United States Department of Agriculture

Weed Risk Assessment for *Triplaris melaenodendron* (Bertol.) Standl. & Steyerm. (Polygonaceae) – Long John

United States Department of Agriculture

Animal and Plant Health Inspection Service

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Version 1

Left: Line drawing of *T. melaenodendron* (source: Vozzo, 2002). Right: Herbarium sheet demonstrating abundance of fruit in one inflorescence (source: OTS, 2013)

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Introduction Plant Protection and Quarantine (PPQ) regulates noxious weeds under the authority of the Plant Protection Act (7 U.S.C. § 7701-7786, 2000) and the Federal Seed Act (7 U.S.C. § 1581-1610, 1939). A noxious weed is defined as "any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment" (7 U.S.C. § 7701-7786, 2000). We use weed risk assessment (WRA)—specifically, the PPQ WRA model (Koop et al., 2012)—to evaluate the risk potential of plants, including those newly detected in the United States, those proposed for import, and those emerging as weeds elsewhere in the world.

Because the PPQ WRA model is geographically and climatically neutral, it can be used to evaluate the baseline invasive/weed potential of any plant species for the entire United States or for any area within it. As part of this analysis, we use a stochastic simulation to evaluate how much the uncertainty associated with the analysis affects the model outcomes. We also use GIS overlays to evaluate those areas of the United States that may be suitable for the establishment of the plant. For more information on the PPQ WRA process, please refer to the document, *Background information on the PPQ Weed Risk Assessment*, which is available upon request.

***Triplaris melaenodendron* (Bertol.) Standl. & Steyerm. – Long John**

Species Information

Family: Polygonaceae

Synonyms: *T. colombiana* Meisener (Brandbyge, 1986); *T. macombii* Donn. Smith (Brandbyge, 1986); *T. macombii* var. *rufescens* Donn. Sm. (Brandbyge, 1986; The Plant List, 2013); *Vellasquezia melaenodendron* Bertol. (basionym) (NGRP, 2013). *Triplaris melaenodendron* subsp. *melaenodendron* is often identified as *T. americana* in the earlier literature (Brandbyge, 1986; Longino, 1996).

Initiation: The PERAL Weed Team initiated this assessment because *Triplaris melaenodendron* was recently detected in the United States for the first time (Wunderlin et al., 2010).

Foreign distribution: This species is native from southern Mexico (Chiapas and Oaxaca) through Central America and into central Colombia (Brandbyge, 1986; NGRP, 2013). Other than the detection noted above, we found no evidence that it has been introduced elsewhere beyond its native range.

U.S. distribution and status: *Triplaris melaenodendron* is known to be present only in Collier County, Florida, in the United States (NRCS, 2013). It was detected in November 2007 as a small population of several dozen plants in several age classes (trees to seedlings). The species was reported to be spreading by seed (Wunderlin et al., 2010). We found no evidence it is cultivated in the United States.

WRA area[1]: Entire United States, including territories.

[1] "WRA area" is the area in relation to which the weed risk assessment is conducted [definition modified from that for "PRA area" (IPPC, 2012).

1. *Triplaris melaenodendron* analysis

Establishment/Spread Potential *Triplaris melaenodendron* is a wind-dispersed, dioecious tree species from the tropics (Brandbyge, 1986). Besides its association with ant species, we found no detailed ecological information. The strongest evidence we have for invasive potential is its establishment in South Florida (see above), although some congeners are considered invasive (Henderson, 2001; Macdonald et al., 2003; Meyer et al., 2008; Randall, 2012). Based on herbarium records (OTS, 2013) and one a remark in a USDA tropical seed tree manual (Vozzo, 2002), we suspect *T. melaenodendron* trees can produce at least a thousand seeds per square meter. We had high uncertainty for this element.
Risk score = 4 Uncertainty index = 0.31

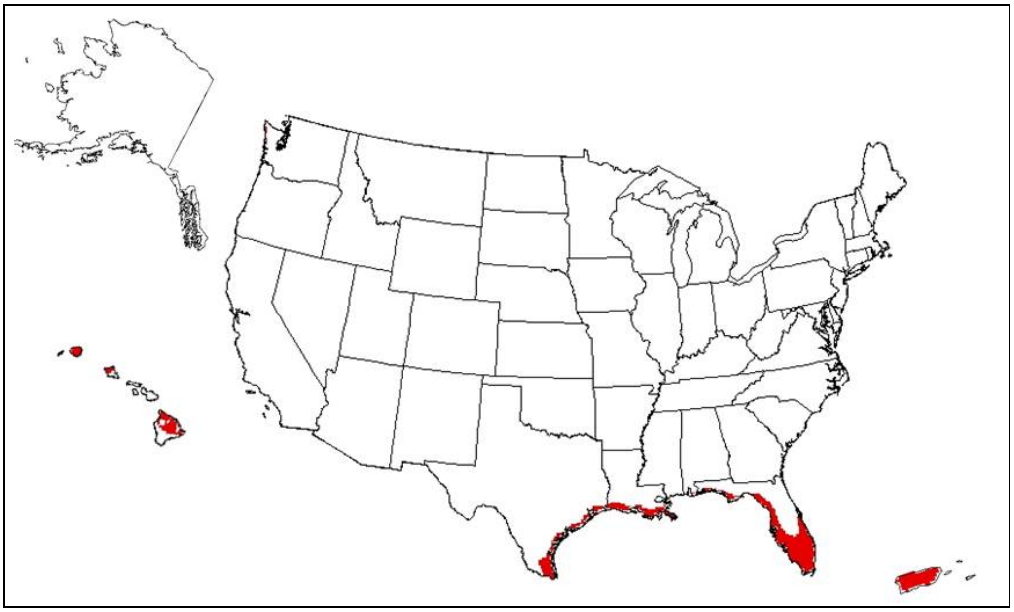
Impact Potential We found no evidence that *T. melaenodendron* causes any harm in natural, anthropogenic, or agricultural systems, but that was not surprising given the limited information available on this species and the lack of any history of behavior beyond its native range. We had high uncertainty for this element.
Risk score = 1.0 Uncertainty index = 0.32

Geographic Potential Based on three climatic variables, we estimate that about 1 percent of the United States is suitable for the establishment of *T. melaenodendron* (Fig. 1). This predicted distribution is based on the species' known distribution elsewhere in the world and includes point-referenced localities and areas of occurrence. The map for *T. melaenodendron* represents the joint distribution of Plant Hardiness Zones 10-13, areas with 20-100+ inches of annual precipitation, and the following Köppen-Geiger climate classes: tropical rainforest, tropical savanna, marine west coast, and humid subtropical.

The area estimated likely represents a conservative estimate as it only uses three climatic variables. Other environmental variables, such as soil and habitat type, may further limit the areas in which this species is likely to establish. *Triplaris melaenodendron* grows in woods, thickets, forests, edges, roadsides, and secondary growth forests (Gargiullo et al., 2008; Matuda, 1950; Standley and Steyermark, 1946). It primarily occurs in wet habitats (Brandbyge and Øllgaard, 1984). In drier climates, it grows along streams (Brandbyge, 1986; Longino, 1996)

Entry Potential We did not assess the entry potential of *T. melaenodendron* because it is already present in the United States (Wunderlin et al., 2010).

Figure 1. Predicted distribution of *T. melaenodendron* in the United States. Map insets for Alaska, Hawaii, and Puerto Rico are not to scale.



2. Results and Conclusion

Model Probabilities: P(Major Invader) = 7.0%
P(Minor Invader) = 64.3%
P(Non-Invader) = 28.7%

Risk Result = Evaluate Further

Secondary Screening = Evaluate Further

Figure 2. *Triplaris melaenodendron* risk score (black box) relative to the risk scores of species used to develop and validate the PPQ WRA model (other symbols). See Appendix A for the complete assessment.

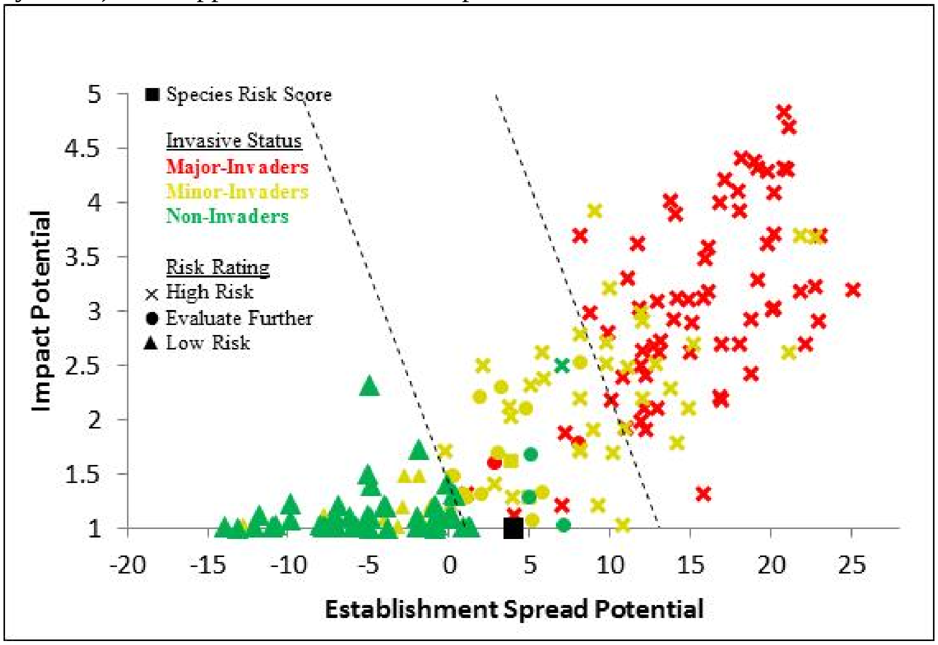
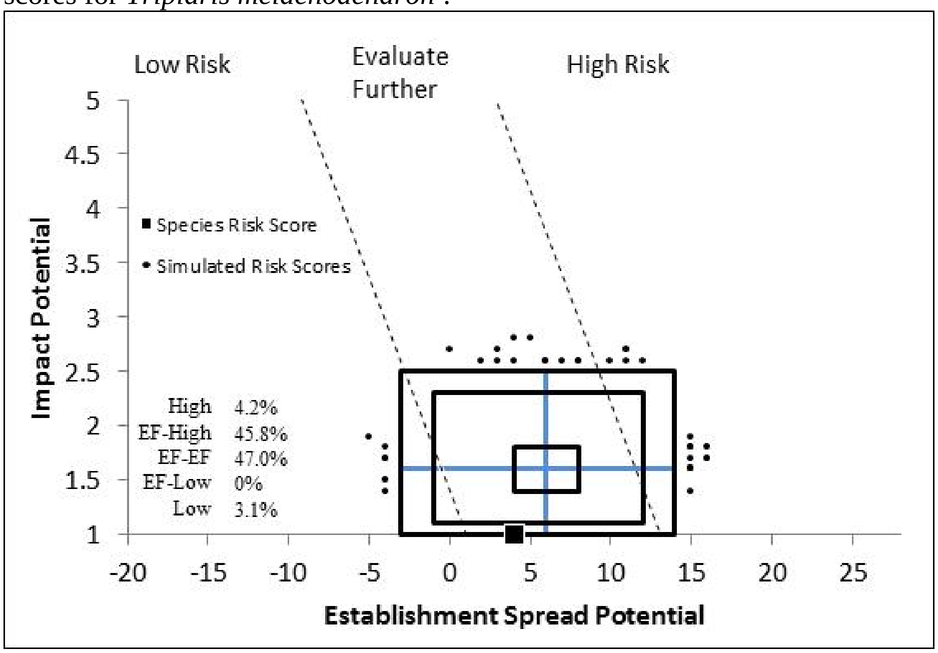


Figure 3. Monte Carlo simulation results (N=5,000) for uncertainty around the risk scores for *Triplaris melaenodendron*[a].



[a] The blue "+" symbol represents the medians of the simulated outcomes. The smallest box contains 50 percent of the outcomes, the second 95 percent, and the largest 99 percent.

3. Discussion

The result of the weed risk assessment for *T. melaenodendron* is Evaluate Further, even after secondary screening (Fig. 2). Because the behavior of this species outside of its native range (except for southern Florida) is unknown and because we found very little information on its biology, our assessment had particularly high uncertainty. We were unable to answer five questions in the Establishment/Spread risk element, and many others were answered with high uncertainty. Our uncertainty analysis indicated an unusually large range of possible scores, but the result was high risk much more often (about 50 percent of the time) than it was low risk (3 percent) (Fig. 3). Oftentimes, cultivated plants provide the initial source for naturalizing species, but we found no evidence that this species is cultivated. Although we found no evidence of harm or impact caused by this species, we are concerned about this species' invasive potential because it has become naturalized in Florida without any obvious sources of propagules, and because a few congeners are invasive beyond their native range (Henderson, 2001; Macdonald et al., 2003; Meyer et al., 2008; Randall, 2012). For example, *T. weigeltiana* forms dense forests in French Polynesia (Meyer et al., 2008). In South Africa, *T. americana* spreads along roads and streams, smothering native vegetation (ARC, 2011). A phylogenetic study of several members of the genus *Triplaris* using chloroplast and nuclear DNA showed that *T. melaenodendron* is closely related to *T. cumingiana*, *T. americana*, *T. purdiei* (Sanchez and Kron, 2011), the first two of which are considered weeds (Randall, 2012).

Triplaris species, including *T. melaenodendron*, are myrmecophilous (benefited by ants) plants that have hollow stems where tree-inhabiting ants dwell (Gargiullo et al., 2008; Hadadd Junior et al., 2009; Longino, 1996). In this symbiotic relationship, the plants provide the ants with a home, and in return the ants defend the plants from herbivores and competing plants, including members of the same host plant species (Heil et al., 2001; Weir et al., 2012). Resident ants of these host trees will often prune the leaves of other plants that touch the canopy of its host including seedlings that germinate under the trees (Larrea-Alcázar and Simonetti, 2007). Ants living in *Triplaris* also present a health hazard as they will aggressively attack people who disturb the tree (Hadadd Junior et al., 2009; Standley and Steyermark, 1946). In Brazil, *Triplaris* trees are often referred to as 'novice trees' because only naïve people touch them (Hadadd Junior et al., 2009). It is beyond the scope of our assessment to try to determine if establishment of *Triplaris* trees in the United States would promote similar symbiotic relationships with any ant species in the United States.

4. Literature Cited

7 U.S.C. § 1581-1610. 1939. The Federal Seed Act, Title 7 United States Code § 1581-1610.

7 U.S.C. § 7701-7786. 2000. Plant Protection Act, Title 7 United States Code § 7701-7786.

ARC. 2011. Southern Africa Plant Invaders Atlas (SAPIA) News. Agriculture Research Council (ARC). Last accessed June 28, 2011, http://www.arc.agric.za/home.asp?pid=1&toolid=2&sec=1001.

Brandbyge, J. 1986. A revision of the genus *Triplaris* (Polygonaceae). Nordic Journal of Botany 6(5):545-570.

Brandbyge, J., and B. Øllgaard. 1984. Inflorescence structure and generic delimitation of *Triplaris* and *Ruprechtia* (Polygonaceae). Nordic Journal of Botany 4(6):765-769.

Cockerell, T. D. A. 1928. III. Bees collected by Dr. W. M. Wheeler at flowers of *Triplaris*. Psyche: A Journal of Entomology 35(3):170-172.

Engel, M. S., and F. Dingemans-Bakels. 1980. Nectar and pollen resources for stingless bees (Meliponinae, Hymenoptera) in Surinam (South America). Apidologie 11(4):341-350.

Gargiullo, M. B., B. Magnuson, and L. Kimball. 2008. A Field Guide to Plants of Costa Rica. Oxford University Press, New York. 494 pp.

GBIF. 2013. GBIF, Online Database. Global Biodiversity Information Facility (GBIF). http://data.gbif.org/welcome.htm. (Archived at PERAL).

Hadadd Junior, V., B. L. R. Hernandes, and A. Fransozo. 2009. The Triplaria tree (*Triplaris* spp) and *Pseudomyrmex* ants: A symbiotic relationship with risks of attack for humans. Revista da Sociedade Brasileira de Medicina Tropical 42(6):727-729.

Heap, I. 2013. The international survey of herbicide resistant weeds. Weed Science Society of America. www.weedscience.com. (Archived at PERAL).

Heide-Jorgensen, H. S. 2008. Parasitic Flowering Plants. Brill, Leiden, The Netherlands. 438 pp.

Heil, M., B. Fiala, C. Maschwitz, and K. E. Linsenmair. 2001. On benefits of indirect defence: short- and long-term studies of antiherbivore protection via mutualistic ants. Oecologia 126:395-403.

Henderson, L. 2001. Alien Weeds and Iinvasive Plants: A Complete Guide to Declared Weeds and Invaders in South Africa. Agricultural Research Council, South Africa. 300 pp.

IPPC. 2012. International Standards for Phytosanitary Measures No. 5: Glossary of Phytosanitary Terms. Food and Agriculture Organization of the United Nations, Secretariat of the International Plant Protection Convention (IPPC), Rome, Italy.

Koop, A., L. Fowler, L. Newton, and B. Caton. 2012. Development and validation of a weed screening tool for the United States. Biological Invasions 14(2):273-294.

Ladera, C. L., and P. A. Pineda. 2009. The physics of the spectacular flight of the *Triplaris* samaras. Latin-American Journal of Physics Education 3(3):557-565.

Larrea-Alcázar, D. M., and J. A. Simonetti. 2007. Why are there few seedlings beneath the myrmecophyte *Triplaris americana*? Acta Oecologica 32(1):112-118.

Longino, J. T. 1996. Taxonomic characterization of some live-stem inhabiting *Azteca* (Hymenoptera: Formicidae) in Costa Rica, with special reference to the ants of *Cordia* (Boraginaceae) and *Triplaris* (Polygonaceae). Journal of Hymenoptera Research 5:131-156.

Lozada, J. R., E. Arends, D. Sanchez, A. Villarreal, P. Soriano, and M. Costa. 2012. Vegetation succession of logged forest in the western alluvial plains of Venezuela. Journal of Tropical forest Science 24(3):300-311.

Mabberley, D. J. 2008. Mabberley's Plant-Book: A Portable Dictionary of Plants, their Classification and Uses (3rd edition). Cambridge University Press, New York. 1021 pp.

Macdonald, I. A. W., J. K. Reaser, C. Bright, L. E. Neville, G. W. Howard, S. J. Murphy, and G. Preston. 2003. Invasive alien species in southern Africa:

National reports & directory of resources. The Global Invasive Species Programme, Cape Town, South Africa. 125 pp.

Martin, P. G., and J. M. Dowd. 1990. A protein sequence study of the dicotyledons and its relevance to the evolution of the legumes and nitrogen fixation. Australian Systematic Botany 3:91-100.

Matuda, E. 1950. A contribution to our knowledge of the wild and cultivated flora of Chiapas. I. Districts Soconusco and Mariscal. American Midland Naturalist 44(3):513-616.

Meyer, J. Y., V. Wan, and J. F. Butaud. 2008. Les plantes envahissantes en Polynésie française. Guide illustré d'identification. Direction de l'Environnement/Délégation à la Recherche, Papeete. 86 pp.

NGRP. 2013. Germplasm Resources Information Network (GRIN). United States Department of Agriculture, Agricultural Research Service, National Genetic Resources Program (NGRP). http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl?language=en. (Archived at PERAL).

Nickrent, D. 2009. Parasitic plant classification. Southern Illinois University Carbondale, Carbondale, IL. Last accessed June 12, 2009, http://www.parasiticplants.siu.edu/ListParasites.html.

NRCS. 2013. The PLANTS Database. United States Department of Agriculture, Natural Resources Conservation Service (NRCS), The National Plant Data Center. http://plants.usda.gov/cgi_bin/. (Archived at PERAL).

OTS. 2013. Las Cruces Herbarium, Online Database. Organization for Tropical Studies (OTS). http://www.ots.ac.cr/herbarium/. (Archived at PERAL).

Randall, R. P. 2012. A Global Compendium of Weeds, 2nd edition. Department of Agriculture and Food, Western Australia, Perth, Australia. 1107 pp.

Sanchez, A., and K. A. Kron. 2011. Phylogenetic relationships of *Triplaris* and *Ruprechtia*: Re-delimitation of the recognized genera and two tew genera for Tribe Triplarideae (Polygonaceae). Systematic Botany 36(3):702-710.

Standley, P. C., and J. A. Steyermark. 1946. Flora of Guatemala. Fieldiana: Botany 24, Part IV:1-493.

The Plant List. 2013. Version 1 [Online Database]. Kew Botanic Gardens and the Missouri Botanical Garden. http://www.theplantlist.org/. (Archived at PERAL).

van der Pijl, L. 1982. Principles of Dispersal in Higher Plants (3 ed.). Springer-Verlag, Berlin. 214 pp.

Vozzo, J. A. (ed.). 2002. Tropical Tree Seed Manual. USDA Forest Service, Washington DC. 889 pp.

Weir, T. L., W. Kofer, S. Newbold, J. M. Vivanco, M. v. Haren, C. Fritchman, A. T. Dossey, S. Bartram, W. Boland, and E. G. Cosio. 2012. Plant-inhabiting ant utilizes chemical cues for host discrimination [Abstract]. Biotropica 44(2):246-253.

Wright, J. 2009. Tropical plant reproduction biology. Smithsonian Tropical Reserach Institute (STRI). Last accessed February 24, 2009, http://striweb.si.edu/esp/tesp/plant_intro.htm.

Wunderlin, R. P., B. F. Hansen, A. R. Franck, K. A. Bradley, and J. M. Kunzer. 2010. Plants new to Florida. Journal of the Botanical Research Institute of Texas 4(1):349-355.

Appendix A. Weed risk assessment for *Triplaris melaenodendron* (Bertol.) Standl. & Steyerm. (Polygonaceae). The following information came from the original risk assessment, which is available upon request (full responses and all guidance). We modified the information to fit on the page.

Question ID	**Answer - Uncertainty**	**Score**	**Notes (and references)**
ESTABLISHMENT/SPREAD POTENTIAL			
ES-1 (Status/invasiveness outside its native range)	e - mod	2	This species is native to southern Mexico (Chiapas and Oaxaca) through Central America and into central Colombia (Brandbyge, 1986; NGRP, 2013). Except for one small naturalized population in Florida (Wunderlin et al., 2010), it is not known to be present or have been introduced anywhere else in the world. The Florida population was first detected in November 2007 and consists of several dozen plants representing several age classes (trees to seedlings). Alternate answers for the Monte Carlo simulation were "f" and "d". We are using moderate uncertainty as we found no other information on the status of the Florida population.
ES-2 (Is the species highly domesticated)	n - low	0	This species is occasionally cultivated as an ornamental (Wunderlin et al., 2010), but we found no other evidence to support that. One factsheet on the species states that the wood is used in making crates, furniture components, fiberboard, and other products in Venezuela (Vozzo, 2002) but this is likely a different species, since *T. melaenodendron* is reported to occur in only Colombia in South America (Brandbyge, 1986). We found no evidence of breeding to reduce traits associated with weed potential.
ES-3 (Weedy congeners)	y - negl	1	This is a genus of about 17 tropical American dioecious tree species (Mabberley, 2008). *Triplaris americana* invades forests and riverbanks, is prohibited, and must be controlled in South Africa (Henderson, 2001; Macdonald et al., 2003). *Triplaris wiegeltiana* is invasive in French Polynesia and forms dense stands (Meyer et al., 2008). Three species of *Triplaris* are considered weeds (Randall, 2012). A phylogenetic study of several members of the genus *Triplaris* using chloroplast and nuclear DNA showed that *T. melaenodendron* is closely related to T. *cumingiana*, *T. americana*, *T. purdiei* (Sanchez and Kron, 2011).
ES-4 (Shade tolerant at some stage of its life cycle)	n - high	0	All species of *Triplaris* are pioneers of forest clearings and are important components of secondary succession (Brandbyge, 1986). Given that *T. melaenodendron* is reported to occur along edges and roadsides, and in second growth forests (Gargiullo et al., 2008), we don't think it is likely to be shade tolerant. However, because many tropical tree species are shade tolerant, we used high uncertainty. The congener, *T. americana* is a late secondary successional species (Lozada et al., 2012).
ES-5 (Climbing or smothering growth form)	n - negl	0	This species is a tree, 6-12 (-20) meters tall (Brandbyge, 1986; Vozzo, 2002). "All species of *Triplaris* are fast growing, small to medium-sized or occasionally tall trees" (Brandbyge, 1986).
ES-6 (Forms dense thickets)	n - high	0	We found no evidence about this for this species. Given that *Triplaris wiegeltiana* is invasive in French Polynesia and forms dense stands (Meyer et al., 2008), we used high uncertainty.

Question ID	Answer - Uncertainty	Score	Notes (and references)
ES-7 (Aquatic)	n - negl	0	*Triplaris* is composed of trees (Brandbyge, 1986), which usually grow along streams and in other wet habitats (Brandbyge and Øllgaard, 1984). We found no evidence that these are aquatic species.
ES-8 (Grass)	n - negl	0	Species is not a grass, rather it is in the Polygonaceae family (Brandbyge, 1986; Sanchez and Kron, 2011).
ES-9 (Nitrogen-fixing woody plant)	n - negl	0	Although the species is woody (Sanchez and Kron, 2011), it is not a member of a family known to contain nitrogen-fixing species (Martin and Dowd, 1990).
ES-10 (Does it produce viable seeds or spores)	y - negl	1	Spreading by seed in Florida (Wunderlin et al., 2010). Produces viable seed (Vozzo, 2002).
ES-11 (Self-compatible or apomictic)	n - negl	-1	The genus is composed of dioecious species (Brandbyge and Øllgaard, 1984; Mabberley, 2008). *Triplaris wiegeltiana* and *T. americana* are dioecious (Heil et al., 2001; Meyer et al., 2008).
ES-12 (Requires special pollinators)	n - high	0	Not much is known about pollination in *Triplaris*. Species in this genus produce floral nectar (Heil et al., 2001) and copious pollen (Brandbyge, 1986). Several species of bees have been reported visiting the flowers, including *Apis mellifera* (Brandbyge, 1986; Cockerell, 1928; Engel and Dingemans-Bakels, 1980). "It cannot be excluded that both anemogamy and entomogamy play a role in pollination" (Brandbyge, 1986). Anemogamy is pollination via wind. Given that several bee species have been observed visiting flowers and that wind pollination is suspected, we don't find much support for specialist pollinators for the genus as a whole. Furthermore, the Florida population of *T. melaenodendron* is spreading by seed. Because it is unlikely that both plant and pollinator were simultaneously introduced, *T. melaenodendron* seems unlikely to require specialist pollinators.
ES-13 (Minimum generation time)	d - high	-1	We found no information on this species' generation time. Given that members of this genus are secondary successional species and fast-growing (Brandbyge, 1986; Gargiullo et al., 2008; Vozzo, 2002), these medium-sized trees probably reach reproductive maturity shortly after four years. Furthermore, it is unlikely they reach maturity in less than 2 years, as they are woody trees. Alternate answers for the Monte Carlo simulation were both "c."
ES-14 (Prolific reproduction)	y - high	1	Produces single-seeded fruit (an achene) (Brandbyge, 1986). A single inflorescence (a raceme) may hold 50 fruit (Vozzo, 2002). Thus given that these are medium-sized trees, it seems likely that at least 1000 seeds may be produced in a square meter. In one study, 90 percent of seeds germinated (Vozzo, 2002).
ES-15 (Propagules likely to be dispersed unintentionally by people)	? - max	0	Unknown.
ES-16 (Propagules likely to disperse in trade as contaminants or hitchhikers)	? - max	0	Unknown.
ES-17 (Number of natural dispersal vectors)	1	-2	Fruit and seed description for ES-17a through ES-17e: The outer perianth parts are accrescent as wings on the fruit (Mabberley, 2008). The genus produces trigonous achenes

Question ID	Answer - Uncertainty	Score	Notes (and references)
			(Brandbyge, 1986; Sanchez and Kron, 2011). "Achenes trialate, 10-12(-17) X 6.5-0 mm, dark yellowish-brown to brown, subglabrous to asperulous-punctate, with a short beak, 1-1.5 mm long; styles 3-4 mm long" (Brandbyge, 1986). Achenes about 1 cm (Standley and Steyermark, 1946).
ES-17a (Wind dispersal)	y - negl		The genus is wind dispersed (Mabberley, 2008). *Triplaris weigeltiana*, *T. cumingiana*, *T. caracasana*, and *T. surinamensis* are wind dispersed (Ladera and Pineda, 2009; Meyer et al., 2008; van der Pijl, 1982; Wright, 2009). The winged seeds indicate they are adapted to wind dispersal.
ES-17b (Water dispersal)	? - max		We found no evidence for water dispersal. This species is moderately abundant along the western side of Costa Rica where it occurs along streams in dry forests (Longino, 1996). Because it grows along streams, a significant number of seeds may be dispersed downstream, even though it is clearly adapted for wind dispersal. Consequently, answering unknown.
ES-17c (Bird dispersal)	n - low		We found no evidence. Furthermore, fruit is adapted for wind dispersal and does not have any adaptations to promote bird dispersal (Brandbyge, 1986).
ES-17d (Animal external dispersal)	n - low		We found no evidence. Furthermore, there are no adaptations to promote attachment to animals (Brandbyge, 1986).
ES-17e (Animal internal dispersal)	n - low		We found no evidence and the seeds have no obvious adaptations to attract frugivores. Furthermore, the large seeds would likely be destroyed by mastication.
ES-18 (Evidence that a persistent (>1yr) propagule bank (seed bank) is formed)	? - max	0	Unknown.
ES-19 (Tolerates/benefits from mutilation, cultivation or fire)	? - max	0	The genus is reported to reproduce vegetatively from suckers (Brandbyge, 1986). In addition, *T. weigeltiana* like other species from riverine habitats can regenerate from fallen trunks by sending up vertical side branches (Brandbyge, 1986). Because it is not clear how aggressive suckering is for this genus and because the previous information is based on congeners, we answered unknown.
ES-20 (Is resistant to some herbicides or has the potential to become resistant)	n - low	0	We found no evidence this species is resistant to herbicides. It is also not listed by Heap (2013). Because we found no evidence this species is regularly exposed to herbicides (e.g., as agricultural weeds would be), it seems unlikely to have developed herbicide resistance.
ES-21 (Number of cold hardiness zones suitable for its survival)	4	0	
ES-22 (Number of climate types suitable for its survival)	4	2	
ES-23 (Number of precipitation bands suitable for its survival)	9	1	
IMPACT POTENTIAL			
General Impacts			
Imp-G1 (Allelopathic)	n - mod	0	Aqueous extracts from the congener *Triplaris americana* reduced the growth of wheat seeds but not the germination of cacao seeds (Larrea-Alcázar and Simonetti, 2007). Because this evidence is from a congener, albeit one that is closely

Question ID	Answer - Uncertainty	Score	Notes (and references)
			related, and because it was based on experimental and not field evidence, we did not consider this strong enough evidence to answer yes.
Imp-G2 (Parasitic)	n - negl	0	We found no evidence. The Polygonaceae family is not known to contain parasitic species (Heide-Jorgensen, 2008; Nickrent, 2009).
Impacts to Natural Systems			
Imp-N1 (Change ecosystem processes and parameters that affect other species)	n - high	0	Excluding the recently detected population in South Florida, we found no evidence this species occurs outside of its native range. Given the lack of detailed biological information on this species and the lack of history elsewhere, we are answering most questions in this subsection with high uncertainty. This approach is further warranted as three congeners of *T. melaenodendron* are considered weeds, two of which are natural areas invaders (see evidence under ES-3). We found no evidence that *T. melaenodendron* changes ecosystem processes.
Imp-N2 (Change community structure)	n - high	0	We found no evidence.
Imp-N3 (Change community composition)	n - high	0	We found no evidence.
Imp-N4 (Is it likely to affect federal Threatened and Endangered species)	n - high	0	We found no evidence.
Imp-N5 (Is it likely to affect any globally outstanding ecoregions)	n - high	0	We found no evidence.
Imp-N6 (Weed status in natural systems)	a - mod	0	We found no evidence. Alternate answers for the Monte Carlo simulation were both "b."
Impact to Anthropogenic Systems (cities, suburbs, roadways)			
Imp-A1 (Impacts human property, processes, civilization, or safety)	n - high	0	We found no evidence. For this particular trait. Because this species occurs in disturbed habitats and along roadsides (Gargiullo et al., 2008), it may become an anthropogenic weed.
Imp-A2 (Changes or limits recreational use of an area)	? - max		*Triplaris* species, including *T. melaenodendron*, are myrmecophilous (benefitting from ants) plants that have hollow stems where tree-inhabiting plants dwell (Gargiullo et al., 2008; Hadadd Junior et al., 2009; Longino, 1996). In this symbiotic relationship, the plants provide the ants a home, while the ants defend the plants from herbivores and competing plants, including conspecifics (Heil et al., 2001; Weir et al., 2012). *Pseudomyrmex* ants living in *Triplaris* represent a health hazard as they will aggressively attack people who disturb the tree (Hadadd Junior et al., 2009; Standley and Steyermark, 1946). In Brazil, *Triplaris* trees are often referred to as ‘novice trees’ because only naïve people touch them (Hadadd Junior et al., 2009). Aggressive ants are reported to reside within *T. melaenodendron* in its native range (Gargiullo et al., 2008). If this species became widely naturalized in the United States, it may become associated with biting and stinging ants in its new range and discourage people from using those areas.
Imp-A3 (Outcompetes,	n - high	0	We found no evidence.

Question ID	Answer - Uncertainty	Score	Notes (and references)
replaces, or otherwise affects desirable plants and vegetation)			
Imp-A4 (Weed status in anthropogenic systems)	a - mod	0	In its native range, this species sometimes occurs along roads and edges (Gargiullo et al., 2008; Vozzo, 2002), but we found no evidence it is considered a weed. Alternate answers for the Monte Carlo simulation were both "b."
Impact to Production Systems (agriculture, nurseries, forest plantations, orchards, etc.)			
Imp-P1 (Reduces crop/product yield)	n - mod	0	We found no evidence.
Imp-P2 (Lowers commodity value)	n - mod	0	We found no evidence.
Imp-P3 (Is it likely to impact trade)	n - mod	0	We found no evidence.
Imp-P4 (Reduces the quality or availability of irrigation, or strongly competes with plants for water)	n - mod	0	We found no evidence.
Imp-P5 (Toxic to animals, including livestock/range animals and poultry)	? - max		We found no evidence that *T. melaenodendron* is toxic. However, given that this species and other members of the genus form symbiotic relationships with aggressive ants (see evidence under Imp-A2), animal health could be affected by stings from poisonous ants. Consequently, we answered unknown.
Imp-P6 (Weed status in production systems)	a - mod	0	We found no evidence. Alternate answers for the Monte Carlo simulation were both "b."
GEOGRAPHIC POTENTIAL			Unless otherwise indicated, the following evidence represents geographically referenced, point references obtained from the Global Biodiversity Information Facility (GBIF, 2013).
Plant cold hardiness zones			
Geo-Z1 (Zone 1)	n - negl	N/A	We found no evidence.
Geo-Z2 (Zone 2)	n - negl	N/A	We found no evidence.
Geo-Z3 (Zone 3)	n - negl	N/A	We found no evidence.
Geo-Z4 (Zone 4)	n - negl	N/A	We found no evidence.
Geo-Z5 (Zone 5)	n - negl	N/A	We found no evidence.
Geo-Z6 (Zone 6)	n - negl	N/A	We found no evidence.
Geo-Z7 (Zone 7)	n - negl	N/A	We found no evidence.
Geo-Z8 (Zone 8)	n - negl	N/A	We found no evidence.
Geo-Z9 (Zone 9)	n - high	N/A	We found no evidence.
Geo-Z10 (Zone 10)	y - mod	N/A	The U.S. location just a few miles southwest of Immokalee Florida (Wunderlin et al., 2010) is in this zone.
Geo-Z11 (Zone 11)	y - low	N/A	A couple of points in Mexico and El Salvador.
Geo-Z12 (Zone 12)	y - negl	N/A	Costa Rica, Guatemala, and Mexico.
Geo-Z13 (Zone 13)	y - negl	N/A	Costa Rica, Guatemala, and Mexico.
Köppen-Geiger climate classes			
Geo-C1 (Tropical rainforest)	y - negl	N/A	Costa Rica, Guatemala, and Mexico.
Geo-C2 (Tropical savanna)	y - negl	N/A	Costa Rica, El Salvador, and Mexico.
Geo-C3 (Steppe)	n - high	N/A	This species is common along the western coast of Central America (Brandbyge, 1986; Longino, 1996), which includes a thin band of this climate type along Guatemala. Some points fall near this narrow band, but none fall inside it. Because this species does not occur further north along Mexico's west coast

Question ID	Answer - Uncertainty	Score	Notes (and references)
			where this climate class is much more prevalent, we assumed it is not well adapted to this climate type.
Geo-C4 (Desert)	n - negl	N/A	We found no evidence.
Geo-C5 (Mediterranean)	n - low	N/A	We found no evidence.
Geo-C6 (Humid subtropical)	y - mod	N/A	The U.S. location just a few miles southwest of Immokalee Florida (Wunderlin et al., 2010) is in this climate type.
Geo-C7 (Marine west coast)	y - mod	N/A	Two points occur in Guatemala.
Geo-C8 (Humid cont. warm sum.)	n - low	N/A	We found no evidence.
Geo-C9 (Humid cont. cool sum.)	n - negl	N/A	We found no evidence.
Geo-C10 (Subarctic)	n - negl	N/A	We found no evidence.
Geo-C11 (Tundra)	n - negl	N/A	We found no evidence.
Geo-C12 (Icecap)	n - negl	N/A	We found no evidence.
10-inch precipitation bands			We found no evidence.
Geo-R1 (0-10 inches; 0-25 cm)	n - negl	N/A	We found no evidence.
Geo-R2 (10-20 inches; 25-51 cm)	n - high	N/A	We found no evidence.
Geo-R3 (20-30 inches; 51-76 cm)	y - mod	N/A	Guatemala and Mexico.
Geo-R4 (30-40 inches; 76-102 cm)	y - low	N/A	Guatemala and Mexico.
Geo-R5 (40-50 inches; 102-127 cm)	y - negl	N/A	El Salvador, Guatemala, and Mexico.
Geo-R6 (50-60 inches; 127-152 cm)	y - negl	N/A	El Salvador and Nicaragua.
Geo-R7 (60-70 inches; 152-178 cm)	y - negl	N/A	Nicaragua. The U.S. location just a few miles southwest of Immokalee Florida (Wunderlin et al., 2010) is in this precipitation band.
Geo-R8 (70-80 inches; 178-203 cm)	y - negl	N/A	Costa Rica and El Salvador.
Geo-R9 (80-90 inches; 203-229 cm)	y - negl	N/A	Costa Rica.
Geo-R10 (90-100 inches; 229-254 cm)	y - negl	N/A	Costa Rica.
Geo-R11 (100+ inches; 254+ cm))	y - negl	N/A	Costa Rica.
ENTRY POTENTIAL			
Ent-1 (Plant already here)	y - negl	1	One naturalized population of this species is reported for southern Florida (Wunderlin et al., 2010).
Ent-2 (Plant proposed for entry, or entry is imminent)	-	N/A	
Ent-3 (Human value & cultivation/trade status)	-	N/A	
Ent-4 (Entry as a contaminant)			
Ent-4a (Plant present in Canada, Mexico, Central America, the Caribbean or China)	-	N/A	
Ent-4b (Contaminant of plant propagative material (except	-	N/A	

Question ID	**Answer - Uncertainty**	**Score**	**Notes (and references)**
seeds))			
Ent-4c (Contaminant of seeds for planting)	-	N/A	
Ent-4d (Contaminant of ballast water)	-	N/A	
Ent-4e (Contaminant of aquarium plants or other aquarium products)	-	N/A	
Ent-4f (Contaminant of landscape products)	-	N/A	
Ent-4g (Contaminant of containers, packing materials, trade goods, equipment or conveyances)	-	N/A	
Ent-4h (Contaminants of fruit, vegetables, or other products for consumption or processing)	-	N/A	
Ent-4i (Contaminant of some other pathway)	-	N/A	
Ent-5 (Likely to enter through natural dispersal)	-	N/A	