

**Family:** *Combretaceae*

**Taxon:** *Terminalia ivorensis*

**Synonym:**

**Common Name:** black afara  
blackbark  
brimstonewood  
satinwood  
shinglewood

**Questionnaire :** current 20090513  
**Status:** Assessor Approved

**Assessor:** Patti Clifford  
**Data Entry Person:** Patti Clifford

**Designation:** H(HPWRA)

**WRA Score 8**

101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?	y=1, n=-1	
103	Does the species have weedy races?	y=1, n=-1	
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	y
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)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic	y=1, n=0	
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens	y=1, n=0	
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	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	
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	y=1, n=-1	
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	y
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	
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	y=1, n=-1	
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	
801	Prolific seed production (>1000/m2)	y=1, n=-1	
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
803	Well controlled by herbicides	y=-1, n=1	
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)	y=-1, n=1	
<b>Designation: H(HPWRA)</b>			<b>WRA Score 8</b>

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**Supporting Data:**

101	2010. World Agroforestry Center. AgroForestry Tree Database Terminalia ivorensis. PROSEA,	Selection and breeding started in the 1960s in Africa. Since then, trees with superior growth rate and stem form have been selected, and clone banks have been established.
201	2010. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/cgi-bin/npgs/html/genus.pl?1738">http://www.ars-grin.gov/cgi-bin/npgs/html/genus.pl?1738</a>	Native distribution: Cameroon; Cote D'Ivoire; Ghana; Guinea-Bissau; Liberia; Nigeria; Sierra Leone
202	2010. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/cgi-bin/npgs/html/genus.pl?1738">http://www.ars-grin.gov/cgi-bin/npgs/html/genus.pl?1738</a>	Native distribution: Cameroon; Cote D'Ivoire; Ghana; Guinea-Bissau; Liberia; Nigeria; Sierra Leone
203	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	Climatic amplitude (estimates) - Altitude range: 100 - 1200 m - Mean annual rainfall: 1400 - 3600 mm - Rainfall regime: summer; bimodal - Dry season duration: 0 - 3 months - Mean annual temperature: 23 - 27°C - Mean maximum temperature of hottest month: 30 - 35°C - Mean minimum temperature of coldest month: 18 - 25°C
203	2010. World Agroforestry Center. AgroForestry Tree Database Terminalia ivorensis. PROSEA,	"Altitude: 0-1 200 m, Mean annual temperature: 20-33 deg. C, Mean annual rainfall: 1 250-3 000 mm."
204	2010. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/cgi-bin/npgs/html/genus.pl?1738">http://www.ars-grin.gov/cgi-bin/npgs/html/genus.pl?1738</a>	Native distribution: Cameroon; Cote D'Ivoire; Ghana; Guinea-Bissau; Liberia; Nigeria; Sierra Leone
205	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	T. ivorensis has been introduced to Central America, India, Fiji, the Solomon Islands, Sarawak, Brazil (Parana) and the Antilles.
205	2010. World Agroforestry Center. AgroForestry Tree Database Terminalia ivorensis. PROSEA,	"Native to tropical West Africa from Guinea to Cameroon; introduced in many other tropical countries as a promising timber plantation species, e.g. in South America, Fiji, the Solomon Islands and Sarawak."
301	2003. Haysom, K.A./Murphy, S.T.. The status of invasiveness of forest tree species outside their natural habitat: a global review and discussion paper. Forest Health and Biosecurity Working Paper FBS/3E. Forestry Department. FAO, Rome <a href="ftp://ftp.fao.org/doc">ftp://ftp.fao.org/doc</a>	Naturalized in Puerto Rico.
302	2007. Randall, R.P.. Global Compendium of Weeds [Online Database]. <a href="http://www.hear.org/gcw/">http://www.hear.org/gcw/</a>	No evidence.
303	2007. Randall, R.P.. Global Compendium of Weeds [Online Database]. <a href="http://www.hear.org/gcw/">http://www.hear.org/gcw/</a>	No evidence.
304	2007. Randall, R.P.. Global Compendium of Weeds [Online Database]. <a href="http://www.hear.org/gcw/">http://www.hear.org/gcw/</a>	No evidence.
305	2003. Haysom, K.A./Murphy, S.T.. The status of invasiveness of forest tree species outside their natural habitat: a global review and discussion paper. Forest Health and Biosecurity Working Paper FBS/3E. Forestry Department. FAO, Rome <a href="ftp://ftp.fao.org/doc">ftp://ftp.fao.org/doc</a>	Terminalia catappa is considered naturalized and invasive in Botswana; the United States - Florida; Barbados; Puerto Rico
401	2010. World Agroforestry Center. AgroForestry Tree Database Terminalia ivorensis. PROSEA,	No spines, thorns, burrs.
402	2010. WRA Specialist. Personal Communication.	Unknown.

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403	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	Not parasitic.
404	2010. WRA Specialist. Personal Communication.	Unknown.
405	2010. National Center for Biotechnology Information. PubMed. U.S. National Library of Medicine, Bethesda, Maryland <a href="http://www.ncbi.nlm.nih.gov/sites/entrez">http://www.ncbi.nlm.nih.gov/sites/entrez</a>	No evidence of toxicity.
405	2010. Specialized Information Services, U.S. National Library of Medicine. TOXNET Toxicology Data Network [Online Database]. National Institutes of Health, <a href="http://toxnet.nlm.nih.gov/">http://toxnet.nlm.nih.gov/</a>	No evidence of toxicity.
406	2010. World Agroforestry Center. AgroForestry Tree Database Terminalia ivorensis. PROSEA,	A 3-mm-long weevil ( <i>Nanophyes</i> spp.), is the most serious pest. The weevil deposits its eggs in the ripening seed on the tree and can reduce germination to 40%. Evidence of die-back, leafspot and canker has been found on <i>T. ivorensis</i> .
407	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	Medicinal uses for <i>T. ivorensis</i> include treating wounds with bark preparations and reducing rheumatic muscle pain by rubbing with the pulp of the bark. The juice of the leaves and bark decoctions are taken to treat gonorrhoea, kidney pains and as an aphrodisiac. In conjunction with the leaves of <i>Eugenia</i> spp. and <i>Pericopsis laxiflora</i> , infusions of <i>T. ivorensis</i> are used externally to treat scabies.
407	2010. National Center for Biotechnology Information. PubMed. U.S. National Library of Medicine, Bethesda, Maryland <a href="http://www.ncbi.nlm.nih.gov/sites/entrez">http://www.ncbi.nlm.nih.gov/sites/entrez</a>	No evidence of toxicity or allergenic reactions.
408	2010. World Agroforestry Center. AgroForestry Tree Database Terminalia ivorensis. PROSEA,	Intolerant of fire. [no evidence of fire promotion in natural systems]
409	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	Light demanding.
409	2010. World Agroforestry Center. AgroForestry Tree Database Terminalia ivorensis. PROSEA,	A strong light demander and a good colonizer of abandoned farmlands.
410	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	" <i>T. ivorensis</i> prefers sandy to well-drained, clayey loams. It will also thrive in lateritic loams and soils of volcanic origin, but does not grow at all in swampy, clayey or very shallow, sandy soils. It is not found on grass savannas or riparian plains subject to flooding of long duration, but tolerates brief flooding."
410	2010. World Agroforestry Center. AgroForestry Tree Database Terminalia ivorensis. PROSEA,	"The most suitable soils are lateritic loams, well-drained loams, sandy loams, clay loams and volcanic soils."
411	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	Tree.
412	2010. World Agroforestry Center. AgroForestry Tree Database Terminalia ivorensis. PROSEA,	"A very fast rate of growth, straight stem and self-pruning habit, even at an early stage, make this an ideal species for the creation of large-scale, even-aged plantations. The tree coppices well even to an advanced age, but it is normally managed on a coppice rotation. It is killed by drought within a few weeks of planting. On plantations, weeding up to the 2nd year and line cleaning or creeper cutting from the 3rd year up to the 6th year may be necessary. Because of the wide-spreading branches, <i>T. ivorensis</i> is more suitable for line planting than for planting in pure plantations."
412	2010. WRA Specialist. Personal Communication.	Unknown.
501	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	Terrestrial.
502	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	Combretaceae
503	2010. www.nationmaster.com. Encyclopedia Nitrogen fixation. Nationmaster.com, <a href="http://www.nationmaster.com/encyclopedia/Nitrogen-fixation">http://www.nationmaster.com/encyclopedia/Nitrogen-fixation</a>	Combretaceae.
504	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	Tree.
601	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	Natural regeneration of <i>Terminalia ivorensis</i> is abundant in open sites such as forest clearings, abandoned farms and fallow and logging roads. Generally, it is found in small stands in moist deciduous forests, but also penetrates evergreen forests.

602	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	Natural regeneration of <i>Terminalia ivorensis</i> is abundant in open sites such as forest clearings, abandoned farms and fallow and logging roads. Generally, it is found in small stands in moist deciduous forests, but also penetrates evergreen forests.
603	2010. WRA Specialist. Personal Communication.	Unknown.
604	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	<i>T. ivorensis</i> is monoecious and self-incompatible, with bisexual flowers.
604	2010. World Agroforestry Center. AgroForestry Tree Database <i>Terminalia ivorensis</i> . PROSEA,	Self-incompatible.
605	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	Pollination is performed by Lepidoptera and Diptera spp.
605	2010. World Agroforestry Center. AgroForestry Tree Database <i>Terminalia ivorensis</i> . PROSEA,	The flowers are fertilized by insects.
606	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	Ability to sucker; self-prune; coppice.
607	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	Flowering and fruiting start after 5 years and mature trees between 6-10 years have been recorded in plantations.
607	2010. World Agroforestry Center. AgroForestry Tree Database <i>Terminalia ivorensis</i> . PROSEA,	A very fast rate of growth.
701	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	Possibly. This species is grown in tree plantation and agroforestry systems around the world.
702	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	<i>T. ivorensis</i> has been introduced to Central America, India, Fiji, the Solomon Islands, Sarawak, Brazil (Parana) and the Antilles.
703	2010. WRA Specialist. Personal Communication.	No evidence of produce contamination.
704	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	The fruits are winged and variable in size (6-10 x 1.7-2 cm), narrow, emarginate and slightly decurrent. They are finely tomentose, with short reddish to orange-brown hairs and are often galled by insects or have a feeding hole due to weevil attack. The seeds are winged, arranged around a common axis (including the wings, which are about 6-7 cm long), very hard, reddish-yellow when ripe and about 2 cm wide. They persist for a long time on the tree before they are disseminated by the wind.
704	2010. World Agroforestry Center. AgroForestry Tree Database <i>Terminalia ivorensis</i> . PROSEA,	Fruit winged and somewhat variable in size, especially in the width of the wings.
705	2010. WRA Specialist. Personal Communication.	Unknown.
706	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	Wind dispersed.
707	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	Wind dispersed.
708	2010. WRA Specialist. Personal Communication.	Unknown.
801	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	The number of seeds per kg is about 5500-6500 with wings and 10,000 without wings. In order to reduce the risk of damage caused by seed borers, it is recommended to collect seeds from fruits that are still on the tree or have recently fallen. The germination capacity varies greatly, but is generally low (10-50%).
801	2010. World Agroforestry Center. AgroForestry Tree Database <i>Terminalia ivorensis</i> . PROSEA,	There are 5500-7300 seeds/kg.

802 1993. Corbineau, F./Come, D.. Improvement of germination of *Terminalia ivorensis* seeds. Forest Genetic Resources Information. 21: .FAO, Rome <http://www.fao.org/docrep/006/v3030e/V3030E10.htm>

"Seeds of *Terminalia ivorensis* germinate with great difficulty. This inability to germinate is caused by the seedcoat, most probably because this is thick and lignified. Extracted embryos germinate much better than un-cut seeds. In species growing under a warm climate (Côme and Corbineau, 1992), such as *Cedrela odorata* (Côme et al., 1985), *Mangifera indica* (Corbineau et al., 1986), *Symphonia globulifera* (Corbineau and Côme, 1986a), *Shorea roxburghii* (Corbineau and Côme, 1986b) or *Hopea odorata* (Corbineau and Côme, 1986b, 1988), the optimal germination temperature is generally relatively high (25–30°C). This is also the case for *Terminalia superba* (Roederer, 1988).

However, the extracted embryos of *Terminalia ivorensis* germinate well only if they have reached a proper stage of development prior to collection. To obtain seeds with good germination ability, it is thus necessary to ensure that the seeds are completely mature at the time of collection. This was well demonstrated by the study of the germination of embryos extracted from seeds at different stages of their development. The seedlots in which the extracted embryos did not germinate totally were certainly collected too early.

GA3 at high concentration (10-3M) significantly facilitates the germination of complete seeds, but this stimulating effect is possible only if the seeds are sufficiently mature, i.e. if the embryo has reached its maximal development. A treatment by GA3 is difficult to utilise in field conditions as it is efficient only if it is applied for a long enough time.

Scarification for 3 hours in sulphuric acid is not sufficient to ensure a satisfactory germination of the seeds, but it will have positive effects if complemented by soaking for 24 hours in a cellulase solution (1.25 g l<sup>-1</sup>). After such a combined treatment, the use of GA3 10-3M is very efficient, even if applied for 5 days only."

802	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	Seed storage recalcitrant.
802	2010. World Agroforestry Center. AgroForestry Tree Database <i>Terminalia ivorensis</i> . PROSEA,	Orthodox seed storage behaviour.
803	2010. WRA Specialist. Personal Communication.	Unknown.
804	2010. World Agroforestry Center. AgroForestry Tree Database <i>Terminalia ivorensis</i> . PROSEA,	It is very vulnerable to fire, but coppices readily from pruning.
805	2010. WRA Specialist. Personal Communication.	Unknown.