UF IFAS UNIVERSITY of FLORIDA

Assessment of Non-native Plants in Florida's Natural Areas

assessment.ifas.ufl.edu

Assessment date 12 July 2017

| | ***Cryptocoryne walkeri*** **All Zones** | **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 Florida's USDA climate zones (0-low; 1-intermediate; 2-high)<br>North Zone: suited to Zones 8, 9<br>Central Zone: suited to Zones 9, 10<br>South Zone: suited to Zone 10 | 0 | |
| 2.02 | Quality of climate match data (0-low; 1-intermediate; 2-high) | 2 | |
| 2.03 | Broad climate suitability (environmental versatility) | y | 1 |
| 2.04 | Native or naturalized in habitats with periodic inundation<br>North Zone: mean annual precipitation 50-70 inches<br>Central Zone: mean annual precipitation 40-60 inches<br>South Zone: mean annual precipitation 40-60 inches | y | 1 |
| 2.05 | Does the species have a history of repeated introductions outside its natural range? | unk | |
| 3.01 | Naturalized beyond native range | unk | |
| 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 | y | 1 |
| 4.01 | Produces spines, thorns or burrs | n | 0 |
| 4.02 | Allelopathic | n | 0 |
| 4.03 | Parasitic | n | 0 |
| 4.04 | Unpalatable to grazing animals | unk | -1 |
| 4.05 | Toxic to animals | unk | 0 |
| 4.06 | Host for recognised pests and pathogens | n | 0 |
| 4.07 | Causes allergies or is otherwise toxic to humans | unk | 0 |
| 4.08 | Creates a fire hazard in natural ecosystems | n | 0 |
| 4.09 | Is a shade tolerant plant at some stage of its life cycle | y | 1 |
| 4.10 | Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols. | n | 0 |
| 4.11 | Climbing or smothering growth habit | n | 0 |
| 4.12 | Forms dense thickets | unk | 0 |
| 5.01 | Aquatic | y | 5 |
| 5.02 | Grass | n | 0 |
| 5.03 | Nitrogen fixing woody plant | n | 0 |
| 5.04 | Geophyte | n | 0 |

| | | | |
|---|---|---|---|
| 6.01 | Evidence of substantial reproductive failure in native habitat | n | 0 |
| 6.02 | Produces viable seed | y | 1 |
| 6.03 | Hybridizes naturally | y | 1 |
| 6.04 | Self-compatible or apomictic | y | 1 |
| 6.05 | Requires specialist pollinators | n | 0 |
| 6.06 | Reproduction by vegetative propagation | y | 1 |
| 6.07 | Minimum generative time (years) | 1 | 1 |
| 7.01 | Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas) | y | 1 |
| 7.02 | Propagules dispersed intentionally by people | y | 1 |
| 7.03 | Propagules likely to disperse as a produce contaminant | unk | -1 |
| 7.04 | Propagules adapted to wind dispersal | unk | -1 |
| 7.05 | Propagules water dispersed | y | 1 |
| 7.06 | Propagules bird dispersed | unk | -1 |
| 7.07 | Propagules dispersed by other animals (externally) | unk | -1 |
| 7.08 | Propagules dispersed by other animals (internally) | unk | -1 |
| 8.01 | Prolific seed production | unk | -1 |
| 8.02 | Evidence that a persistent propagule bank is formed (>1 yr) | n | -1 |
| 8.03 | Well controlled by herbicides | unk | 1 |
| 8.04 | Tolerates, or benefits from, mutilation or cultivation | ? | |
| 8.05 | | ? | |
| | **Total Score** | **10** | |
| | **Implemented Pacific Second Screening** | **NO** | |
| | **Risk Assessment Results** | **High** | |

| section | # questions answered | satisfy minimum? |
|---|---|---|
| A | 9 | yes |
| B | 8 | yes |
| C | 15 | yes |
| total | 32 | yes |

| | Reference | Source data |
|---|---|---|
| 1.01 | | Cultivated, but no evidence of selection for reduced weediness |
| 1.02 | | Skip to 2.01 |
| 1.03 | | Skip to 2.01 |
| 2.01 | 1. Global Plant Hardiness Zones for Phytosanitary Risk Analysis. http://naldc.nal.usda.gov/download/36586/PDF (Accessed: 22 May 2017) 2. AquariumLife. http://www.aquariumlife.com.au/content.php/714-Cryptocoryne-walkeri-Cryptocoryne-walkeri-lutea (Accessed: 22 May 2017) 3. BucePlant. https://buceplant.com/products/cryptocoryne-walkeri (Accessed: 22 May 2017) 4. The Crypts Pages. https://crypts.home.xs4all.nl/Cryptocoryne/Gallery/wal/wal.html (Accessed: 22 May 2017) 5. Florida Natural Areas Inventory. http://fnai.org/Invasives/Cryptocoryne_walkeri_FNAI.pdf (Accessed: 23 May 2017) | 1. Figure 3. Florida North Zone: Hardiness zones 8 and 9. Central Zone: Hardiness zones 9 and 10. South Zone: Hardiness zone 10. C. walkeri native to zones 10 and 11. 2. "Country of Origin: Sri Lanka" 3. "Origin: Sri Lanka" 4. See Sri Lanka distribution map 5. "Origin: Sri Lanka" |
| 2.02 | | Native range is well known. |
| 2.03 | 1. The University of Melbourne. Köppen-Geiger Climate Map of the World. http://people.eng.unimelb.edu.au/mpeel/koppen.html (Accessed: 22 May 2017) 2. AquariumLife. http://www.aquariumlife.com.au/content.php/714-Cryptocoryne-walkeri-Cryptocoryne-walkeri-lutea (Accessed: 22 May 2017) 3. BucePlant. https://buceplant.com/products/cryptocoryne-walkeri (Accessed: 22 May 2017) 4. The Crypts Pages. https://crypts.home.xs4all.nl/Cryptocoryne/Gallery/wal/wal.html (Accessed: 22 May 2017) 5. Florida Natural Areas Inventory. http://fnai.org/Invasives/Cryptocoryne_walkeri_FNAI.pdf (Accessed: 23 May 2017) | 1. Native or naturalized to Köppen-Geiger Climate Zones: Af, Am, Aw, Cwa 2. "Country of Origin: Sri Lanka" 3. "Origin: Sri Lanka" 4. See Sri Lanka distribution map 5. "Origin: Sri Lanka" |
| 2.04 | 1. Climate Charts. World Climate Maps. http://www.climate-charts.com/World-Climate-Maps.html#rain (Accessed: 22 May 2017) 2. AquariumLife. http://www.aquariumlife.com.au/content.php/714-Cryptocoryne-walkeri-Cryptocoryne-walkeri-lutea (Accessed: 22 May 2017) 3. BucePlant. https://buceplant.com/products/cryptocoryne-walkeri (Accessed: 22 May 2017) 4. The Crypts Pages. https://crypts.home.xs4all.nl/Cryptocoryne/Gallery/wal/wal.html (Accessed: 22 May 2017) 5. Florida Natural Areas Inventory. http://fnai.org/Invasives/Cryptocoryne_walkeri_FNAI.pdf (Accessed: 23 May 2017) | 1. Native and naturalized in areas with rainfall within these ranges. 2. "Country of Origin: Sri Lanka" 3. "Origin: Sri Lanka" 4. See Sri Lanka distribution map 5. "Origin: Sri Lanka" |
| 2.05 | 1. Florida Natural Areas Inventory. http://fnai.org/Invasives/Cryptocoryne_walkeri_FNAI.pdf (Accessed: 23 May 2017) | Likely, but very little evidence 1. "Established in the Rainbow river" |
| 3.01 | 1. Florida Natural Areas Inventory. http://fnai.org/Invasives/Cryptocoryne_walkeri_FNAI.pdf (Accessed: 23 May 2017) | Likely, but very little evidence 1. "Established in the Rainbow river" |
| 3.02 | 1. Florida Natural Areas Inventory. http://fnai.org/Invasives/Cryptocoryne_walkeri_FNAI.pdf (Accessed: 23 May 2017) | 1. "Habitat: Freshwater springs and rivers" |
| 3.03 | | No evidence |

| | | |
|---|---|---|
| 3.04 | 1. Florida Natural Areas Inventory. http://fnai.org/Invasives/Cryptocoryne_walkeri_FNAI.pdf (Accessed: 23 May 2017) | 1. "Habitat: Freshwater springs and rivers" |
| 3.05 | 1. Global Compendium of Weeds. http://www.hear.org/gcw/species/cryptocoryne_beckettii/ (Accessed: 23 May 2017) 2. USDA Weed Risk Assessment for Cryptocoryne beckettii Thwaites ex Trimen. (Araceae) – Beckett's water trumpet. https://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/wra/Cryptocoryne-beckettii.pdf (Accessed: 23 May 2017) . 3. Personnal communication with Niels Jacobsen via ResearchGate 7/112/2017 | 1. Cryptocoryne beckettii classified as an environmental weed 2. Cryptocoryne beckettii is an environmental weed 3. "What can be said/written about C. beckettii in Florida and Texas would also apply to C. walkerii. The two species can hybridize and produce fertile offspring." N. Jacobsen, pers. comm. |
| 4.01 | 1. The Crypts Pages. https://crypts.home.xs4all.nl/Cryptocoryne/Gallery/wal/wal.html (Accessed: 23 May 2017) | 1. See photos |
| 4.02 | | No evidence |
| 4.03 | | No evidence |
| 4.04 | | Aquatic, no information regarding grazing |
| 4.05 | | Aquatic, no information regarding grazing |
| 4.06 | | No evidence |
| 4.07 | | no evidence |
| 4.08 | | No evidence |
| 4.09 | 1. BucePlant. https://buceplant.com/products/cryptocoryne-walkeri (Accessed: 23 May 2017) 2. Aqua Eden. http://www.aquaeden.co.uk/cryptocoryne_walkeri.html (Accessed: 23 May 2017) | This is a submerged aquatic plant. Per WRA guidelines, this substantiates a "YES" answer for this question. 1. "Low to moderate lighting is enough to keep this plant going" 2. "Lighting : Medium" |
| 4.10 | | Per WRA guidelines:answer No for submerged or floating aquatic plants |
| 4.11 | | Submerged aquatic |
| 4.12 | 1. Plant Epidemiology and Risk Analysis Laboratory Center for Plant Health Science and Technology (2016) Weed Risk Assessment for Cryptocoryne beckettii. USDA Animal and Plant Health Inspection Service. | No evidence, but likely if established based on evidence from populations of the congener C. beckettii. |
| 5.01 | 1. Global Biodiversity Information System. http://www.gbif.org/species/2869125 (Accessed: 23 May 2017) 2. BucePlant. https://buceplant.com/products/cryptocoryne-walkeri (Accessed: 23 May 2017) 3. Aqua Eden. http://www.aquaeden.co.uk/cryptocoryne_walkeri.html (Accessed: 23 May 2017) 4. Florida Natural Areas Inventory. http://fnai.org/Invasives/Cryptocoryne_walkeri_FNAI.pdf (Accessed: 23 May 2017) | 1. "Habitat: Not marine" 2. "Although they are easier to grow submersed, they will also grow emersed and can produce flowers above the water. " 3. "Can Be Grown Emersed : Yes" 4. "Growth Habit: Submersed Aquatic" |
| 5.02 | 1. Aqua Eden. http://www.aquaeden.co.uk/cryptocoryne_walkeri.html (Accessed: 23 May 2017) 2. USDA Plants Database. https://plants.usda.gov/core/profile?symbol=CRWA4 (Accessed: 23 May 2017) | 1. "Plant Type: Rosette" 2. "Growth Habit: Forb/herb" |
| 5.03 | | |
| 5.04 | | |
| 6.01 | | No evidence |
| 6.02 | 1. Personnal communication with Niels Jacobsen via ResearchGate 7/112/2017 | Expert confirms anecdotal evidence from aquarium forums. "Viable seed is produced-seeds normally, easily produced." |

| | | |
|---|---|---|
| 6.03 | 1. Personnal communication with Niels Jacobsen via ResearchGate 7/112/2017 2. Jacono (2002) Cryptocoryne beckettii complex (Araceae) introduced at a Florida spring. Sida 20; 819-832. | 1. What can be said/written about C. beckettii in Florida and Texas would also apply to C. walkerii. The two species can hybridize and produce fertile offspring. N. Jacobsen, pers. comm. 2. "A vegetative population of Cryptocoryne (Araceae), introduced at a Florida spring, appeared to represent three closely related species in the C. beckettii complex: C. beckettii Thw. ex Trimen, C. wendtii de Wit and C. undulata Wendt. Individuals of C. undulata were true to type and could be delineated at the site. Intergradation of diagnostic features was common in others, upon transplanting and flowering. While some transplants produced spathes characteristic of either C. wendtii or C. beckettii, intermediates between the two species were common." |
| 6.04 | 1. Personnal communication with Niels Jacobsen via ResearchGate 7/112/2017 | 1. "self pollinates: 1 spathe - no. - 2 or more spathe from same mat of plants - yes." |
| 6.05 | 1. Jacobson, N (1976) Notes on Cryptocoryne of Sri Lanka (Ceylon). Bot. Notiser 129:179-190. ISSN 0006-8195 2. Personnal communication with Niels Jacobsen via ResearchGate 7/112/2017 | 1. Species of Cryptocoryne are pollinated by insects and have seeds which germinate within one or two days and die if they dry out 2. "requires specialist pollinators - probably any small fly that likes decaying animals." |
| 6.06 | 1. AquariumLife. http://www.aquariumlife.com.au/content.php/714-Cryptocoryne-walkeri-Cryptocoryne-walkeri-lutea (Accessed: 23 May 2017) 2. BucePlant. https://buceplant.com/products/cryptocoryne-walkeri (Accessed: 23 May 2017) 3. Aqua Eden. http://www.aquaeden.co.uk/cryptocoryne_walkeri.html (Accessed: 23 May 2017) 4. 1. Personnal communication with Niels Jacobsen via ResearchGate 7/112/2017 | 1. "Propagation: As with all crypts, it is unlikely to flower submersed, but will propagate itself in the tank by sending up runners. These will not take over your tank, but may serve to slowly form a clump." 2. "Propagation: Runners" 3. "Propagation : Runners" 4. Vegetative propagation by stolons is the problem - small broken rhizome/stolon pieces easily grow again. |
| 6.07 | 1. Personnal communication with Niels Jacobsen via ResearchGate 7/112/2017 | 1. "how long it takes a plant to reach reproductive maturity - under favourable conditions 1-2 years." " |
| 7.01 | 1. Personnal communication with Niels Jacobsen via ResearchGate 7/112/2017 3. Plant Epidemiology and Risk Analysis Laboratory Center for Plant Health Science and Technology (2016) Weed Risk Assessment for Cryptocoryne beckettii. USDA Animal and Plant Health Inspection Service." | 1. Vegetative propagation by stolons is the problem - small broken rhizome/stolon pieces easily grow again. "What has been said/written about C. beckettii in Florida and Texas would also apply to C. walkeri. The two species can hybridize and produce fertile offspring." 2. Evidence from congener C. beckettii sumarized by USDA WRA" "This species' occurrence in the San Marcos River in Texas is likely due to the cultivation or dumping of aquarium plants (Rosen, 2000). A U.S. Fish and Wildlife Service recovery plan for the river indicated that one of the threats to native species was due to the introduction and harvesting of exotic aquatic plant species for aquaria (USFWS, 1985). A study in the San Marcos River in Texas showed that recreational activities and aquatic plant management were associated with increased loadings of aquatic plant fragments downstream in the river system (Owens et al., 2001)." |
| 7.02 | 1. AquariumLife. http://www.aquariumlife.com.au/content.php/714-Cryptocoryne-walkeri-Cryptocoryne-walkeri-lutea (Accessed: 23 May 2017) 2. BucePlant. https://buceplant.com/products/cryptocoryne-walkeri (Accessed: 23 May 2017) 3. The Crypts Pages. https://crypts.home.xs4all.nl/Cryptocoryne/Gallery/wal/wal.html (Accessed: 23 May 2017) 4. Personnal communication with Niels Jacobsen via ResearchGate 7/112/2017 | 1. Commonly used as an aquarium plant 2. Can be purchased online 3. "<br>Cryptocoryne walkeri is a well known aquarium plant for many years." 4. Vegetative propagation by stolons is the problem - small broken rhizome/stolon pieces easily grow again. |
| 7.03 | | no evidence |
| 7.04 | | no evidence & unlikely for submerged aquative species |

| | | |
|---|---|---|
| 7.05 | 1. Jacobson, N (1976) Notes on Cryptocoryne of Sri Lanka (Ceylon). Bot. Notiser 129:179-190. ISSN 0006-8195 2. Kubitzki (1998) The families and genera of vascular plants Vol IV Flowering Plants. Monocotyledons: Alismatanae and Commelinanae (except Gramineae) Springer -Verlag, Berlin, Heidelberg, New York; pg 34. 3 . Jacono, C. C. 2002. Cryptocoryne beckettii complex (Araceae) introduced at a Florida spring. SIDA, Contributions to Botany 20(2):819-832. 4. Kasselmann, C. 2003. Aquarium Plants. Krieger Publishing Company, Malabar, Florida. 518 pp. | 1. Aquatic plant, producing viable seed that do not germinate if they dry out 2. Congener C. ciliata forms cataphylls in the embryo which probably serve to fix the seed to the substrate to prevent movement with tide. 3. Vegetative framents may be moved by stream currents. 4. Other Cryptocoryne seeds are dispersed by water. |
| 7.06 | | no evidence |
| 7.07 | | no evidence |
| 7.08 | | no evidence |
| 8.01 | | no evidence |
| 8.02 | 1. Jacobson, N (1976) Notes on Cryptocoryne of Sri Lanka (Ceylon). Bot. Notiser 129:179-190. ISSN 0006-8195 | 1. seeds do not germinate if they dry out |
| 8.03 | 1. Florida Natural Areas Inventory. http://fnai.org/Invasives/Cryptocoryne_walkeri_FNAI.pdf (Accessed: 23 May 2017) | 1. "Control Methods: No known control methods" |
| 8.04 | 1. Plant Epidemiology and Risk Analysis Laboratory Center for Plant Health Science and Technology (2016) Weed Risk Assessment for Cryptocoryne beckettii. USDA Animal and Plant Health Inspection Service." | No direct evidence, but likely 1. Information for congener C. beckettii summarized by USDA WRA: "Cryptocoryne beckettii reproduces easily by rhizome fragmentation (Alexander et al., 2008; Jacono, 2002). "Fragments as small as 2 mm can easily break off from the parent plant and grow into a separate plant" (cited in Alexander et al., 2008). Belowground biomass of roots, rhizomes, and stolons is twice that of aboveground tissues (Jacono, 2002). Walking on a population can easily create plant fragments (Jacono, 2002; Owens et al., 2001). In general, recreational and other activities in aquatic plant populations readily produce fragments (Owens et al., 2001). Although we found no direct evidence that mutilation benefits individual plants or populations, the evidence suggests that this species would benefit from fragmentation, as do most other aquatic plants. Also, aroid plants have contractile roots that allow them to straighten themselves after heaving or flooding (cited in Jacono, 2002)." |
| 8.05 | | No evidence |