromatic rhizome, which is horizontal and tuberous and bears scaly leaves with occasional buds in axils. The leaves are large, about 30 cm long and 12 cm wide, with close nerves below. They occur in two rows with an open or closed sheath sessile or stalked on the sheath; the blades are usually large, with numerous closely parallel pinnate nerves diverging obliquely from the midrib. The bracts are few and about half overlapping. The plant yields beautiful aromatic flowers with orange-colored lip and a rich pinkish-orange part. They are solitary, borne separately from the leafy stem. The fruits are fleshy and indehiscent and contain numerous small seeds embedded in pleasant-tasting aril. The seeds are golden or red-brown when fresh but darken on drying; they are angular and granular, strongly aromatic, and pungent."

402	Allelopathic	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	Unknown. No evidence found

403	Parasitic	n
	Source(s)	**Notes**
	Iwu, M.M. (2014). Handbook of African Medicinal Plants, Second Edition. CRC Press, Boca Raton, FL	"A. melegueta is an aromatic plant cultivated for its edible spicy fruit. It is a perennial herb growing up to 4 m high." [No evidence]

404	Unpalatable to grazing animals	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	Unknown

405	Toxic to animals	n
	Source(s)	**Notes**
	Tropical Plants Database, Ken Fern. (2023). Aframomum melegueta. https://tropical.theferns.info/viewtropical.php?id=Aframomum+melegueta. [Accessed 23 Mar 2023]	"Known Hazards - None known"
	Iwu, M.M. (2014). Handbook of African Medicinal Plants, Second Edition. CRC Press, Boca Raton, FL	"Toxicity — Aframomum is considered a safe herbal supplement, and no human toxicity or allergic reaction has been reported."

406	Host for recognized pests and pathogens	n
	Source(s)	**Notes**

Qsn #	Question	Answer
	Lock, J. M., Hall, J. B., & D. K. Abbiw. (1977). The Cultivation of Melegueta Pepper (Aframomum melegueta) in Ghana. Economic Botany, 31(3), 321–330	"Pests and diseases do not appear to pose problems. The farmers complained of damage by grass-cutters (Thryonomys swinderianus Temn.), which bite off the leafy shoots, and occasionally damage young fruits. A few older leaves bear small lesions, probably caused by a rust, but otherwise the plants appeared remarkably healthy."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	**Notes**
	Tropical Plants Database, Ken Fern. (2023). Aframomum melegueta. https://tropical.theferns.info/viewtropical.php?id=Aframomum+melegueta. [Accessed 23 Mar 2023]	"Known Hazards - None known"
	Ravindran, P. N. (2017). The Encyclopedia of Herbs and Spices. CABI, Wallingford, UK	"No health hazards or side effects are known in conjunction with the proper administration of designated therapeutic dosages. Owing to the constituent pungent substances, the intake of larger dosages could lead to irritation of the stomach and the urinary tract (Gruenwald et al., 2007; Khan and Abourashed, 2010). Nothing is known about the safety aspects when consumed by pregnant women, so it is better to avoid overuse during pregnancy."
	Iwu, M.M. (2014). Handbook of African Medicinal Plants, Second Edition. CRC Press, Boca Raton, FL	"Toxicity — Aframomum is considered a safe herbal supplement, and no human toxicity or allergic reaction has been reported."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	**Notes**
	Harris, D.J., Wortley, A.H. & Olander, S.B. (2019). Aframomum melegueta. The IUCN Red List of Threatened Species 2019: e.T117208334A124285350. http://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T117208334A124285350.en. [Accessed 23 Mar 2023]	["A rhizomatous herb (1-2 m tall) found growing in seasonally wet forest, often in disturbed forest near villages (which is probably an indication of a naturalized subpopulation rather than a wild subpopulation); occurs from 0-1,160 m asl." [No evidence]

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	**Notes**
	van Wyk, B.-E. (2014). Culinary Herbs and Spices of the World. University of Chicago Press, Chicago, IL	"It is easily cultivated by planting the rhizomes in warm, humid and partially shaded places."
	Lock, J. M., Hall, J. B., & D. K. Abbiw. (1977). The Cultivation of Melegueta Pepper (Aframomum melegueta) in Ghana. Economic Botany, 31(3), 321–330	[Light shade is required. Deep shade reduces longevity] "Melegueta appears to have rather precise shade requirements. Some shade is essential; the farmer repeatedly stated that shade was very important in determining yield, and the shade requirement partly explains why melegueta is planted after the coco-yams and other crops. On the other hand, excessive shading is also harmful, causing the plants to die out early. If sown under cocoa, which casts a very deep shade, the plants are said to die off much more quickly than is usual. In normal practice it is not clear whether the plants eventually die off, or whether harvesting is abandoned because of the excessive labour involved in weeding. The plant is not drought-tolerant, and the crop apparently fails occasionally because of lack of rain."

Qsn #	Question	Answer
410	**Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)**	**y**
	Source(s)	**Notes**
	Kurtz, R. (2023). How to Kill & Remove Euphorbia Tirucalli. https://homeguides.sfgate.com/propagation-alligator-peppers-77095.html. [Accessed 23 Mar 2023]	"Alligator peppers grow well in a fertile, well-drained soil mix, such as a combination of compost, manure and peat moss. Sand can also be mixed into the topsoil to improve drainage. Regular, well-drained potting soil can also be used for alligator pepper plants raised in pots."
	Lock, J. M., Hall, J. B., & D. K. Abbiw. (1977). The Cultivation of Melegueta Pepper (Aframomum melegueta) in Ghana. Economic Botany, 31(3), 321–330	"The restriction of melegueta cultivation to a few villages is attributed to tradition by the inhabitants, who point out that at Aiyiase, a neighbouring village, ginger, rather than melegueta, is grown as a cash crop. There do not appear to be any local climatic features, or special soil types, which could account for its restriction."

411	**Climbing or smothering growth habit**	**n**
	Source(s)	**Notes**
	Ravindran, P. N. (2017). The Encyclopedia of Herbs and Spices. CABI, Wallingford, UK	"Guinea grains plants are perennial herbs, with strong fibrous subterranean scaly rhizomes and with leafy stems, c. 1-2 m tall. Rhizomes are subshort, terete, brown to red- brown, smooth and glabrous; scales are brown, deciduous, thin, subovate with prominent parallel veins outside, with scarious ciliate margins and the scars arc visible as lighter coloured rings."

412	**Forms dense thickets**	**n**
	Source(s)	**Notes**
	Harris, D.J., Wortley, A.H. & Olander, S.B. (2019). Aframomum melegueta. The IUCN Red List of Threatened Species 2019: e.T117208334A124285350. http://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T117208334A124285350.en. [Accessed 23 Mar 2023]	[No evidence. Widely cultivated and distributed] "This is a widespread and abundant species, however, because it has been widely cultivated and then become naturalized, it is not clear which plants are part of the wild native population, hence it is not possible to say anything about population size or trends." ... "A rhizomatous herb (1-2 m tall) found growing in seasonally wet forest, often in disturbed forest near villages (which is probably an indication of a naturalized subpopulation rather than a wild subpopulation); occurs from 0-1,160 m asl."
	Lock, J. M., Hall, J. B., & D. K. Abbiw. (1977). The Cultivation of Melegueta Pepper (Aframomum melegueta) in Ghana. Economic Botany, 31(3), 321–330	[No evidence] "Aframomum melegueta occurs in West Africa from Guinea and Sierra Leone to Nigeria, and south through Cameroun and Gabon to Angola. Most of the collections from these countries are, according to the collectors' notes, cultivated plants."

Qsn #	Question	Answer
501	**Aquatic**	**n**
	Source(s)	**Notes**
	Harris, D.J., Wortley, A.H. & Olander, S.B. (2019). Aframomum melegueta. The IUCN Red List of Threatened Species 2019: e.T117208334A124285350. http://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T117208334A124285350.en. [Accessed 22 Mar 2023]	[Terrestrial] "A rhizomatous herb (1-2 m tall) found growing in seasonally wet forest, often in disturbed forest near villages (which is probably an indication of a naturalized subpopulation rather than a wild subpopulation); occurs from 0-1,160 m asl."

502	**Grass**	**n**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2023). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 22 Mar 2023]	"Family: Zingiberaceae Subfamily: Alpinioideae Tribe: Alpinieae"

503	**Nitrogen fixing woody plant**	**n**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2023). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 22 Mar 2023]	"Family: Zingiberaceae Subfamily: Alpinioideae Tribe: Alpinieae"

504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	**y**
	Source(s)	**Notes**
	KewScience. (2023). Plants of the World Online - Aframomum melegueta. http://powo.science.kew.org. [Accessed 23 Mar 2023]	"The native range of this species is W. Tropical Africa to Angola. It is a rhizomatous geophyte and grows primarily in the seasonally dry tropical biome."

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Harris, D.J., Wortley, A.H. & Olander, S.B. (2019). Aframomum melegueta. The IUCN Red List of Threatened Species 2019: e.T117208334A124285350. http://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T117208334A124285350.en. [Accessed 22 Mar 2023]	[No evidence, although native and cultivated ranges unclear] "The plant is recorded from many protected areas across its "range" but it is not known which are within the wild native part of its range. The species is widely grown in ex situ cultivation (BGCI 2018) but it is not known how many of these are from wild plants versus cultivated/naturalized plants. Genetic research is required to determine which parts of the "range" and which plants might be treated as being truly wild."

602	**Produces viable seed**	**y**

Qsn #	Question	Answer
	Source(s)	**Notes**
	Iwu, M.M. (2014). Handbook of African Medicinal Plants, Second Edition. CRC Press, Boca Raton, FL	"The fruits are fleshy and indehiscent and contain numerous small seeds embedded in pleasant-tasting aril. The seeds are golden or red-brown when fresh but darken on drying; they are angular and granular, strongly aromatic, and pungent."
	Ravindran, P. N. (2017). The Encyclopedia of Herbs and Spices. CABI, Wallingford, UK	"The plant can be propagated through seeds as well as through suckers (Jansen, 1981; Anon., 2011, 2013b; Simon et al., 2007)."

603	**Hybridizes naturally**	
	Source(s)	**Notes**
	Nzigou Doubindou, E. C., & Ley, A. C. (2021). Flower morphological differentiation and plant-pollinator interactions among sympatric Aframomum species (Zingiberaceae) with floral trumpet type in the tropical African rainforest. Plant Ecology and Evolution, 154(3), 447-457	[Description of genus] "Due to a lack of genetic studies, there is no evidence of hybridization yet."

604	**Self-compatible or apomictic**	
	Source(s)	**Notes**
	Nzigou Doubindou, E. C., & Ley, A. C. (2021). Flower morphological differentiation and plant-pollinator interactions among sympatric Aframomum species (Zingiberaceae) with floral trumpet type in the tropical African rainforest. Plant Ecology and Evolution, 154(3), 447-457	"All studied Aframomum species are xenogamous, thus they need pollinators to produce fruits as shown by our pollinator exclusion experiments. Xenogamy increases the likelihood of cross-fertilisation by which genetic diversity within a species is maintained and/or increased (Bawa 1990; Brisson et al. 1994; Ley & Claßen-Bockhoff 2009). Further tests of self and cross-species compatibility in Aframomum are needed to establish whether fruits can arise from selfing, probably geitonogamy, and whether pollinator sharing might facilitate hybridisation. The observed spatial isolation of style head and thecae through their respective relative position to each other in the flower rather contradicts the potential for autogamy (see Ley & Harris 2014). The potential for geitonogamy is reduced through the sparse flowering of an inflorescence (rarely more than one simultaneously open flower): geitonogamy would only be possible as a result of pollen transfer across adjacent clonal individuals."
	Lock, J. M., Hall, J. B., & D. K. Abbiw. (1977). The Cultivation of Melegueta Pepper (Aframomum melegueta) in Ghana. Economic Botany, 31(3), 321–330	[Possibly, although natural selfing may be impossible] "Plants cultivated at the Botany Department of the University of Ghana, from seed from two different places, were found to be self-fertile, but the relative positions of stigma and stamen make self-pollination virtually impossible."

Qsn #	Question	Answer
605	**Requires specialist pollinators**	**n**
	Source(s)	**Notes**
	Nzigou Doubindou, E. C., & Ley, A. C. (2021). Flower morphological differentiation and plant-pollinator interactions among sympatric Aframomum species (Zingiberaceae) with floral trumpet type in the tropical African rainforest. Plant Ecology and Evolution, 154(3), 447-457	"The study of the pollinator community of the five Aframomum species revealed about 11 different pollinator species altogether. This included eight species from two hymenopteran orders (Apidae, Halictidae), a fly (Diptera), and two species of butterflies"

Qsn #	Question	Answer
606	**Reproduction by vegetative fragmentation**	**y**
	Source(s)	**Notes**
	Larsen, K., Lock, J.M., Maas, H., Maas, & P.J.M. (1998). Zingiberaceae. In: Kubitzki, K. (eds) Flowering Plants · Monocotyledons. The Families and Genera of Vascular Plants, vol 4. Springer, Berlin, Heidelberg	"Most Zingiberaceae can be propagated by fragmenting the rhizome."
	Ravindran, P. N. (2017). The Encyclopedia of Herbs and Spices. CABI, Wallingford, UK	"The plant can be propagated through seeds as well as through suckers (Jansen, 1981; Anon., 2011, 2013b; Simon et al., 2007)."

Qsn #	Question	Answer
607	**Minimum generative time (years)**	**2**
	Source(s)	**Notes**
	Lock, J. M., Hall, J. B., & D. K. Abbiw. (1977). The Cultivation of Melegueta Pepper (Aframomum melegueta) in Ghana. Economic Botany, 31(3), 321–330	[2 to 3 years in cultivation] "In June or July, at the time of the heaviest rains, seeds of Aframomum melegueta, obtained from pods which have partially rotted, or which have not ripened properly, are sown in the shade of the growing coco-yams and plantains. The seeds are either sown several together in small holes made with a hoe, or are broadcast. In the following wet season, the young plants are transplanted to produce a more even spacing. In the second wet season after sowing, a few flowers are produced, but the main cropping period does not start until three years after sowing."

Qsn #	Question	Answer
701	**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)**	**n**
	Source(s)	**Notes**
	Iwu, M.M. (2014). Handbook of African Medicinal Plants, Second Edition. CRC Press, Boca Raton, FL	"The fruits are fleshy and indehiscent and contain numerous small seeds embedded in pleasant-tasting aril. The seeds are golden or red-brown when fresh but darken on drying; they are angular and granular, strongly aromatic, and pungent." [No evidence. No means of external attachment]

Qsn #	Question	Answer
702	**Propagules dispersed intentionally by people**	**y**
	Source(s)	**Notes**

Qsn #	Question	Answer
	Harris, D.J., Wortley, A.H. & Olander, S.B. (2019). Aframomum melegueta. The IUCN Red List of Threatened Species 2019: e.T117208334A124285350. http://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T117208334A124285350.en. [Accessed 23 Mar 2023]	"This species is widely cultivated from Guinea to central Democratic Republic of the Congo; the native distribution and origin of this species are at present unclear (Harris and Wortley 2018). The extent of occurrence is 4,030,250 km2 and the area of occupancy 208 km2, but as it is unclear how much of this range is actually the native wild population, the estimates have to be treated as highly uncertain. The species has been introduced to other areas outside of this range where it has become naturalized, for example in East Africa (Burundi and Uganda), the Caribbean (Martinique and Trinidad and Tobago) and Latin America (French Guiana and Guyana)."
	WRA Specialist. (2023). Personal Communication	Seeds sold online.

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Crop, Herbal, Ornamental Dispersed by: Humans"

704	Propagules adapted to wind dispersal	n
	Source(s)	**Notes**
	Iwu, M.M. (2014). Handbook of African Medicinal Plants, Second Edition. CRC Press, Boca Raton, FL	"The fruits are fleshy and indehiscent and contain numerous small seeds embedded in pleasant-tasting aril. The seeds are golden or red-brown when fresh but darken on drying; they are angular and granular, strongly aromatic, and pungent." [No adaptations for wind dispersal]

705	Propagules water dispersed	n
	Source(s)	**Notes**
	Harris, D.J., Wortley, A.H. & Olander, S.B. (2019). Aframomum melegueta. The IUCN Red List of Threatened Species 2019: e.T117208334A124285350. http://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T117208334A124285350.en. [Accessed 23 Mar 2023]	"A rhizomatous herb (1-2 m tall) found growing in seasonally wet forest, often in disturbed forest near villages (which is probably an indication of a naturalized subpopulation rather than a wild subpopulation); occurs from 0-1,160 m asl." [Possibly by seeds or rhizome fragments if cultivated or occurring in riparian areas, but direct evidence is lacking.]
	Larsen, K., Lock, J.M., Maas, H., Maas, & P.J.M. (1998). Zingiberaceae. In: Kubitzki, K. (eds) Flowering Plants · Monocotyledons. The Families and Genera of Vascular Plants, vol 4. Springer, Berlin, Heidelberg	"In Africa the indehiscent fleshy fruits of Aframomum are eaten by primates and elephants (Nishida and Vehara 1983)."

706	Propagules bird dispersed	
	Source(s)	**Notes**
	Larsen, K., Lock, J.M., Maas, H., Maas, & P.J.M. (1998). Zingiberaceae. In: Kubitzki, K. (eds) Flowering Plants · Monocotyledons. The Families and Genera of Vascular Plants, vol 4. Springer, Berlin, Heidelberg	"In Africa the indehiscent fleshy fruits of Aframomum are eaten by primates and elephants (Nishida and Vehara 1983)"

Qsn #	Question	Answer
	Iwu, M.M. (2014). Handbook of African Medicinal Plants, Second Edition. CRC Press, Boca Raton, FL	"The fruits are fleshy and indehiscent and contain numerous small seeds embedded in pleasant-tasting aril. The seeds are golden or red-brown when fresh but darken on drying; they are angular and granular, strongly aromatic, and pungent." [Fleshy fruit and arillate seeds suggest the potential to be dispersed by birds, but no direct evidence of bird dispersal in the genus was found.]
	WRA Specialist. (2023). Personal Communication	In the Hawaiian Islands, game birds could potentially disperse the seeds.

707	Propagules dispersed by other animals (externally)	
	Source(s)	**Notes**
	Larsen, K., Lock, J.M., Maas, H., Maas, & P.J.M. (1998). Zingiberaceae. In: Kubitzki, K. (eds) Flowering Plants · Monocotyledons. The Families and Genera of Vascular Plants, vol 4. Springer, Berlin, Heidelberg	[Unknown if arillate seeds are carried or externally dispersed by ants, or other animals] "In many species the arillate seeds are shed onto the ground and dispersal by ants, or mice or squirrels (Ridley 1899) is suggested." ... "In Africa the indehiscent fleshy fruits of Aframomum are eaten by primates and elephants (Nishida and Vehara 1983)." ... "Capsule ovoid to globose, beaked, fleshy, ridged or smooth, indehiscent; seeds with white, translucent aril."

708	Propagules survive passage through the gut	y
	Source(s)	**Notes**
	Larsen, K., Lock, J.M., Maas, H., Maas, & P.J.M. (1998). Zingiberaceae. In: Kubitzki, K. (eds) Flowering Plants · Monocotyledons. The Families and Genera of Vascular Plants, vol 4. Springer, Berlin, Heidelberg	"In Africa the indehiscent fleshy fruits of Aframomum are eaten by primates and elephants (Nishida and Vehara 1983)."
	Iwu, M.M. (2014). Handbook of African Medicinal Plants, Second Edition. CRC Press, Boca Raton, FL	"The fruits are fleshy and indehiscent and contain numerous small seeds embedded in pleasant-tasting aril. The seeds are golden or red-brown when fresh but darken on drying; they are angular and granular, strongly aromatic, and pungent." [Presumably adapted for vertebrate dispersal, including primates and elephants, as are other members of the genus.]
	Agmen, F. L., Chapman, H. M., & Bawuro, M. (2010). Seed dispersal by tantalus monkeys (Chlorocebus tantalus tantalus) in a Nigerian montane forest. African Journal of Ecology, 48(4), 1123-1128	[Related species survives gut passage] "Ficus spp. seeds occurred in 58% of faecal samples, and among the species for which seed numbers were recorded, Aframomum angustifolium seeds were the most common (Fig. 1)."

801	Prolific seed production (>1000/m2)	
	Source(s)	**Notes**
	Lock, J. M., Hall, J. B., & D. K. Abbiw. (1977). The Cultivation of Melegueta Pepper (Aframomum melegueta) in Ghana. Economic Botany, 31(3), 321–330	"Two different fruit shapes are found on the farms, produced on different plants. They are illustrated in Figure 4. Apparently no distinction is made in the growing, harvesting or sale of the two fruit types, although Dalziel (1955) gives a different name for the long form from Southern Nigeria, suggesting that such a distinction may be made there. The capsules contain 300-500 seeds each. There does not appear to be any difference in seed content between the two different types of fruit."

Qsn #	Question	Answer
802	**Evidence that a persistent propagule bank is formed (>1 yr)**	
	Source(s)	**Notes**
	Baskin, C.C. & Baskin, J.M. 2014. Seeds Ecology, Biogeography, and Evolution of Dormancy and Germination. Second Edition. Academic Press, San Francisco, CA	Unknown. No information found.

803	**Well controlled by herbicides**	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species.

804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	
	Source(s)	**Notes**
	Ravindran, P. N. (2017). The Encyclopedia of Herbs and Spices. CABI, Wallingford, UK	"The plant can be propagated through seeds as well as through suckers (Jansen, 1981; Anon., 2011, 2013b; Simon et al., 2007)." [Probably Yes, but no direct evidence found]

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	Unknown

Summary of Risk Traits:

Aframomum melegueta is a species in the ginger family, Zingiberaceae, and closely related to cardamom. Its seeds are used as a spice (ground or whole); it imparts a pungent, black-pepper-like flavor with hints of citrus. It is also known as grains of paradise. Its exact native range is unknown, but it probably originates from, and is widely cultivated or naturalized, from Guinea to central Democratic Republic of the Congo. It has also been introduced and cultivated in other regions of the tropics but although naturalized, has not been reported to have negative impacts within its introduced range.

High Risk / Undesirable Traits
• Thrives and spreads in regions with tropical climates.
• Reported to be introduced and naturalized outside its native range, for example East Africa (Burundi and Uganda), the Caribbean (Martinique and Trinidad and Tobago) and Latin America (French Guiana and Guyana).
• Tolerates many soil types.
• Reproduces by seeds and vegetatively by rhizomes.
• Reaches maturity in 2-3 years from seed.
• Seeds dispersed by primates and elephants within its native range, as well as through intentional cultivation.
• Produces 300-500 seeds per capsule.
• Seed longevity unknown.
• Effectiveness of chemical or mechanical control methods unknown.

Low Risk Traits
• No reports of negative impacts within its native or introduced range.
• Unarmed (no spines, thorns, or burrs)
• Valued as a spice plant.
• Non-toxic
• Although tolerant of light shade, dense shade may inhibit spread and result in reduced longevity of plants.

Second Screening Results for Herbs or Low Stature Shrubby Life Forms

(A) Reported as a weed of cultivated lands? No evidence
Outcome = Accept (Low Risk)