

Taxon: Terminalia superba Engl. & Diels	Family: Combretaceae
Common Name(s): korina limba shinglewood white afara white mukonja yellow pine	Synonym(s): Terminalia altissima A. Chev.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 26 Jan 2022
WRA Score: -2.0	Designation: L	Rating: Low Risk

Keywords: Tropical Tree, Pioneer, Light-Demanding, Wind-Dispersed, Prolific Seeder

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	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	y=1, n=-1	n
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		

Qsn #	Question	Answer Option	Answer
407	Causes allergies or is otherwise toxic to humans		
408	Creates a fire hazard in natural ecosystems		
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	n
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	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic	y=1, n=-1	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	>3
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	y
705	Propagules water dispersed		
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m2)	y=1, n=-1	y
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	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
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	[Not domesticated] "Clonal breeding is a line of research in the genetic improvement programme for <i>Terminalia superba</i> ; it was shown valuable in trials in Congo. It is known that there are significant clonal differences in wood formation, e.g. regarding rate of growth and radial dimensions of vessels, fibres and parenchyma."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	NA

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	High
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 21 Jan 2022]	"Native Africa WEST-CENTRAL TROPICAL AFRICA: Cameroon, Democratic Republic of the Congo, Gabon, Equatorial Guinea WEST TROPICAL AFRICA: Benin, Côte D'Ivoire, Ghana, Guinea, Guinea-Bissau, Liberia, Nigeria, Sierra Leone SOUTH TROPICAL AFRICA: Angola (Cabinda)"
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	" <i>Terminalia superba</i> is widespread in West and Central Africa, from Guinea Bissau east to DR Congo and south to Cabinda (Angola)."

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 21 Jan 2022]	

203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes

Qsn #	Question	Answer
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"Climatic amplitude (estimates) - Altitude range: 0 - 1000 m - Mean annual rainfall: 1300 - 3500 mm - Rainfall regime: summer; uniform - Dry season duration: 0 - 4 months - Mean annual temperature: 24 - 27°C - Mean maximum temperature of hottest month: 26 - 32°C - Mean minimum temperature of coldest month: 22 - 26°C - Absolute minimum temperature: 8 - 18°C"
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	"Terminalia superba is most common in moist semi-deciduous forest, but can also be found in evergreen forest. It occurs up to 1000 m altitude. It is most common in disturbed forest. It is found in regions with an annual rainfall of (1000–)1400–3000(–3500) mm and a dry season up to 4 months, and mean annual temperatures of 23–27°C."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	"Terminalia superba is widespread in West and Central Africa, from Guinea Bissau east to DR Congo and south to Cabinda (Angola). It has been planted in many tropical countries outside the natural distribution area as a promising timber plantation species, e.g. in Uganda, Tanzania, Zimbabwe, Madagascar, Indonesia, Malaysia, the Philippines, the Solomon Islands, Fiji, Australia, Brazil and Argentina."
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence from the Hawaiian Islands

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	"It has been planted in many tropical countries outside the natural distribution area as a promising timber plantation species, e.g. in Uganda, Tanzania, Zimbabwe, Madagascar, Indonesia, Malaysia, the Philippines, the Solomon Islands, Fiji, Australia, Brazil and Argentina."

301	Naturalized beyond native range	n
	Source(s)	Notes
	Groom Q., Wong L. J., & Pagad S. (2020). Terminalia superba Engl. & Diels in Global Register of Introduced and Invasive Species - Burundi. Version 1.5. Invasive Species Specialist Group ISSG. https://www.gbif.org/species/148676505 . [Accessed 24 Jan 2022]	"Present in Burundi - Establishment means: Introduced" [Not designated as a Weed, in contrast to Randall (2017)]

Qsn #	Question	Answer
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	"Terminalia superba is widespread in West and Central Africa, from Guinea Bissau east to DR Congo and south to Cabinda (Angola)."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Designations of this tree as naturalized and a weed in Burundi were not corroborated in subsequent reviews of the cited sources] "Terminalia superba Engl. & Diels Combretaceae Total N° of Refs: 2 Preferred Climate/s: Tropical Origin: Africa Major Pathway/s: Crop, Forestry, Ornamental Dispersed by: Humans References: Burundi-N-2012, Burundi-W- 1977."
	Bigirimana, J., Bogaert, J., De Canniere, C., Lejoly, J., & Parmentier, I. (2011). Alien plant species dominate the vegetation in a city of Sub-Saharan Africa. Landscape and Urban Planning, 100(3), 251-267	In Appendix A., Terminalia superba's Ecological groups (EG) is listed as a cultivated species (Cu), with no indication of naturalization or invasiveness, in contrast to Randall (2017) which cites this publication as evidence for naturalization.
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence

302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	GBIF Secretariat. (2021). Terminalia superba Engl. & Diels in GBIF Backbone Taxonomy. https://www.gbif.org/species/3189393 . [Accessed 25 Jan 2022]	Burundi - Evidence of impact = No Tanzania - Evidence of impact = No
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence. Cited designation as a weed was not corroborated

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	GBIF Secretariat. (2021). Terminalia superba Engl. & Diels in GBIF Backbone Taxonomy. https://www.gbif.org/species/3189393 . [Accessed 25 Jan 2022]	Burundi - Evidence of impact = No Tanzania - Evidence of impact = No
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

Qsn #	Question	Answer
304	Environmental weed	n
	Source(s)	Notes
	GBIF Secretariat. (2021). <i>Terminalia superba</i> Engl. & Diels in GBIF Backbone Taxonomy. https://www.gbif.org/species/3189393 . [Accessed 25 Jan 2022]	Burundi - Evidence of impact = No Tanzania - Evidence of impact = No
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

305	Congeneric weed	y
	Source(s)	Notes
	GBIF Secretariat. (2021). <i>Terminalia superba</i> Engl. & Diels in GBIF Backbone Taxonomy. https://www.gbif.org/species/3189393 . [Accessed]	" <i>Terminalia catappa</i> is a native plant of Asia that has escaped from cultivation. Due to its ability to cope with sandy, well draining soil, and salt spray it is often found on coastal regions. It is considered invasive in Florida, United States, and several Carribean Islands, including Montserrat, Puerto Rico and the Cayman Islands. Its seeds are highly bouyant which allows it disperse vast distances however they are highly edible so are eaten by bats, crabs and humans. However despite its potential as being an invasive species it is being considered for multiple applications. Due to its extensive and deep-rooting structure it is considered a possible species to use as a dune retention species against proposed climate change and sea-level rise, and in Brazil it is also being considered a potential cultivar to use in bio-fuel creation."
	Enloe, S. F., Langeland, K., Ferrell, J., Sellers, B. and MacDonald, G. (2018). <i>Integrated Management of Non-Native Plants in Natural Areas of Florida</i> . SP 242. Revised. University of Florida, IFAS, Gainesville, FL	[<i>Terminalia catappa</i>] "Comments: The Indian almond is deciduous and invades coastal habitats, hammocks, and disturbed sites"

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

Qsn #	Question	Answer
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	[No evidence] "Deciduous medium-sized to large tree up to 45(-50) m tall; bole branchless for up to 30(-35) m, usually straight and cylindrical, up to 120(-150) cm in diameter, with large, fairly thick, plank-like buttresses up to 5(-8) m high; bark surface smooth and grey in young trees, but shallowly grooved and with elongated, brownish grey scales, inner bark soft-fibrous, pale yellow; crown storied with branches in whorls, spreading; young twigs rusty-brown short-hairy, branchlets with conspicuous rounded scars from fallen leaves. Leaves arranged spirally, clustered near ends of branchlets, simple and entire; stipules absent; petiole (1.5-)3-6(-7) cm long, with 2 glands near apex; blade obovate, (4-)6-17(-20) cm × (2.5-)4-10 cm, cuneate at base, short-acuminate at apex, thinly leathery, glabrous, pinnately veined with 4-7 pairs of lateral veins. Inflorescence an axillary spike 7-20 cm long, slender; peduncle 1-4 cm long, short-hairy. Flowers bisexual or male, regular, usually 5-merous; receptacle spindle-shaped, 1.5-3 mm long; sepals triangular, c. 1.5 mm long; petals absent; stamens usually 10, free, 1.5-3 mm long; disk annular, densely woolly hairy; ovary inferior, 1-celled, style 2-2.5 mm long, sparsely hairy. Fruit a winged nut, transversely oblong-elliptical in outline, 1.5-2.5 cm × 4-7 cm including the wing, nut c. 1.5 cm × 7 mm, golden brown, glabrous, indehiscent, 1-seeded."

402	Allelopathic	
	Source(s)	Notes
	Abugre, S., Apetorgbor, A. K., Antwiwaa, A., & Apetorgbor, M. M. (2011). Allelopathic effects of ten tree species on germination and growth of four traditional food crops in Ghana. <i>Journal of Agricultural Technology</i> , 7(3), 825-834	[Possibly. Root extracts inhibit germination of Zea mays] "Seed germination of Zea mays was promoted by root extracts of all the trees (except that of <i>Terminalia superba</i>) as well as leaf extracts of <i>Gliricidia sepium</i> , <i>Albizia lebeck</i> and <i>Terminalia superba</i> ."

403	Parasitic	n
	Source(s)	Notes
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	"Deciduous medium-sized to large tree up to 45(-50) m tall" [No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	" <i>Terminalia superba</i> was identified in Nigeria to have high potential for the development of integrated crop-livestock (sheep and goats) agroforestry technologies based on fodder yield and concentrations of crude protein, neutral detergent fibre, acid detergent fibre and lignin."

Qsn #	Question	Answer
	Larbi, A., Anyanwu, N. J., Oji, U. I., Etela, I., Gbaraneh, L. D., & Ladipo, D. O. (2005). Fodder yield and nutritive value of browse species in west African humid tropics: response to age of coppice regrowth. <i>Agroforestry Systems</i> , 65(3), 197-205	[Identified as a promising browse species] "Fodder yield and chemical composition could be used to identify promising browse species for development of integrated crop-livestock agroforestry technologies. Based on fodder yield, and concentrations of CP, NDF, ADF and lignin, <i>B. monandra</i> , <i>C. calothyrsus</i> , <i>D. sisso</i> , <i>E. cyclocarpum</i> , <i>G. pubescens</i> , <i>G. sepium</i> , <i>L. leucocephala</i> , <i>S. spectabilis</i> , and <i>T. superba</i> were identified as having a high potential for integrated crop-livestock agroforestry technologies in the humid lowlands of west and central Africa."

405	Toxic to animals	n
	Source(s)	Notes
	Larbi, A., Anyanwu, N. J., Oji, U. I., Etela, I., Gbaraneh, L. D., & Ladipo, D. O. (2005). Fodder yield and nutritive value of browse species in west African humid tropics: response to age of coppice regrowth. <i>Agroforestry Systems</i> , 65(3), 197-205	[No evidence. Identified as a promising browse species] "Fodder yield and chemical composition could be used to identify promising browse species for development of integrated crop-livestock agroforestry technologies. Based on fodder yield, and concentrations of CP, NDF, ADF and lignin, <i>B. monandra</i> , <i>C. calothyrsus</i> , <i>D. sisso</i> , <i>E. cyclocarpum</i> , <i>G. pubescens</i> , <i>G. sepium</i> , <i>L. leucocephala</i> , <i>S. spectabilis</i> , and <i>T. superba</i> were identified as having a high potential for integrated crop-livestock agroforestry technologies in the humid lowlands of west and central Africa."
	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. Used medicinally for humans] "Fruits, bark and leaves for piles, labor, diarrhea and dysentery. Inner bark used as a macerate for mouthwash to treat gingivitis and thrush. A bark macerate used as an antiseptic on sores and wounds, on swellings and areas of general pain. Vasorelaxant, laxative, antidiabetic, antivenin, antifungal."
	CAB International. (2005). <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Possibly allergenic to some individuals, but no evidence of toxicity to animals] "Reports of contact dermatitis from sawdust and splinters have been cited, although the wood is widely used and such reports of skin irritations are rare (Hausen et al., 1981). Splinters can cause wounds that become increasingly inflamed and resist healing. The wood can also cause respiratory disorders such as asthma and bleeding of the nose and gums, and also contact urticaria (Hartmann and Schlegel, 1980; Hausen et al., 1981)."

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

Qsn #	Question	Answer
	Orwa C,et al. (2009). Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed]	"The principle problems are ambrosia beetles (<i>Dolipygus dubius</i> and <i>D. paradubius</i>), which degrade the standing tree, pockets of rot caused by stem wounds or defective pruning, and the condition known as 'black heart' which occurs as a result of poor growth conditions or over-maturity. Stem-boring damage is caused by <i>Tridesmodes ramiculata</i> . Other insect and fungal parasites occur only sporadically and are not a major threat. Wood from the northern part of the species' range, north of the equator, tends to be attacked by pinhole borer, whereas that from the southern part of the range is practically free from this defect. When the tree is split, insects, notably termites, usually attack it. When freshly felled, logs are liable to attack by fungi whose effect is mainly aesthetic, but which is nevertheless serious in a wood renowned for its agreeable colour. Depending on the species causing the infection, the lustrous creamy-white colour can be spoiled completely even if only the sheen of the wood is altered. The logs are also susceptible to insect attack."
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	"Young plantations in Côte d'Ivoire and Nigeria have been defoliated by larvae of the moth <i>Epicerura</i> spp. and by the locust <i>Zonocerus variegatus</i> , which may cause considerable decrease of the yield. Spraying with the insecticides decamethrin and thiocyclam hydrogen oxalate at concentrations of 900 g and 300 g active ingredient per ha, respectively, showed good results, but a virus disease attacking the pest was also identified. Standing boles are often attacked by ambrosia beetles of the genus <i>Doliopygus</i> . This results in small blackish holes in the wood. Newly planted stumps can be attacked by termites; this can be avoided by treating the base with insecticides."

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	Notes
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[No evidence. Used medicinally] "Fruits, bark and leaves for piles, labor, diarrhea and dysentery. Inner bark used as a macerate for mouthwash to treat gingivitis and thrush. A bark macerate used as an antiseptic on sores and wounds, on swellings and areas of general pain. Vasorelaxant, laxative, antidiabetic, antivenin, antifungal."
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	[Possibly allergenic to some individuals] "Reports of contact dermatitis from sawdust and splinters have been cited, although the wood is widely used and such reports of skin irritations are rare (Hausen et al., 1981). Splinters can cause wounds that become increasingly inflamed and resist healing. The wood can also cause respiratory disorders such as asthma and bleeding of the nose and gums, and also contact urticaria (Hartmann and Schlegel, 1980; Hausen et al., 1981)."

408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes

Qsn #	Question	Answer
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	"It is found in regions with an annual rainfall of (1000–)1400–3000(–3500) mm and a dry season up to 4 months, and mean annual temperatures of 23–27°C. <i>Terminalia superba</i> prefers well-drained, fertile, alluvial soils with pH of about 6.0, but it tolerates a wide range of soil types, from sandy to clayey-loamy and lateritic. It does not tolerate prolonged waterlogging, but withstands occasional flooding. It is susceptible to fire."
	Orwa C,et al. (2009). Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 24 Jan 2022]	[Unknown. Fire-sensitive, but may be cause of fire ignition due to large size] "It is frequently struck by lightning, presumably because of its dominant position in the forest. It is very fire sensitive."

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	" <i>T. superba</i> is a moderately fast growing, light-demanding pioneer species that regenerates easily in clearings." ... "Natural regeneration is abundant in open sites such as forest clearings, abandoned farms, fallow areas and logging roads. It is absent beneath the canopy of mature stands, and young trees are not able to survive in a state of suppression."
	Orwa C,et al. (2009). Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 24 Jan 2022]	"The young tree grows straight and vigorously in full light, particularly if its crown is free, but stagnates under shade."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	" <i>T. superba</i> prefers fresh fertile soils of alluvial origin, but will also grow in soils derived from a variety of other parent materials (for example, sandstone, crystalline rock and basalt). It tolerates brief flooding, but is damaged after extended dry periods (Lamprecht, 1989). Aluko (1989) mentions that the optimum pH for an ultisol after liming is 5.9-6.5 (Nigeria). Soil descriptors - Soil texture: light; medium; heavy - Soil drainage: free - Soil reaction: acid; neutral; alkaline - Soil types: alluvial soils; sandstone soils; ultisols"
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	" <i>Terminalia superba</i> prefers well-drained, fertile, alluvial soils with pH of about 6.0, but it tolerates a wide range of soil types, from sandy to clayey-loamy and lateritic. It does not tolerate prolonged waterlogging, but withstands occasional flooding."

Qsn #	Question	Answer
411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	"Deciduous medium-sized to large tree up to 45(-50) m tall"

412	Forms dense thickets	n
	Source(s)	Notes
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	[Cultivated, but no indication that natural pure stands are formed] "Terminalia superba is most common in moist semi-deciduous forest, but can also be found in evergreen forest. It occurs up to 1000 m altitude. It is most common in disturbed forest." ... "Terminalia superba can be planted in pure stand or in mixed stands with other timber species such as Terminalia ivorensis A.Chev., Milicia excelsa (Welw.) C.C.Berg and Triplochiton scleroxylon K.Schum., or on fertile soils with Khaya and Entandrophragma spp."

501	Aquatic	n
	Source(s)	Notes
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	[Terrestrial] "Terminalia superba is most common in moist semi-deciduous forest, but can also be found in evergreen forest. It occurs up to 1000 m altitude. It is most common in disturbed forest. "

502	Grass	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 24 Jan 2022]	"Family: Combretaceae Subfamily: Combretoideae Tribe: Combreteae Subtribe: Terminaliinae"

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 24 Jan 2022]	"Family: Combretaceae Subfamily: Combretoideae Tribe: Combreteae Subtribe: Terminaliinae"

Qsn #	Question	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	"Deciduous medium-sized to large tree up to 45(-50) m tall"

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	"As a pioneer species with abundant regeneration and a wide distribution, <i>Terminalia superba</i> is not easily liable to genetic erosion. However, it is one of the most heavily exploited African timber species, and locally supplies have dwindled, with reports of declining populations in Côte d'Ivoire, Ghana, Nigeria, Cameroon and Congo. This is compensated for a small part by the establishment of plantations. Its ability to colonize abandoned agricultural land and heavily exploited forest make that <i>Terminalia superba</i> is less susceptible to forest clearance than many other tree species. Provenances have been tested in Côte d'Ivoire, Cameroon and Congo, especially concerning growth rates and wood characteristics. Several provenances originating from tropical Africa have been planted in other tropical countries, e.g. 13 provenances have been tried in Ecuador; these showed considerable differences in performance. The genetic variability of <i>Terminalia superba</i> has been assessed, using samples from Côte d'Ivoire, Cameroon, the Central African Republic and Congo. The samples from Côte d'Ivoire were found to represent a distinct group."

602	Produces viable seed	y
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	" <i>T. superba</i> produces large amounts of seed every year. The number of seeds per kg is about 6000-7000 with wings and 10,000 without. It is best is to collect fruit from felled trees, which enables the wood quality of the mother tree to be inspected. After collecting, the seeds are sun-dried for a few days in order to prevent fermentation or fungal attack during storage. It is not necessary to remove the wings before storage, but they will then occupy more room. The seeds keep their full germination potential for at least 1 month, although 10-15% of seeds are usually sterile, rising to 30% if there are bad weather conditions at anthesis. Fresh, sun-dried seeds exhibit germination rates of 60-80%, but this drops to 30-50% after 1 year. If seeds are stored at 2-4°C, germination capacity will still be approximately 60% after 2 years. No special treatment is recommended before sowing and dissection of the wings is not necessary."

603	Hybridizes naturally	
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Qsn #	Question	Answer
	Source(s)	Notes
	Stace, C. A. (2010). Combretaceae : Terminalia and Buchenavia with Abdul-Ridha Alwan. Flora Neotropica, 107, 1–369	"Hybrids have rarely been reported in the family and no field studies have been made."
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	Unknown. No evidence

604	Self-compatible or apomictic	n
	Source(s)	Notes
	Orwa C,et al. (2009). Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 24 Jan 2022]	"Terminalia has an effective system of self-incompatibility."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Orwa C,et al. (2009). Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 25 Jan 2022]	"Various insects (Coleoptera, Diptera, Hemiptera, Hymenoptera and Lepidoptera) pollinate flowers."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Orwa C,et al. (2009). Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 25 Jan 2022]	[Resprouts from stumps, but no indication of natural vegetative spread] "Natural pruning is excellent and starts early, at 3-4 years, and from then onwards the degree of self-pruning has a strong effect on the health and future value of the tree. It coppices readily from tree stumps, bears copious amounts of seed every year, and under plantation conditions achieves sexual maturity after 6-10 years."

607	Minimum generative time (years)	>3
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"T. superba is monoecious and seed dissemination is anemochorous. Flowering and fruiting commence at a d.b.h. of 30 cm, although the best fruiting trees are often at least 25 years old."
	Orwa C,et al. (2009). Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 24 Jan 2022]	"T. superba reaches sexual maturity late and at variable ages, for example 15 years in Cote d'Ivoire and 23 years in Congo."
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	"Trees may start flowering when the bole is 30 cm in diameter, which can be reached after 6 years."

Qsn #	Question	Answer
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	"Fruit a winged nut, transversely oblong-elliptical in outline, 1.5–2.5 cm × 4–7 cm including the wing, nut c. 1.5 cm × 7 mm, golden brown, glabrous, indehiscent, 1-seeded." ... "The fruits ripen 6–9 months after flowering in the dry season and are dispersed by wind." [No evidence. Unlikely. No means of external attachment]
702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	"It has been planted in many tropical countries outside the natural distribution area as a promising timber plantation species, e.g. in Uganda, Tanzania, Zimbabwe, Madagascar, Indonesia, Malaysia, the Philippines, the Solomon Islands, Fiji, Australia, Brazil and Argentina."
703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	"Fruit a winged nut, transversely oblong-elliptical in outline, 1.5–2.5 cm × 4–7 cm including the wing, nut c. 1.5 cm × 7 mm, golden brown, glabrous, indehiscent, 1-seeded." ... "The fruits ripen 6–9 months after flowering in the dry season and are dispersed by wind." [No evidence]
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Crop, Forestry, Ornamental" [No evidence]
704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"T. superba is monoecious and seed dissemination is anemochorous."
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	"The fruits ripen 6–9 months after flowering in the dry season and are dispersed by wind."
705	Propagules water dispersed	
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"It tolerates brief flooding, but is damaged after extended dry periods (Lamprecht, 1989)." [Unknown if wind-dispersed seeds are buoyant or if they can be secondarily dispersed by water]
706	Propagules bird dispersed	n
	Source(s)	Notes

Qsn #	Question	Answer
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	[No evidence. Not fleshy-fruited] "Fruit a winged nut, transversely oblong-elliptical in outline, 1.5–2.5 cm × 4–7 cm including the wing, nut c. 1.5 cm × 7 mm, golden brown, glabrous, indehiscent, 1-seeded." ... "The fruits ripen 6–9 months after flowering in the dry season and are dispersed by wind."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	[No evidence. No means of external attachment] "Fruit a winged nut, transversely oblong-elliptical in outline, 1.5–2.5 cm × 4–7 cm including the wing, nut c. 1.5 cm × 7 mm, golden brown, glabrous, indehiscent, 1-seeded." ... "The fruits ripen 6–9 months after flowering in the dry season and are dispersed by wind."

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	[Wind-dispersed. No evidence of consumption or internal dispersal] "Fruit a winged nut, transversely oblong-elliptical in outline, 1.5–2.5 cm × 4–7 cm including the wing, nut c. 1.5 cm × 7 mm, golden brown, glabrous, indehiscent, 1-seeded." ... "The fruits ripen 6–9 months after flowering in the dry season and are dispersed by wind."

801	Prolific seed production (>1000/m2)	y
	Source(s)	Notes
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"T. superba produces large amounts of seed every year. The number of seeds per kg is about 6000-7000 with wings and 10,000 without."
	Clark, C. J., Poulsen, J. R., Bolker, B. M., Connor, E. F., & Parker, V. T. (2005). Comparative seed shadows of bird, monkey-, and wind-dispersed trees. Ecology, 86(10), 2684-2694	"TABLE 3. Characteristics of adult trees included in the study." [Terminalia superba - Estimated seed crop = 51200 6 ± 11465 seeds]

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Kyereh, B., Swaine, M. D., & Thompson, J. (1999). Effect of light on the germination of forest trees in Ghana. Journal of Ecology, 87(5), 772-783	"Terminalia ivorensis and Terminalia superba are also fast-growing pioneers but achieve larger size and their larger seeds (in winged fruits) are uncommon in soil seed banks."
	CAB International. (2005). Forestry Compendium. CAB International, Wallingford, UK	"The seeds keep their full germination potential for at least 1 month, although 10-15% of seeds are usually sterile, rising to 30% if there are bad weather conditions at anthesis. Fresh, sun-dried seeds exhibit germination rates of 60-80%, but this drops to 30-50% after 1 year. If seeds are stored at 2-4°C, germination capacity will still be approximately 60% after 2 years."

Qsn #	Question	Answer
	Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Eds.). (2012). Plant Resources of Tropical Africa 7(2). Timbers 2. PROTA Foundation, Wageningen, Netherlands	"The seeds show some dormancy. After collection, fruits should be dried in the sun for a few days. Fresh, sun-dried seeds have a germination rate of up to 90%, decreasing to less than 50% when stored for a year. However, when stored at 2–4°C a germination rate of 40–60% can still be reached after 2 years. Tests in Ghana showed that seeds can best be stored in polyethylene bags at 0–2°C, with a germination rate of 45% after 15 months of storage."

803	Well controlled by herbicides	
	Source(s)	Notes
	Langeland, K.A. & Stocker, R.K. (2001). Control of Non-native Plants in Natural Areas of Florida. SP 242. Institute of Food & Agricultural Sciences, University of Florida, Gainesville, FL	[Unknown. <i>Terminalia arjuna</i> controlled with herbicides] "Treatment: Basal bark application of 10% Garlon 4 or cut-stump treatment with 50% Garlon 3A."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Orwa C, et al. (2009). Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 25 Jan 2022]	"It coppices readily from tree stumps"

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives, and could potentially spread, in regions with tropical climates
- Other *Terminalia* species are invasive
- Possibly allelopathic
- Sawdust and wood may cause contact dermatitis
- Tolerates many soil types
- Reproduces by prolific seed production
- Self-fertile
- Seeds dispersed by wind and intentionally by people
- Prolific seed producer (>50,000 per tree)
- Resprouts and coppices from tree stumps

Low Risk Traits

- No reports of naturalization or invasiveness, despite widespread cultivation
- Unarmed (no spines, thorns, or burrs)
- Potential source of fodder
- Non-toxic to animals
- Light-demanding pioneer tree (dense shade may inhibit ability to spread)
- Self-incompatible
- Reaches maturity in 6+ years