**Taxon:** Antiaris toxicaria (Pers.) Lesch. **Family:** Moraceae

**Common Name(s):** bark cloth tree
false iroko
sackingtree
upastree

**Synonym(s):** Ipo toxicaria Pers.

**Assessor:** Chuck Chimera **Status:** Assessor Approved **End Date:** 4 Dec 2018

**WRA Score:** 3.0 **Designation:** EVALUATE **Rating:** Evaluate

**Keywords:** Tropical Tree, Naturalized, Toxic Properties, Light Demanding, Bird-dispersed

| 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 | 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 | n |
| 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 | | |
| 406 | Host for recognized pests and pathogens | | |
| 407 | Causes allergies or is otherwise toxic to humans | y=1, n=0 | y |
| 408 | Creates a fire hazard in natural ecosystems | | |

| Qsn # | Question | Answer Option | Answer |
|---|---|---|---|
| 409 | Is a shade tolerant plant at some stage of its life cycle | y=1, n=0 | y |
| 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 | n |
| 604 | Self-compatible or apomictic | | |
| 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 | y |
| 707 | Propagules dispersed by other animals (externally) | | |
| 708 | Propagules survive passage through the gut | y=1, n=-1 | y |
| 801 | Prolific seed production (>1000/m2) | | |
| 802 | Evidence that a persistent propagule bank is formed (>1 yr) | y=1, n=-1 | n |
| 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** |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 30 Nov 2018] | [No evidence of domestication] "Antiaris toxicaria is still a poorly known timber tree; in Ghana it is on the list of lesser-used species which are currently being promoted. Studies of its technological and investment profile may pave the way for increased utilization as a commercial timber. Its fast growth and ease of propagation make it a potential plantation species." |

| | | |
|---|---|---|
| **102** | **Has the species become naturalized where grown?** | |
| | **Source(s)** | **Notes** |
| | WRA Specialist. 2018. Personal Communication | NA |

| | | |
|---|---|---|
| **103** | **Does the species have weedy races?** | |
| | **Source(s)** | **Notes** |
| | WRA Specialist. 2018. 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, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 30 Nov 2018] | "Native<br>Africa<br>NORTHEAST TROPICAL AFRICA: Sudan<br>EAST TROPICAL AFRICA: Kenya, Tanzania, Uganda<br>WEST-CENTRAL TROPICAL AFRICA: Cameroon, Central African Republic, Zaire (n.e.)<br>WEST TROPICAL AFRICA: Benin, Cote D'Ivoire, Gambia, Ghana, Mali, Nigeria, Senegal, Sierra Leone, Togo<br>SOUTH TROPICAL AFRICA: Angola, Zambia<br>WESTERN INDIAN OCEAN: Madagascar<br>Asia-Temperate<br>CHINA: China [Guangdong, Yunnan (s.), Guangxi, Hainan]<br>Asia-Tropical<br>INDIAN SUBCONTINENT: India, Sri Lanka<br>INDO-CHINA: Cambodia, India, [Andaman and Nicobar] Laos, Myanmar, Thailand, Vietnam<br>MALESIA: Indonesia, [Celebes, Java, Kalimantan, Sumatra] Malaysia, Philippines<br>Australasia<br>AUSTRALIA: Australia [Queensland, Northern Territory]<br>Pacific<br>SOUTHWESTERN PACIFIC: Fiji, Tonga" |

| Qsn # | Question | Answer |
|---|---|---|
| **202** | **Quality of climate match data** | **High** |
| | **Source(s)** | **Notes** |
| | USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 30 Nov 2018] | |

| 203 | Broad climate suitability (environmental versatility) | y |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 30 Nov 2018] | "Antiaris toxicaria is found from the wettest to dry forest types, from wet evergreen forest to dry deciduous forest, and even in wooded grassland. It is often common in secondary forest, and is an emergent tree of the high forest. In the wetter types of forest, it seems to prefer well-drained sites. Antiaris toxicaria can be found from sea-level to 1800 m altitude. It has no special soil requirements." |

| 204 | Native or naturalized in regions with tropical or subtropical climates | y |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 30 Nov 2018] | "Antiaris toxicaria is extremely widespread, being found throughout the Old World tropics. In Africa it occurs from Senegal east to southern Ethiopia, and south to Zambia and Angola; it is also found in Madagascar. It occurs in tropical Asia, islands of the Pacific Ocean (east to Fiji and Tonga) and northern Australia." |
| | Daehler, C. C. & Baker, R. F. 2006. New Records of Naturalized and Naturalizing Plants Around Lyon Arboretum, Mānoa Valley, Oʻahu. Bishop Museum Occasional Papers 87: 3-18 | "This tree, which occurs in tropical rainforests throughout the Old World tropics, was first planted in the Arboretum in 1929. Lyon noted seedlings of this plant in 1946. In our current survey, roughly a dozen seedlings were seen within 100 m of planted specimens. This species may lack an effective disperser in Hawaiʻi. The drupes are fairly large (2 cm in diameter), and a large bird or bat would be required to transport the seeds. Nevertheless, the plant appears to be locally reproducing. Material examined: OʻAHU: Lyon Arboretum (cultivated), 6 Aug 1964, G. Gillett 1592 (HLA)." |

| 205 | Does the species have a history of repeated introductions outside its natural range? | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Imada, C.T., Staples, G.W. & Herbst, D.R. 2005. Annotated Checklist of Cultivated Plants of Hawaiʻi. http://www2.bishopmuseum.org/HBS/botany/cultivatedplants/. [Accessed 3 Dec 2018] | "Locations:<br>Foster Botanical Garden<br>Harold L. Lyon Arboretum (Confirmed)<br>Hoʻomaluhia Botanical Garden<br>Pacific Tropical Botanical Garden (now National Tropical Botanical Garden)<br>Waimea Arboretum & Botanical Garden" |

| Qsn # | Question | Answer |
|---|---|---|
| | Daehler, C. C. & Baker, R. F. 2006. New Records of Naturalized and Naturalizing Plants Around Lyon Arboretum, Mānoa Valley, Oʻahu. Bishop Museum Occasional Papers 87: 3-18 | "This tree, which occurs in tropical rainforests throughout the Old World tropics, was first planted in the Arboretum in 1929. Lyon noted seedlings of this plant in 1946." |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 3 Dec 2018] | [Broad native range. Little evidence of introduction outside native range] "Antiaris toxicaria is extremely widespread, being found throughout the Old World tropics. In Africa it occurs from Senegal east to southern Ethiopia, and south to Zambia and Angola; it is also found in Madagascar. It occurs in tropical Asia, islands of the Pacific Ocean (east to Fiji and Tonga) and northern Australia." |

| 301 | Naturalized beyond native range | y |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Daehler, C. C. & Baker, R. F. 2006. New Records of Naturalized and Naturalizing Plants Around Lyon Arboretum, Mānoa Valley, Oʻahu. Bishop Museum Occasional Papers 87: 3-18 | "This tree, which occurs in tropical rainforests throughout the Old World tropics, was first planted in the Arboretum in 1929. Lyon noted seedlings of this plant in 1946. In our current survey, roughly a dozen seedlings were seen within 100 m of planted specimens. This species may lack an effective disperser in Hawaiʻi. The drupes are fairly large (2 cm in diameter), and a large bird or bat would be required to transport the seeds. Nevertheless, the plant appears to be locally reproducing. Material examined: OʻAHU: Lyon Arboretum (cultivated), 6 Aug 1964, G. Gillett 1592 (HLA)." |

| 302 | Garden/amenity/disturbance weed | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall | No evidence |

| 303 | Agricultural/forestry/horticultural weed | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall | No evidence |

| Qsn # | Question | Answer |
|---|---|---|
| **304** | **Environmental weed** | **n** |
| | **Source(s)** | **Notes** |
| | Daehler, C. C. & Baker, R. F. 2006. New Records of Naturalized and Naturalizing Plants Around Lyon Arboretum, Mānoa Valley, Oʻahu. Bishop Museum Occasional Papers 87: 3-18 | "This tree, which occurs in tropical rainforests throughout the Old World tropics, was first planted in the Arboretum in 1929. Lyon noted seedlings of this plant in 1946. In our current survey, roughly a dozen seedlings were seen within 100 m of planted specimens. This species may lack an effective disperser in Hawaiʻi. The drupes are fairly large (2 cm in diameter), and a large bird or bat would be required to transport the seeds. Nevertheless, the plant appears to be locally reproducing." [No evidence of detrimental impacts documented in this publication] |
| | Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall | No evidence |

| 305 | Congeneric weed | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 30 Nov 2018] | "Antiaris comprises a single variable species, which is subdivided into 5 subspecies. Two of these occur in tropical Asia and islands of the Pacific, two in Madagascar: subsp. madagascariensis (H.Perrier) C.C.Berg (synonym: Antiaris madagascariensis H.Perrier) and subsp. humbertii (Leandri) C.C.Berg (synonym: Antiaris humbertii Leandri), and one in mainland Africa: subsp. welwitschii (Engl.) C.C.Berg (synonym: Antiaris welwitschii Engl.). Within the latter subspecies 3 varieties are distinguished based on differences of texture, indumentum and venation of the leaves: var. welwitschii (Engl.) Corner widely distributed in rainforest, var. africana A.Chev. (synonym: Antiaris africana Engl.) widely distributed in drier habitats, and var. usambarensis (Engl.) C.C.Berg (synonym: Antiaris usambarensis Engl.) from eastern DR Congo, Kenya, Uganda and Tanzania. However, intermediates are rather common." |

| 401 | Produces spines, thorns or burrs | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2003. Flora of China. Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis | [No evidence] "Trees 25-40 m tall, d.b.h. 3040 cm, occasionally with buttresses when large. Bark gray, coarse. Branchlets brown pubescent when young, furrowed when dry. Stipules lanceolate, caducous. Petiole 58 mm, with long thick hairs; leaf blade elliptic to obovate but narrowly elliptic on mature plants, 719 × 36 cm, abaxially pale green but brown when dry and densely covered with long thick hairs but more densely so along main veins, adaxially dark green and sparsely covered with long thick hairs, base rounded to ± cordate and asymmetric, margin serrate, apex acuminate; secondary veins 1013 on each side of midvein, apically inflexed." |

| 402 | Allelopathic | n |
|---|---|---|
| | **Source(s)** | **Notes** |

| Qsn # | Question | Answer |
|---|---|---|
| | Orwa C,, Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org. [Accessed 3 Dec 2018] | "Shade or shelter: Provides dense shade.<br>Soil improver: Leaf litter enriches the soil.<br>Intercropping: Has dense shade and may interfere with other crops." [Shade may impede growth of other plants, but no evidence of allelopathic effects] |

| 403 | Parasitic | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 30 Nov 2018] | "Deciduous, monoecious, small to large tree up to 45(–60) m tall" [Moraceae. No evidence] |

| 404 | Unpalatable to grazing animals | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 30 Nov 2018] | "The fruit is edible. The leaves are used as fodder." … "In an experimental plantation in northern Côte d'Ivoire, the survival rate of seedlings after 3.5 years was only 49% and the average height only 60 cm because of high grazing pressure of cattle and wild animals" |

| 405 | Toxic to animals | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 3 Dec 2018] | "The fruit is edible. The leaves are used as fodder." … "In an experimental plantation in northern Côte d'Ivoire, the survival rate of seedlings after 3.5 years was only 49% and the average height only 60 cm because of high grazing pressure of cattle and wild animals" [Not reported to be toxic to animals that consume seedlings or saplings] |

| 406 | Host for recognized pests and pathogens | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 3 Dec 2018] | "Diseases and pests - The psyllid Triozamia lamborni is the most important pest of Antiaris toxicaria. All stages of the insect can attack the plant, but the greatest damage is done by the nymphs, which kill the apical points of suckers or seedlings, causing dieback, shedding of leaves, and sometimes death." |
| | Orwa C,, Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org. [Accessed 3 Dec 2018] | "The sapwood is susceptible to Lyctus." [Lyctus is a genus of powder-post beetles in the family Bostrichidae, being present on all continents except Antarctica.] |

| Qsn # | Question | Answer |
|---|---|---|
| **407** | **Causes allergies or is otherwise toxic to humans** | **y** |
| | **Source(s)** | **Notes** |
| | Orwa C,, Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org. [Accessed 3 Dec 2018] | "Poison: Used with Strychnos ignatii, A. toxicaria latex is an important component in the manufacture of dart and arrow poisons whose active components are cardenolides and alkaloids (chemicals with cardiac arresting potential). The sawdust may cause skin irritation and stomach pain." |
| | Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2003. Flora of China. Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis | "The latex contains varying amounts of cardiac glycosides and can be very poisonous." |
| | Chew, W.-L. (1989) Moraceae, Flora of Australia 3: 15-68 | "Though the latex is known to be highly poisonous if injected into the blood stream (which is used widely in SE Asia by hunting communities), if swallowed its toxic properties are apparently not effective." |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed ] | [Latex with toxic properties and a skin irritant] "In tropical Asia the latex from the bark is mixed with other ingredients such as bark or roots of Strychnos and Derris spp. The mixture is boiled over a fire to obtain a thick paste in which the dart and arrow points are dipped. Bark cloth is obtained by shaving off the outer part from bark stripped from the tree, and beating and washing the inner fibrous part. Careful preparation is required because traces of latex may irritate the skin." |

| 408 | **Creates a fire hazard in natural ecosystems** | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | de Padua, L.S., Bunyapraphatsara, N. & Lemmens, R.H.M.J. (Eds.). 1999. Plant Resources of South-East Asia. No 12(1). Medicinal and Poisonous Plants 1. Backhuys Publishers, Leiden, The Netherlands | "Trees of A. toxicaria have a good self-pruning ability; they are not resistant to fire." [Not resistant to fire. Fire ecology unknown] |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed ] | [Fire ecology unknown] "Antiaris toxicaria is found from the wettest to dry forest types, from wet evergreen forest to dry deciduous forest, and even in wooded grassland. It is often common in secondary forest, and is an emergent tree of the high forest. In the wetter types of forest, it seems to prefer well-drained sites. Antiaris toxicaria can be found from sea-level to 1800 m altitude. It has no special soil requirements. In the driest forest types (e.g. in southern Mali and Burkina Faso) it is frequently associated with Milicia excelsa (Welw.) C.C.Berg and Ceiba pentandra (L.) Gaertn." |

| Qsn # | Question | Answer |
|---|---|---|
| **409** | **Is a shade tolerant plant at some stage of its life cycle** | **y** |
| | **Source(s)** | **Notes** |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 30 Nov 2018] | [Shade tolerant, but requires full light for further growth] "Antiaris toxicaria is a non-pioneer light demander. Seedlings are usually abundant near the mother tree, but experience high mortality in the first year. In the shade of the forest, seedlings up to 40 cm tall are common, but exposure to full light is required for further growth." |

| | | |
|---|---|---|
| **410** | **Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)** | **y** |
| | **Source(s)** | **Notes** |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 30 Nov 2018] | "Antiaris toxicaria can be found from sea-level to 1800 m altitude. It has no special soil requirements." |

| | | |
|---|---|---|
| **411** | **Climbing or smothering growth habit** | **n** |
| | **Source(s)** | **Notes** |
| | Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2003. Flora of China. Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis | "Trees 25-40 m tall, d.b.h. 3040 cm, occasionally with buttresses when large." |

| | | |
|---|---|---|
| **412** | **Forms dense thickets** | **n** |
| | **Source(s)** | **Notes** |
| | Orwa C,, Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org. [Accessed 3 Dec 2018] | "A tree common in grassy savanna and on coastal plateaus. In Africa this tree has three varieties which are clearly distinguished by their habitat preferences and juvenile forms. While one is found largely in wooded grassland, the others grow in rain forest, wetter forest, riverine and semi-swamp forests. In the west African rain forest, Milicia excelsa and A. toxicaria are components of a 3-layered forest canopy structure." [No evidence] |
| | de Padua, L.S., Bunyapraphatsara, N. & Lemmens, R.H.M.J. (Eds.). 1999. Plant Resources of South-East Asia. No 12(1). Medicinal and Poisonous Plants 1. Backhuys Publishers, Leiden, The Netherlands | "A. toxicaria is a rare, scattered tree in primary forest up to 1500 m altitude. It is occasionally found in grassy savanna and on coastal plateaus." [No evidence from Southeast Asia] |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed ] | "Antiaris toxicaria is found from the wettest to dry forest types, from wet evergreen forest to dry deciduous forest, and even in wooded grassland. It is often common in secondary forest, and is an emergent tree of the high forest." [Common, but no evidence of thickets or pure stands being formed] |

| | | |
|---|---|---|
| **501** | **Aquatic** | **n** |

| Qsn # | Question | Answer |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2003. Flora of China. Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis | [Terrestrial tree] "Trees25-40 m tall, d.b.h. 3040 cm, occasionally with buttresses when large." … "Rain forests; below 1500 m." |

| 502 | Grass | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 30 Nov 2018] | Family: Moraceae<br>Tribe: Castilleae |

| 503 | Nitrogen fixing woody plant | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 30 Nov 2018] | Family: Moraceae<br>Tribe: Castilleae |

| 504 | Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers) | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 30 Nov 2018] | "Deciduous, monoecious, small to large tree up to 45(–60) m tall; bole straight, branchless for up to 25(–33) m, up to 180 cm in diameter, sometimes with steep buttresses up to 3 m high" |

| 601 | Evidence of substantial reproductive failure in native habitat | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 30 Nov 2018] | "Antiaris toxicaria is extremely widespread and consequently not easily liable to genetic erosion. However, in tropical Asia it is not common, with usually only low densities in the forest. In Africa it is generally much more common, but local exploitation has severely reduced populations. The great variability of the species should be studied in more detail, also in relation to its wood and chemical properties and ecology." |

| 602 | Produces viable seed | y |
|---|---|---|
| | **Source(s)** | **Notes** |

| Qsn # | Question | Answer |
|---|---|---|
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed ] | "Fresh seed has a high germination rate, up to 94% in 2.5–13 weeks. Under natural conditions, the seeds lose viability rapidly, but when stored in wet sand at low temperatures they still may have a germination rate of 82% after 5 months. " |
| | Daehler, C. C. & Baker, R. F. 2006. New Records of Naturalized and Naturalizing Plants Around Lyon Arboretum, Mānoa Valley, Oʻahu. Bishop Museum Occasional Papers 87: 3-18 | "This tree, which occurs in tropical rainforests throughout the Old World tropics, was first planted in the Arboretum in 1929. Lyon noted seedlings of this plant in 1946. In our current survey, roughly a dozen seedlings were seen within 100 m of planted specimens. This species may lack an effective disperser in Hawai'i. The drupes are fairly large (2 cm in diameter), and a large bird or bat would be required to transport the seeds. Nevertheless, the plant appears to be locally reproducing." |

| 603 | Hybridizes naturally | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 30 Nov 2018] | [No evidence] "Antiaris comprises a single variable species, which is subdivided into 5 subspecies. Two of these occur in tropical Asia and islands of the Pacific, two in Madagascar: subsp. madagascariensis (H.Perrier) C.C.Berg (synonym: Antiaris madagascariensis H.Perrier) and subsp. humbertii (Leandri) C.C.Berg (synonym: Antiaris humbertii Leandri), and one in mainland Africa: subsp. welwitschii (Engl.) C.C.Berg (synonym: Antiaris welwitschii Engl.). Within the latter subspecies 3 varieties are distinguished based on differences of texture, indumentum and venation of the leaves: var. welwitschii (Engl.) Corner widely distributed in rainforest, var. africana A.Chev. (synonym: Antiaris africana Engl.) widely distributed in drier habitats, and var. usambarensis (Engl.) C.C.Berg (synonym: Antiaris usambarensis Engl.) from eastern DR Congo, Kenya, Uganda and Tanzania. However, intermediates are rather common." |

| 604 | Self-compatible or apomictic | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 3 Dec 2018] | "Deciduous, monoecious, small to large tree up to 45(–60) m tall" … "Flowers unisexual; male flowers with (2–)3–5(–7) free tepals and 2–4 stamens; female flowers with 4-lobed perianth and 1-celled ovary adnate to the perianth, styles 2, long." [Breeding system unspecified] |

| 605 | Requires specialist pollinators | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Mirgal, A. B., Gunaga, R. P., & Salunkhe, C. B. (2016). Seed traits, germination pattern and seedling vigour in Antiaris toxicaria (Pers.) Lesch., a rare plant species of Western ghats. Journal of Applied and Natural Science, 8(3), 1710-1713 | "A. toxicaria is monoecious tree species that produce crowded male flowers and solitary female flower and pollinated by tiny insects." |

| Qsn # | Question | Answer |
|---|---|---|
| 606 | **Reproduction by vegetative fragmentation** | **n** |
| | **Source(s)** | **Notes** |
| | de Padua, L.S., Bunyapraphatsara, N. & Lemmens, R.H.M.J. (Eds.). 1999. Plant Resources of South-East Asia. No 12(1). Medicinal and Poisonous Plants 1. Backhuys Publishers, Leiden, The Netherlands | "A. toxicaria can be propagated by seed. About 70-90% of sown stones germinate in 18-89 days." |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 3 Dec 2018] | "Propagation and planting - Fresh seed has a high germination rate, up to 94% in 2.5–13 weeks." |

| Qsn # | Question | Answer |
|---|---|---|
| 607 | **Minimum generative time (years)** | **>3** |
| | **Source(s)** | **Notes** |
| | Northern Land Manager. (2011). Fire responses of Antiaris toxicaria var. macrophylla. http://www.landmanager.org.au/#sort=sort_title%20asc&nid=523005. [Accessed 3 Dec 2018] | "First seeds: 6-20 years" |

| Qsn # | Question | Answer |
|---|---|---|
| 701 | **Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)** | **n** |
| | **Source(s)** | **Notes** |
| | Daehler, C. C. & Baker, R. F. 2006. New Records of Naturalized and Naturalizing Plants Around Lyon Arboretum, Mānoa Valley, Oʻahu. Bishop Museum Occasional Papers 87: 3-18 | "This species may lack an effective disperser in Hawaiʻi. The drupes are fairly large (2 cm in diameter), and a large bird or bat would be required to transport the seeds. Nevertheless, the plant appears to be locally reproducing." |
| | Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2003. Flora of China. Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis | [No means of external attachment] "Drupes bright red to purple red, pear-shaped, ca. 2 cm in diam. when mature." |

| Qsn # | Question | Answer |
|---|---|---|
| 702 | **Propagules dispersed intentionally by people** | **y** |
| | **Source(s)** | **Notes** |
| | de Padua, L.S., Bunyapraphatsara, N. & Lemmens, R.H.M.J. (Eds.). 1999. Plant Resources of South-East Asia. No 12(1). Medicinal and Poisonous Plants 1. Backhuys Publishers, Leiden, The Netherlands | "A. toxicaria can be propagated by seed. About 70-90% of sown stones germinate in 18-89 days." |
| | Daehler, C. C. & Baker, R. F. 2006. New Records of Naturalized and Naturalizing Plants Around Lyon Arboretum, Mānoa Valley, Oʻahu. Bishop Museum Occasional Papers 87: 3-18 | "This tree, which occurs in tropical rainforests throughout the Old World tropics, was first planted in the Arboretum in 1929. Lyon noted seedlings of this plant in 1946. In our current survey, roughly a dozen seedlings were seen within 100 m of planted specimens." |

| Qsn # | Question | Answer |
|---|---|---|
| 703 | **Propagules likely to disperse as a produce contaminant** | **n** |

| Qsn # | Question | Answer |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed ] | "Deciduous, monoecious, small to large tree up to 45(–60) m tall" … "Fruit forming a drupe-like, ellipsoid to ovoid or globose entity together with the enlarged, fleshy orange to scarlet receptacle, 1–1.5(–2) cm long, 1-seeded. Seed globose to ellipsoid, 7–9 mm long, with thin seed coat, veined near hilum." [No evidence. A large, animal-dispersed tree with relatively large seeds that are unlikely to become a produce contaminant] |

| 704 | Propagules adapted to wind dispersal | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2003. Flora of China. Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis | "Drupes bright red to purple red, pear-shaped, ca. 2 cm in diam. when mature." |

| 705 | Propagules water dispersed | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 4 Dec 2018] | ["The seeds are dispersed by animals such as birds, monkeys and antelopes, which relish the fruits." … " Antiaris toxicaria is found from the wettest to dry forest types, from wet evergreen forest to dry deciduous forest, and even in wooded grassland. It is often common in secondary forest, and is an emergent tree of the high forest. In the wetter types of forest, it seems to prefer well-drained sites." [Water dispersal may be rare or insignificant. Animal-dispersed, and not described as commonly occurring in riparian areas] |

| Qsn # | Question | Answer |
|---|---|---|
| **706** | **Propagules bird dispersed** | **y** |
| | **Source(s)** | **Notes** |
| | Kankam, B. O., & Oduro, W. (2009). Frugivores and fruit removal of Antiaris toxicaria (Moraceae) at Bia Biosphere reserve, Ghana. Journal of Tropical Ecology, 25(2), 201-204 | "A total of 10 species of mammal and nine species of bird were observed to visit A. toxicaria at Bia Biosphere Reserve (Table 1); however, data on number of fruits removed or eaten were estimated for only potential seed dispersers. Mammals were responsible for 76.3% of fruits dispersed as compared with birds (23.7%). The western plantain-eater (Crinifer piscator) and the monkeys (Cercopithecus campbelli and C. petaurista)were the major seed dispersers among the birds and mammals respectively (Table 1). Fruit bats, especially Eidolon helvum removed more than 400 fruits in each night they visited the focal trees for 3 d." |
| | Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2003. Flora of China. Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis | "Drupes bright red to purple red, pear-shaped, ca. 2 cm in diam. when mature." |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 30 Nov 2018] | "The seeds are dispersed by animals such as birds, monkeys and antelopes, which relish the fruits." |

| 707 | **Propagules dispersed by other animals (externally)** | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Kankam, B. O., & Oduro, W. (2009). Frugivores and fruit removal of Antiaris toxicaria (Moraceae) at Bia Biosphere reserve, Ghana. Journal of Tropical Ecology, 25(2), 201-204 | "The fruits of A. toxicaria were processed differently by different frugivores" … "Paraxerus poensis was seen transporting fruits away from the parent tree." [A squirrel species transports fruit externally to consume pulp. Introduced rodents and mongoose might disperse seeds externall in Hawaiian Islands. Direct evidence lacking] |

| 708 | **Propagules survive passage through the gut** | **y** |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 30 Nov 2018] | "The seeds are dispersed by animals such as birds, monkeys and antelopes, which relish the fruits." [Seeds presumably survive gut passage] |

| 801 | **Prolific seed production (>1000/m2)** | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Orwa C,, Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org. [Accessed 4 Dec 2018] | "A. toxicaria produces large amounts of seed which are easily collected from the ground." [Densities unspecified] |

| Qsn # | Question | Answer |
|---|---|---|
| **802** | **Evidence that a persistent propagule bank is formed (>1 yr)** | **n** |
| | **Source(s)** | **Notes** |
| | Orwa C,, Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org. [Accessed 30 Nov 2018] | "A. toxicaria produces large amounts of seed which are easily collected from the ground. These seeds require no pretreatment. However they lose viability very fast and should be sown as soon as collected. About 70-90% of sown seeds germinate in 18-89 days." |
| | Lan, Q. Y., Luo, Y. L., Qiu, Y. P., Jin, B. Q., He, H. Y., & Yin, S. H. (2014). Storage of recalcitrant seeds of Antiaris toxicaria (Moraceae). Seed Science and Technology, 42(1), 97-100 | "Seeds of the tropical tree Antiaris toxicaria have typical recalcitrant storage behaviour. The purpose of this work was to examine the effects of temperature and moisture content (MC) on germination during storage. Germination of seeds with a MC of 1.14, 0.90, 0.76 or 0.68 g H2O g-1 DW was not significantly reduced when stored at 15°C for one year. However, seeds with a MC of 0.90 or 0.68 g g-1 DW stored at -20 C for one month lost viability, as did approximately 50% of those at 4°C. After one year, seeds with a MC of 0.90 g g-1 DW stored at 15°C had significantly higher germination percentage than those stored at -20, 4, 10 and 25°C; seeds with a MC of 0.68 g g-1 DW stored at 25°C had significantly higher germination percentage than those stored at -20, 4, 10 and 15°C. Thus, the lower the MC (0.68 g g-1 DW) of seeds, the higher the storage temperature (25°C) required to ensure seed survival." |
| | Bosu, P. P. & Krampah, E. (2005). Antiaris toxicaria Lesch. [Internet] Record from PROTA4U. Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 30 Nov 2018] | "Under natural conditions, the seeds lose viability rapidly, but when stored in wet sand at low temperatures they still may have a germination rate of 82% after 5 months." |

| | | |
|---|---|---|
| **803** | **Well controlled by herbicides** | |
| | **Source(s)** | **Notes** |
| | WRA Specialist. 2018. Personal Communication | Unknown. No information on herbicide efficacy or chemical control of this species |

| | | |
|---|---|---|
| **804** | **Tolerates, or benefits from, mutilation, cultivation, or fire** | **y** |
| | **Source(s)** | **Notes** |
| | Northern Land Manager. (2011). Fire responses of Antiaris toxicaria var. macrophylla. http://www.landmanager.org.au/#sort=sort_title%20asc&nid=523005. [Accessed 3 Dec 2018] | "Adult fire response: Resprouter (<30% mortality when subject to 100% leaf scorch)" [In contrast to other cited reference] |
| | de Padua, L.S., Bunyapraphatsara, N. & Lemmens, R.H.M.J. (Eds.). 1999. Plant Resources of South-East Asia. No 12(1). Medicinal and Poisonous Plants 1. Backhuys Publishers, Leiden, The Netherlands | "Trees of A. toxicaria have a good self-pruning ability; they are not resistant to fire. " |

| | | |
|---|---|---|
| **805** | **Effective natural enemies present locally (e.g. introduced biocontrol agents)** | |

| Qsn # | Question | Answer |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Daehler, C. C. & Baker, R. F. 2006. New Records of Naturalized and Naturalizing Plants Around Lyon Arboretum, Mānoa Valley, Oʻahu. Bishop Museum Occasional Papers 87: 3-18 | [Unknown] "This tree, which occurs in tropical rainforests throughout the Old World tropics, was first planted in the Arboretum in 1929. Lyon noted seedlings of this plant in 1946. In our current survey, roughly a dozen seedlings were seen within 100 m of planted specimens. This species may lack an effective disperser in Hawaiʻi. The drupes are fairly large (2 cm in diameter), and a large bird or bat would be required to transport the seeds. Nevertheless, the plant appears to be locally reproducing." |

**Summary of Risk Traits:**

High Risk / Undesirable Traits
• Elevation range exceeds 1000 m, demonstrating environmental versatility
• Grows in tropical climates
• Naturalized on Oahu (Hawaiian Islands)
• Latex toxic; latex and sawdust a skin irritant
• Seedling and saplings are shade tolerant
• Tolerates many soil types
• Reproduces by seed
• Seeds dispersed by birds, other animals & intentionally by people
• Reported to resprout after fires in Australia; other reports suggest trees are not resistant to fire

Low Risk Traits
• No reports of invasiveness or naturalization (with the exception of Oahu), but no evidence of widespread introduction outside native range
• Unarmed (no spines, thorns, or burrs)
• Provides fodder for livestock (palatable despite reports of toxicity)
• Not reported to spread vegetatively
• Seeds lose viability quickly

Second Screening Results for Tree/tree-like shrubs

(A) Shade tolerant or known to form dense stands?> Yes. A light demanding tree, but seedlings and sapling can establish in shade
(B) Bird or clearly wind-dispersed?> Dispersed by birds and other frugivorous animals
(C) Life cycle <4 years? No. Reaches maturity in 6+ years
Outcome = Evaluate