Keywords: Evaluated, Naturalized, Fruit Tree, Toxic Seeds, Arillate

Family: ***Sapindaceae***

Taxon: ***Blighia sapida***

Synonym: *Cupania sapida Voigt*

Common Name: akee
akee apple

Questionaire : current 20090513
Status: Assessor Approved

Assessor: Assessor
Data Entry Person: Assessor

Designation: EVALUATE
WRA Score 1

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**	**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**	**y=1, n=0**	**n**
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**	
406	**Host for recognized pests and pathogens**	**y=1, n=0**	
407	**Causes allergies or is otherwise toxic to humans**	**y=1, n=0**	**y**
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**	**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**	**y=1, n=-1**	
604	**Self-compatible or apomictic**	**y=1, n=-1**	
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**	**n**
705	**Propagules water dispersed**	**y=1, n=-1**	**n**
706	**Propagules bird dispersed**	**y=1, n=-1**	
707	**Propagules dispersed by other animals (externally)**	**y=1, n=-1**	**y**
708	**Propagules survive passage through the gut**	**y=1, n=-1**	
801	**Prolific seed production (>1000/m2)**	**y=1, n=-1**	**n**
802	**Evidence that a persistent propagule bank is formed (>1 yr)**	**y=1, n=-1**	**n**
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**	

Designation: EVALUATE **WRA Score** **1**

Supporting Data:

101	2008. Janick, J./Paull, R.E.. The Encyclopedia of Fruit & Nuts. Cabi Publishing, Wallingford, UK	[Is the species highly domesticated? No] No evidence
101	2010. Asamoah, A. et al.. Blighia sapida K.D.Koenig. [Internet] Record from PROTA4U. Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Is the species highly domesticated? No] "In Jamaica, some different fruit types of Blighia sapida have been developed, mainly differing in the aril, which may be soft and yellow or firm and cream-coloured."
102	2013. WRA Specialist. Personal Communication.	NA
103	2013. WRA Specialist. Personal Communication.	NA
201	2008. Janick, J./Paull, R.E.. The Encyclopedia of Fruit & Nuts. Cabi Publishing, Wallingford, UK	[Species suited to tropical or subtropical climate(s) 2-High] "The ackee, Blighia sapida Koenig (Sapindaceae), is native to West African tropical forests and has been spread in the tropics as a curiosity and as an ornamental tree."
202	2008. Janick, J./Paull, R.E.. The Encyclopedia of Fruit & Nuts. Cabi Publishing, Wallingford, UK	[Quality of climate match data 2-High]
203	1987. Morton, J.F.. Fruits of warm climates - Akee (Blighia sapida). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/akee.html [Accessed 24 July 2013]	[Broad climate suitability (environmental versatility)? No] "The akee tree is tropical to subtropical; flourishes from sea-level to an elevation of 3,000ft (900 m) in Jamaica. It does not bear fruit in Guatemala City; fruits heavily in southern Florida where young trees have been killed by winter cold but mature trees have escaped serious injury during brief periods of 26° F (-3.33° C)."
203	1998. Riffle, R.L.. The Tropical Look - An Encyclopedia of Dramatic Landscape Plants. Timber Press, Portland, OR	[Broad climate suitability (environmental versatility)? No] "Zones 10 and 11"
204	2008. Janick, J./Paull, R.E.. The Encyclopedia of Fruit & Nuts. Cabi Publishing, Wallingford, UK	[Native or naturalized in regions with tropical or subtropical climates? Yes] "It was introduced in the late 18th century and became naturalized through the Caribbean and Central America from Brazil to Florida."
205	2008. Janick, J./Paull, R.E.. The Encyclopedia of Fruit & Nuts. Cabi Publishing, Wallingford, UK	[Does the species have a history of repeated introductions outside its natural range? Yes] "It was introduced in the late 18th century and became naturalized through the Caribbean and Central America from Brazil to Florida."
301	2008. Janick, J./Paull, R.E.. The Encyclopedia of Fruit & Nuts. Cabi Publishing, Wallingford, UK	[Naturalized beyond native range? Yes] "It was introduced in the late 18th century and became naturalized through the Caribbean and Central America from Brazil to Florida."
302	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Garden/amenity/disturbance weed? No] No evidence
303	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Agricultural/forestry/horticultural weed? No] No evidence
304	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Environmental weed? No] No evidence
305	2011. Kubitzki, K. (ed.). The Families and Genera of Vascular Plants. Vol. X. Flowering Plants. Eudicots: Sapindales, Cucurbitales, Myrtaceae. Springer, New York	[Congeneric weed? No] "Three species from tropical Africa." [No evidence]
305	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Congeneric weed? No] No evidence
401	1987. Morton, J.F.. Fruits of warm climates - Akee (Blighia sapida). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/akee.html [Accessed 24 July 2013]	[Produces spines, thorns or burrs? No] "The tree, reaching 33 to 40 ft (10-12 m), is rather hand some, usually with a short trunk to 6 ft (1.8 m) in circumference, and a dense crown of spreading branches. Its bark is gray and nearly smooth. The evergreen (rarely deciduous), alternate leaves are compound with 3 to 5 pairs of oblong, obovate-oblong, orelliptic leaflets, 6 to 12 in (15-30 cm) long, rounded at the base, short-pointed at the apex; bright-green and glossy on the upper surface, dull and paler and finely hairy on the veins on the under side."
402	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Allelopathic? No evidence] "Soil improver: Soils under the B. sapida canopy have more organic matter and greater potassium contents (Muoghalu & Awokunle 1994)."

403	2008. Janick, J./Paull, R.E.. The Encyclopedia of Fruit & Nuts. Cabi Publishing, Wallingford, UK	[Parasitic? No] Sapindaceae
404	2010. Ekué, M.R. et al.. Uses, traditional management, perception of variation & preferences in ackee (Blighia sapida KD Koenig) fruit traits in Benin: implications for domestication & conservation. Journal of Ethnobiology and Ethnomedicine. 6(12): 1-14.	[Unpalatable to grazing animals? No] "Table 7 Propagation, regeneration and management practices of Blighia sapida in Benin" … "Young plants are staked to be easily visible and protected from tillage, grazing and fire" [Young plants palatable and require protection from grazers]
405	1987. Morton, J.F.. Fruits of warm climates - Akee (Blighia sapida). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/akee.html [Accessed 24 July 2013]	[Toxic to animals? Potentially the unripe fruits and seeds] "In feeding experiments at the University of Miami, Dr. Edward Larson found that the membrane of open fruits was harmless; rabbits were readily killed by the unripe arils; rats were resistant and had to be force fed to be fatally poisoned. I have found that squirrels will make holes in the unopened fruits on the tree to consume the unripe arils but they leave the seeds untouched."
405	2010. Ekué, M.R. et al.. Uses, traditional management, perception of variation & preferences in ackee (Blighia sapida KD Koenig) fruit traits in Benin: implications for domestication & conservation. Journal of Ethnobiology and Ethnomedicine. 6(12): 1-14.	[Toxic to animals? No evidence of leaf toxicity] "Feeding trial experiments conducted in savannas areas of Nigeria have shown that ackee leaves are good fodder resource for West African Dwarf goats especially in the dry season [25]. This is probably good news for animal breeders in the region because ackee trees flush during dry seasons in many part of West Africa when the availability of grasses to feed ruminants decreases drastically."
406	2010. Asamoah, A. et al.. Blighia sapida K.D.Koenig. [Internet] Record from PROTA4U. Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Host for recognized pests and pathogens?] "Diseases and pests - In Florida, an attack by Verticillium dahliae has been recorded, causing wilt and dieback. In Jamaica, stem galls are common."
407	1987. Morton, J.F.. Fruits of warm climates - Akee (Blighia sapida). J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton/akee.html [Accessed 24 July 2013]	[Causes allergies or is otherwise toxic to humans? Yes] "The toxicity of the akee was long misunderstood and believed to reside in the membranes attaching the arils to the jacket, or only in the overripe and decomposing arils. There have been intensive clinical and chemical studies of the akee and its effects since 1940, and it is now known that the unripe arils contain hypoglycin, a-amino-B (2 methylenecyclopropyl) propionic acid, formerly called hy poglycin A. This toxic property is largely dispelled by light as the jacket opens. When fully ripe, the arils still possess 1/12 of the amount in the unripe. The seeds are always poisonous. They contain hypoglycin and its y-glutamyl derivative, y L glutamyl a-amino-B-(2-methylene cyclopropyl) propionic acid, formerly called hypoglycin B. The latter is 1/2 as toxic as the former." … "Akee poisoning in humans is evidenced by acute vomiting, sometimes repeated, without diarrhea (called "vomiting sickness" in Jamaica), followed by drowsiness, convulsions, coma and, too often, death. Because of hypoglycaemic effects, administration of sugar solutions have been found helpful. Most cases occur in winter in Jamaica when 30% to 50% of the arils have small, underdeveloped seeds, often not apparent externally. Ingestion of such arils, raw or cooked, is hazardous. For more information on the toxicity of the akee, one may consult Kean, Hypoglycin (1975), and Morton, Forensic Medicine, Vol. III, Chap. 71 (1977)."
407	1998. Riffle, R.L.. The Tropical Look - An Encyclopedia of Dramatic Landscape Plants. Timber Press, Portland, OR	[Causes allergies or is otherwise toxic to humans? Yes] "The flesh of the fruit is said to be edible at certain stages of maturity but, unless at the right stage, is very poisonous, as are the seeds. This beautiful tree is therefore unsuitable for planting where small children might have access to the fruit."
407	2006. Wong, M.. Edible Plants for Hawai'i Landscapes. Landscape. L-14: .College of Tropical Agriculture and Human Resources, UH Manoa, Honolulu, HI	[Causes allergies or is otherwise toxic to humans? Yes] "Akee (Blighia sapida) although an attractive tree cannot be recommended because its fruits are poisonous in both the unripe and over-ripe stages, and only people who know this plant well can safely eat the fruit."
407	2011. Kubitzki, K. (ed.). The Families and Genera of Vascular Plants. Vol. X. Flowering Plants. Eudicots: Sapindales, Cucurbitales, Myrtaceae. Springer, New York	[Causes allergies or is otherwise toxic to humans? Yes] "The arillodes of Blighia sapida are the source of the nutritious ackee, widely consumed in Jamaica, but highly toxic when eaten unripe (Rashford 2001)."
408	2010. Asamoah, A. et al.. Blighia sapida K.D.Koenig. [Internet] Record from PROTA4U. Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Creates a fire hazard in natural ecosystems? No] "Blighia sapida occurs most commonly in semi-deciduous forest, but can also be found in evergreen forest as well as in forest outliers in savanna regions." … "It shows some resistance to fire." [May be a component of fire prone communities, but no evidence that this tree increases fire risk]

408	2011. Ekué, M.R.M.. Blighia sapida, ackee. Conservation and Sustainable Use of Genetic Resources of Priority Food Tree Species in sub-Saharan Africa. Bioversity International, Rome, Italy	[Creates a fire hazard in natural ecosystems? No. No evidence] "Ackee is an evergreen tree that occurs naturally in mature or climax forests. It generally occurs naturally in areas that are wet enough to support closed canopy forest, but not in humid forest."
409	1999. Agyeman, V.K./Swaine, M.D./Thompson, J.. Responses of tropical forest tree seedlings to irradiance and the derivation of a light response index. Journal of Ecology. 87(5): 815-827.	[Is a shade tolerant plant at some stage of its life cycle? Yes] "Guarea, Cola and Blighia, are often abundant as small seedlings in deep forest shade where their growth is better than that of the pioneers"
409	2010. Asamoah, A. et al.. Blighia sapida K.D.Koenig. [Internet] Record from PROTA4U. Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Is a shade tolerant plant at some stage of its life cycle? Seedlings can establish in dense shade] "Seedlings grow best in gaps in the forest canopy, with a mean annual height increment of 70 cm. Blighia sapida is classified as a non pioneer light demander."
410	2010. Asamoah, A. et al.. Blighia sapida K.D.Koenig. [Internet] Record from PROTA4U. Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? Yes] "It prefers well-drained deep fertile soils, but occurs also on non-fertile sandy soils and limestone. In drier regions it is often found on termite mounds."
411	1976. Woodson, Jr., R.E./Schery, R.W./Croat, T.B.. Flora of Panama. Part VI. Family 108. Sapindaceae. Annals of the Missouri Botanical Garden. 63(3): 419-540.	[Climbing or smothering growth habit? No] "Trees 8-15(-50) m tall; stems yellowish tomentose when young, only sparsely pubescent in age."
412	1989. Keay, R.W.J.. Trees of Nigeria. Clarendon Press, Oxford, UK	[Forms dense thickets? No evidence] "Habitat: drier forest areas and forest outliers in savanna regions."
412	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Forms dense thickets? No evidence] "Found in areas outlying forests in the savanna regions and in drier parts of the eastern half of the West African region, B. sapida is a climax forest species commonly associated with Strombosia pustulata."
412	2010. Asamoah, A. et al.. Blighia sapida K.D.Koenig. [Internet] Record from PROTA4U. Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Forms dense thickets? No evidence] "Blighia sapida occurs most commonly in semi-deciduous forest, but can also be found in evergreen forest as well as in forest outliers in savanna regions. In Côte d'Ivoire, it is most common in the transition zone between dry and moister forest and in gallery forest. It has been planted successfully in villages in much drier zones in Mali and Burkina Faso. The natural habitat of the species is obscured by the common planting around villages and further spread from there into the forest."
501	1989. Keay, R.W.J.. Trees of Nigeria. Clarendon Press, Oxford, UK	[Aquatic? No] "Habitat: drier forest areas and forest outliers in savanna regions."
501	2010. Asamoah, A. et al.. Blighia sapida K.D.Koenig. [Internet] Record from PROTA4U. Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Aquatic? No] "It does not tolerate waterlogged soils and cannot withstand flooding."
502	2011. Kubitzki, K. (ed.). The Families and Genera of Vascular Plants. Vol. X. Flowering Plants. Eudicots: Sapindales, Cucurbitales, Myrtaceae. Springer, New York	[Grass? No] Sapindaceae
503	2011. Kubitzki, K. (ed.). The Families and Genera of Vascular Plants. Vol. X. Flowering Plants. Eudicots: Sapindales, Cucurbitales, Myrtaceae. Springer, New York	[Nitrogen fixing woody plant? No] Sapindaceae
504	1976. Woodson, Jr., R.E./Schery, R.W./Croat, T.B.. Flora of Panama. Part VI. Family 108. Sapindaceae. Annals of the Missouri Botanical Garden. 63(3): 419-540.	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "Trees 8-15(-50) m tall; stems yellowish tomentose when young, only sparsely pubescent in age."
601	2004. Arbonnier, M.. Trees, Shrubs and Lianas of West African Dry Zones. CTA, Wageningen, The Netherlands	[Evidence of substantial reproductive failure in native habitat? No] "From Senegal to Cameroon, Africa, Asia and tropical America. Scattered, locally common."

601	2010. Asamoah, A. et al.. Blighia sapida K.D.Koenig. [Internet] Record from PROTA4U. Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Evidence of substantial reproductive failure in native habitat? No] "There seems to be no reason to consider Blighia sapida to be under threat of genetic erosion. It is quite widespread and is commonly planted. Research in Benin showed that Blighia sapida has moderate levels of genetic diversity in Benin and little differentiation among populations and climatic zones. "
602	2008. Janick, J./Paull, R.E.. The Encyclopedia of Fruit & Nuts. Cabi Publishing, Wallingford, UK	[Produces viable seed? Yes] "Traditionally propagated by seed and recently, also by rooted shoot cuttings, vegetative propagation is now encouraged (Lindsay, 2000)."
603	2011. Ekué, M.R.M.. Blighia sapida, ackee. Conservation and Sustainable Use of Genetic Resources of Priority Food Tree Species in sub-Saharan Africa. Bioversity International, Rome, Italy	[Hybridizes naturally? Unknown] "There are two other Blighia species: Blighia welwitschii (Hiem.) Radlk (with seven synonyms) found in the forest zone in Sierra Leone to West Cameroon, and across the Congo basin to Uganda and Angola and Blighia unijugata Baker (with five synonyms) found in evergreen forest, riverine forest, grassland with trees and termite mounds in Sierra Leone to West Cameroon, and across NE, E and S central tropical Africa. The ranges of the three species overlap but there is little information about their distinguishing characteristics."
603	2011. Kubitzki, K. (ed.). The Families and Genera of Vascular Plants. Vol. X. Flowering Plants. Eudicots: Sapindales, Cucurbitales, Myrtaceae. Springer, New York	[Hybridizes naturally? Unknown] "Three species from tropical Africa."
604	1989. Keay, R.W.J.. Trees of Nigeria. Clarendon Press, Oxford, UK	[Self-compatible or apomictic?] "Some trees with bisexual flowers, some with males only."
604	1993. Free, J.B.. Insect Pollination of Crops. Academic Press, London, UK	[Self-compatible or apomictic? Possibly Yes] "Blighia sapida Koenig The small greenish-white flowers of Blighia sapida, akee, 5 mm long, are borne on narrow racemes (Fig. 62.1). The hermaphrodite flower has eight sessile anthers and a short protruding stigma with a superior ovary of three cells, each containing one ovule. The male flower has no stigma and its anthers are on long filaments. In Jamaica (Free, 1976; Free and Williams, 1976b), some racemes (10%) contained hermaphrodite flowers only but most contained male flowers only (45%) or both male and hermaphrodite (45%). The latter usually contained more male than hermaphrodite flowers (66 : 34%). One of 10 trees examined contained male flowers only, another contained hermaphrodite flowers only; the remainder contained both (mean of 28% hermaphrodite). A mean of 14% of hermaphrodite flowers set fruit; the number of fruits set per raceme was positively correlated with the number of hermaphrodite flowers present. Because akee trees vary greatly in the relative proportions of their male and hermaphrodite flowers, and because the set of hermaphrodite flowers does not appear to diminish with increase in the number present, trees for future plantings should be selected from stock with a high proportion of hermaphrodite flowers. Failure to recognize that there are two types of akee flowers probably helps explain why this has not been done extensively in the past."
604	2010. Asamoah, A. et al.. Blighia sapida K.D.Koenig. [Internet] Record from PROTA4U. Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Self-compatible or apomictic? Unknown] "Although trees in the natural area of distribution seem to be dioecious (male and female flowers on different trees), it has been reported in Jamaica that they are andro monoecious (with male and bisexual flowers produced on the same tree)."
605	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Requires specialist pollinators? No] "Apiculture: The flowers are visited by bees for pollen and nectar." [No indication of trouble with seed set, so these and other insects are probably providing effective pollination]
605	2010. Asamoah, A. et al.. Blighia sapida K.D.Koenig. [Internet] Record from PROTA4U. Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Requires specialist pollinators? No] "The flowers are pollinated by insects such as bees."
606	2008. Janick, J./Paull, R.E.. The Encyclopedia of Fruit & Nuts. Cabi Publishing, Wallingford, UK	[Reproduction by vegetative fragmentation? No] "Traditionally propagated by seed and recently, also by rooted shoot cuttings, vegetative propagation is now encouraged (Lindsay, 2000)." [Propagated vegetatively, but no evidence of natural vegetative spread]
607	2008. Janick, J./Paull, R.E.. The Encyclopedia of Fruit & Nuts. Cabi Publishing, Wallingford, UK	[Minimum generative time (years)? 3+] "The tree begins to bear fruit in 3-4 years from seed and 1-2 years by vegetative propagation."

701	1989. Keay, R.W.J.. Trees of Nigeria. Clarendon Press, Oxford, UK	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? No] "Fruits (Mar.-Sep.) more or less obovoid, 3.5-6 cm long by 3-5 cm diam. Bright red and yellow, splitting open on the tree, with thick leathery valves glabrous outside and velvety within; seeds about 2.5 cm long by 2 cm broad; aril (this being the edible part of the fruit) pale yellow or cream-coloured, much wrinkled, about 2 cm long and broad." [No evidence, and unlikely as fruit and seeds are relatively large and lack means of external attachment]
702	1989. Keay, R.W.J.. Trees of Nigeria. Clarendon Press, Oxford, UK	[Propagules dispersed intentionally by people? Yes] "Ornamental: Commonly planted along avenues, it enhances aesthetic value of urban landscapes."
702	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Propagules dispersed intentionally by people? Yes] "Introduced to Hawaii from Jamaica in 1885, it is cultivated as a street or specimen tree."
703	1989. Keay, R.W.J.. Trees of Nigeria. Clarendon Press, Oxford, UK	[Propagules likely to disperse as a produce contaminant? No] "Fruits (Mar.-Sep.) more or less obovoid, 3.5-6 cm long by 3-5 cm diam. Bright red and yellow, splitting open on the tree, with thick leathery valves glabrous outside and velvety within; seeds about 2.5 cm long by 2 cm broad" [No evidence, and unlikely as fruits and seeds are relatively large]
704	1976. Woodson, Jr., R.E./Schery, R.W./Croat, T.B.. Flora of Panama. Part VI. Family 108. Sapindaceae. Annals of the Missouri Botanical Garden. 63(3): 419-540.	[Propagules adapted to wind dispersal? No] "Capsules oblong-obovate, obtusely 3-lobed, 6 10 cm long, yellowish to red; valves 3, fleshy, glabrate outside, densely woolly pubescent inside; seeds usually 3, globose, to 1.8 cm diam., black, shiny, drying dark brown, borne on a fleshy white aril, the aril several times larger than the seed itself."
705	2011. Ekué, M.R.M.. Blighia sapida, ackee. Conservation and Sustainable Use of Genetic Resources of Priority Food Tree Species in sub-Saharan Africa. Bioversity International, Rome, Italy	[Propagules water dispersed? No] "Ackee is an evergreen tree that occurs naturally in mature or climax forests. It generally occurs naturally in areas that are wet enough to support closed canopy forest, but not in humid forest." … "Fruit is a red, yellow or orange capsule, 5–10 cm long, opening at maturity, with three cream-coloured arils, each tipped with a black seed." … "Seeds are dispersed by humans and by large animals, including chimpanzees and large birds." [Habitat, fruit & seed morphology & dispersal ecology suggest seeds are unlikely to be water dispersed]
706	2010. Asamoah, A. et al.. Blighia sapida K.D.Koenig. [Internet] Record from PROTA4U. Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Propagules bird dispersed? Possibly Yes, but Hawaii and most other tropical Pacific Islands lack birds capable of dispersing such large seeds. Game birds may be able to secondarily disperse seeds that have fallen on the ground] "The seeds are probably dispersed by animals such as large birds and monkeys."
707	2010. Asamoah, A. et al.. Blighia sapida K.D.Koenig. [Internet] Record from PROTA4U. Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Propagules dispersed by other animals (externally)? Yes] "The seeds are probably dispersed by animals such as large birds and monkeys."
707	2011. Ekué, M.R.M.. Blighia sapida, ackee. Conservation and Sustainable Use of Genetic Resources of Priority Food Tree Species in sub-Saharan Africa. Bioversity International, Rome, Italy	[Propagules dispersed by other animals (externally)? Yes] "Fruit is a red, yellow or orange capsule, 5–10 cm long, opening at maturity, with three cream-coloured arils, each tipped with a black seed." ,,, "Seeds are dispersed by humans and by large animals, including chimpanzees and large birds." [Arils consumed, so animals presumably disperse seeds by transporting aril & seed together and consuming away from parent tree. Introduced rodents and mongoose may disperse seeds in this way]
708	2011. Ekué, M.R.M.. Blighia sapida, ackee. Conservation and Sustainable Use of Genetic Resources of Priority Food Tree Species in sub-Saharan Africa. Bioversity International, Rome, Italy	[Propagules survive passage through the gut? Unknown. Dispersers consume aril, and probably discard seed without ingestion] "Seeds are dispersed by humans and by large animals, including chimpanzees and large birds." [Feral pigs may consume and disperse seeds]
801	2010. Asamoah, A. et al.. Blighia sapida K.D.Koenig. [Internet] Record from PROTA4U. Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Prolific seed production (>1000/m2)? No, given relatively large fruit and seed size] "Fruit an obovoid to pear-shaped capsule 3.5–10 cm × 3–5 cm, slightly 3-lobed, yellow to red when ripe, glabrous, dehiscing with 3 woody valves hairy inside, usually 3-seeded. Seeds ovoid, 2–2.5 cm long, glossy black, with cream-coloured to yellow cup-shaped aril up to 2 cm long at base."
802	2010. Asamoah, A. et al.. Blighia sapida K.D.Koenig. [Internet] Record from PROTA4U. Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Evidence that a persistent propagule bank is formed (>1 yr)? No] "Seeds are sensitive to desiccation and are considered short-lived. It is recommended to sow them within a few days after extraction from the fruit. However, seeds can be kept for 3 months in moist storage at 21°C. Germination starts after 2–4 weeks, with a germination rate of 80%."

802	2011. Ekué, M.R.M.. Blighia sapida, ackee. Conservation and Sustainable Use of Genetic Resources of Priority Food Tree Species in sub-Saharan Africa. Bioversity International, Rome, Italy	[Evidence that a persistent propagule bank is formed (>1 yr)?No] "Seeds germinate readily when fresh, but are recalcitrant, meaning that they do not maintain their viability when dried." … "The recalcitrant seed would not maintain viability in a seed bank and there are no reports in the literature of field clone banks or provenance trials."
803	2013. WRA Specialist. Personal Communication.	[Well controlled by herbicides? Unknown] No information on herbicide efficacy or chemical control of this species
804	2010. Asamoah, A. et al.. Blighia sapida K.D.Koenig. [Internet] Record from PROTA4U. Lemmens, R.H.M.J., Louppe, D. & Oteng-Amoako, A.A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands http://www.prota4u.org/search.asp	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "It is recommended to control tree form by pruning several times when the tree is grown for timber production. Trees often sprout vigorously from stumps."
805	2013. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown]

Summary of Risk Traits

High Risk / Undesirable Traits

- Thrives in tropical climates
- Naturalized through the Caribbean and Central America from Brazil to Florida
- Unripe and overripe fruit and seeds are highly toxic
- Seedlings tolerant of deep shade
- Tolerates many soil types
- Can reach maturity as early as 3 years
- Seeds dispersed by people, large birds and frugivorous mammals
- Trees often sprout vigorously from stumps

Low Risk / Desirable Traits

- Despite naturalization, no negative impacts to agriculture or the natural environment have been documented in introduced range
- Unarmed (no spines, thorns or burrs)
- Leaves palatable to grazing animals
- Landscaping and ornamental value
- Fruit edible at the ripe stage (toxic otherwise)
- Will not spread vegetatively
- Large fruit and seeds unlikely to be inadvertently dispersed
- Seeds will not form a persistent seed bank (and do not store well)