

Australia/New Zealand Weed Risk Assessment adapted for United States.

Data used for analysis published in: Gordon, D.R. and C.A. Gantz. 2008. Potential impacts on the horticultural industry of screening new plants for invasiveness. Conservation Letters 1: 227-235. Available at: <http://www3.interscience.wiley.com/cgi-bin/fulltext/121448369/PDFSTART>

| <i>Hapaline benthamiana</i> | | | |
|-----------------------------|--|--------|-------|
| Question number | Question | Answer | Score |
| 1.01 | Is the species highly domesticated? | n | 0 |
| 1.02 | Has the species become naturalised where grown? | | |
| 1.03 | Does the species have weedy races? | | |
| 2.01 | Species suited to U.S. climates (USDA hardiness zones; 0-low, 1-intermediate, 2-high) | 2 | |
| 2.02 | Quality of climate match data (0-low; 1-intermediate; 2-high) | 2 | |
| 2.03 | Broad climate suitability (environmental versatility) | n | 0 |
| 2.04 | Native or naturalized in regions with an average of 11-60 inches of annual precipitation | y | 1 |
| 2.05 | Does the species have a history of repeated introductions outside its natural range? | ? | |
| 3.01 | Naturalized beyond native range | n | -1 |
| 3.02 | Garden/amenity/disturbance weed | n | 0 |
| 3.03 | Weed of agriculture | n | 0 |
| 3.04 | Environmental weed | n | 0 |
| 3.05 | Congeneric weed | n | 0 |
| 4.01 | Produces spines, thorns or burrs | n | 0 |
| 4.02 | Allelopathic | | |
| 4.03 | Parasitic | n | 0 |
| 4.04 | Unpalatable to grazing animals | | |
| 4.05 | Toxic to animals | n | 0 |
| 4.06 | Host for recognised pests and pathogens | | |
| 4.07 | Causes allergies or is otherwise toxic to humans | n | 0 |
| 4.08 | Creates a fire hazard in natural ecosystems | | |
| 4.09 | Is a shade tolerant plant at some stage of its life cycle | | |
| 4.1 | Grows on one or more of the following soil types: alfisols, entisols, or mollisols | y | 1 |
| 4.11 | Climbing or smothering growth habit | n | 0 |
| 4.12 | Forms dense thickets | n | 0 |

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|--------------------|--|---|----------|
| 5.01 | Aquatic | n | 0 |
| 5.02 | Grass | n | 0 |
| 5.03 | Nitrogen fixing woody plant | n | 0 |
| 5.04 | Geophyte | y | 1 |
| 6.01 | Evidence of substantial reproductive failure in native habitat | n | 0 |
| 6.02 | Produces viable seed | | |
| 6.03 | Hybridizes naturally | | |
| 6.04 | Self-compatible or apomictic | | |
| 6.05 | Requires specialist pollinators | | |
| 6.06 | Reproduction by vegetative fragmentation | y | 1 |
| 6.07 | Minimum generative time (years) | | |
| 7.01 | Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas) | | |
| 7.02 | Propagules dispersed intentionally by people | ? | |
| 7.03 | Propagules likely to disperse as a produce contaminant | n | -1 |
| 7.04 | Propagules adapted to wind dispersal | n | -1 |
| 7.05 | Propagules water dispersed | | |
| 7.06 | Propagules bird dispersed | y | 1 |
| 7.07 | Propagules dispersed by other animals (externally) | n | -1 |
| 7.08 | Propagules dispersed by other animals (internally) | ? | |
| 8.01 | Prolific seed production | | |
| 8.02 | Evidence that a persistent propagule bank is formed (>1 yr) | | |
| 8.03 | Well controlled by herbicides | | |
| 8.04 | Tolerates, or benefits from, mutilation or cultivation | | |
| 8.05 | Effective natural enemies present in U.S. | | |
| Total Score | | | 1 |

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| Outcome | Accept* |
|----------------|----------------|

*Used secondary screen from: Daehler, C. C., J.L. Denslow, S. Ansari, and H. Kuo. 2004. A risk assessment system for screening out harmful invasive pest plants from Hawaii's and other Pacific islands. *Conserv. Biol.* 18: 360-368.

| section | # questions answered | satisfy minimum? |
|---------|----------------------|------------------|
| A | 10 | Yes |
| B | 7 | Yes |
| C | 10 | Yes |
| total | 27 | yes |

Data collected 2008

| Question number | Reference | Source data |
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| 1.01 | | cultivated, but no evidence of significant modification |
| 1.02 | | |
| 1.03 | | |
| 2.01 | 1. PERAL NAPPFAST Global Plant Hardiness (http://www.nappfast.org/Plant_hardiness/NAPPFAST%20Global%20zones/10-year%20climate/PLANT_HARDINESS_10YR%20lgnd.tif). 2. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?433474). 3. Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. 4. Kress, WJ, DeFilipps, RA, Farr, E, and Yin Yin Kyi, D (2003) A checklist of the trees, shrubs, herbs, and climbers of Myanmar. Contributions from the United States National Herbarium 45: 1-590. | 1. Global hardiness zones 10-13. 2. Indo-China: Laos; Thailand; Vietnam 3. Distribution almost entirely tropical. 4. Distribution: Bago, Mandalay, Mon, Yangon. |
| 2.02 | | |
| 2.03 | 1. Köppen-Geiger climate map (http://www.hydrol-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf). 2. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?433474). 3. Boyce, | 1. Only one climatic region. 2. Indo-China: Laos; Thailand; Vietnam 3. Distribution almost entirely tropical. [only 1-2 biomes]. 4. Distribution: Bago, Mandalay, Mon, Yangon. |

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| | PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. 4. Kress, WJ, DeFilipps, RA, Farr, E, and Yin Yin Kyi, D (2003) A checklist of the trees, shrubs, herbs, and climbers of Myanmar. Contributions from the United States National Herbarium 45: 1-590. | |
| 2.04 | Atlapedia Online (http://www.atlapedia.com/online/countries/). | For Laos: "average annual precipitation varying from 1,270 mm (50 inches) to 2,290 mm (90 inches) depending on the region"; For Thailand: "Average annual precipitation varies from 1,020 mm (40 inches) to 2,030 mm (80 inches) depending on the region."; For Vietnam: "Average annual precipitation in Hanoi is 1,830 mm (72 inches) with areas in the Annamite Mountains exceeding 4,060 mm (160 inches)" |
| 2.05 | 1. Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. 2. B and T World Seeds (http://www.b-and-t-world-seeds.com/cart_print.asp?species=Hapaline%20benthamiana&sref=522244). | 1. Cultivated in Bangkok [unclear whether in horticulture trade]. 2. Listed on B and T World Seeds website, but not currently available. |
| 3.01 | | no evidence |
| 3.02 | | no evidence |
| 3.03 | | no evidence |
| 3.04 | | no evidence |
| 3.05 | | no evidence |
| 4.01 | Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. | no description of these traits |
| 4.02 | | |
| 4.03 | Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. | no description of parasitism |
| 4.04 | | |
| 4.05 | Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. | no evidence |
| 4.06 | | |

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| 4.07 | Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. | no evidence |
| 4.08 | | |
| 4.09 | | |
| 4.1 | 1. USDA, National Resources Conservation Services (NRCS), Soil Survey Division, World Soil Resources (http://soils.usda.gov/use/worldsoils/mapindex/order.html). 2. Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. | 1. Ultisols are the predominant soil order in this region. 2. grows on granitic stone or limestone |
| 4.11 | 1. Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. 2. Mayo, SJ, Bogner, J, and Boyce, PC (1997) The Genera of Araceae. Royal Botanic Gardens, Kew, London. | 1. "Deciduous perennial herb up to 30 cm high". 2. "Habit: small to moderate, slender, seasonally dormant or evergreen herbs" [genus description]. |
| 4.12 | Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. | "It often occurs as extensive colonies as a result of the long stolons" [but is a low-growing herb]. |
| 5.01 | Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. | Terrestrial herb. |
| 5.02 | USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?433474). | Araceae |
| 5.03 | USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?433474). | Herbaceous; Araceae. |
| 5.04 | 1. Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. 2. Mayo, SJ, Bogner, J, and Boyce, PC (1997) The Genera of Araceae. Royal Botanic Gardens, Kew, | 1. "Tuberous; undergoes an annual dormant period". 2. "Tubers small" [genus description]. |

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| | London. | |
| 6.01 | | no evidence |
| 6.02 | | |
| 6.03 | | |
| 6.04 | | |
| 6.05 | Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. | "No pollination studies have been undertaken." |
| 6.06 | Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. | "Tuberous and stoloniferous". |
| 6.07 | | |
| 7.01 | | |
| 7.02 | 1. Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. 2. B and T World Seeds (http://www.b-and-t-world-seeds.com/cart_print.asp?species=Hapaline%20benthamiana&sref=522244). | 1. Cultivated in Bangkok [unclear whether in horticulture trade]. 2. Listed on B and T World Seeds website, but not currently available. |
| 7.03 | | no evidence |
| 7.04 | 1. Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. 2. Mayo, SJ, Bogner, J, and Boyce, PC (1997) The Genera of Araceae. Royal Botanic Gardens, Kew, London. | 1. Fruits are ellipsoid to subglobose berries, 4-6 mm in diameter. 2. "Berry: ellipsoid to globose...pericarp thin, 1-seeded, white. Seed: ellipsoid...very thin" [genus description]. [no evidence of adaptations to wind dispersal] |
| 7.05 | | |
| 7.06 | Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. | "The method of seed dispersal is unknown." But has small, fleshy berries. |
| 7.07 | 1. Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. 2. Mayo, SJ, Bogner, J, and Boyce, PC (1997) The Genera of Araceae. Royal Botanic Gardens, Kew, London. | 1. Fruits are ellipsoid to subglobose berries, 4-6 mm in diameter. 2. "Berry: ellipsoid to globose...pericarp thin, 1-seeded, white. Seed: ellipsoid...very thin" [genus description]. [no evidence of adaptations to external dispersal] |
| 7.08 | Boyce, PC (1996) The genus <i>Hapaline</i> (Araceae: Aroideae: Caladieae). Kew Bulletin 51: 63-82. | "The method of seed dispersal is unknown." But has small, fleshy berries. |
| 8.01 | | |
| 8.02 | | |

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| 8.03 | | |
| 8.04 | | |
| 8.05 | | |