

Assessment date 2016

<i>Dioscorea bulbifera</i> 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) North Zone: suited to Zones 8, 9 Central Zone: suited to Zones 9, 10 South Zone: suited to Zone 10	2	
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 North Zone: mean annual precipitation 50-70 inches Central Zone: mean annual precipitation 40-60 inches 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?	y	
3.01	Naturalized beyond native range	y	2
3.02	Garden/amenity/disturbance weed		
3.03	Weed of agriculture	y	4
3.04	Environmental weed	y	4
3.05	Congeneric weed	y	2
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	?	
4.07	Causes allergies or is otherwise toxic to humans	y	1
4.08	Creates a fire hazard in natural ecosystems	unk	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.	unk	0
4.11	Climbing or smothering growth habit	y	1
4.12	Forms dense thickets	y	1
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	y	1
6.03	Hybridizes naturally	unk	-1
6.04	Self-compatible or apomictic	n	-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	n	-1
7.04	Propagules adapted to wind dispersal	y	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)	y	1
8.03	Well controlled by herbicides	n	1
8.04	Tolerates, or benefits from, mutilation or cultivation	y	1
8.05	Effective natural enemies present in U.S.	?	
Total Score			21
Implemented Pacific Second Screening			No
Risk Assessment Results			High

section	# questions answered	satisfy minimum?
A		10 yes
B		7 yes
C		18 yes
total		35 yes

	Reference	Source data
1.01		cultivated, but no evidence of selection for reduced weediness
1.02		skip to question 2.01
1.03		skip to question 2.01
2.01	<p>1. PERAL NAPPFAST Global Plant Hardiness. http://www.nappfast.org/Plant_hardiness/2012/PHZ%20update201230%20yr%20%20300dpi.tif (Accessed: 14 April 2016) 2. Martin (1974) Tropical yams and their potential. Part 2. <i>Dioscorea bulbifera</i>. USDA Agricultural Handbook No. 466. Washington, D.C. 3. US National Plant Germplasm System. https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?14186 (Accessed: 14 April 2016) 4. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 15 April 2016)</p>	<p>1. Native or naturalized in areas classified under Global Plant Hardiness Zones 8 through 12. 2. "Probably <i>D. bulbifera</i> can be found in every hot, humid, tropical region." 3. "Native: Africa: East Tropical Africa: Tanzania; Uganda West Tropical Africa: Burkina Faso; Cote D'Ivoire; Ghana; Guinea; Liberia; Nigeria; Senegal; Sierra Leone, West-Central Tropical Africa: Cameroon Western Indian Ocean: Madagascar; Mauritius; Reunion, Asia-Temperate; China: China; Asia-Tropical: Indian Subcontinent: India; Nepal; Sri Lanka, Indo-China: Cambodia; Laos; Myanmar; Thailand; Vietnam, Malesia: Indonesia; Malaysia; Papua New Guinea; Philippines; Australasia: Australia: Australia - Northern Territory, - Queensland, - Western Australia" 4. "The native range of <i>D. bulbifera</i> in Africa includes: the east tropical Africa countries of Tanzania and Uganda; the southern African countries of Zambia, Zimbabwe, Malawi, Mozambique and Namibia; Cameroon in west-central tropical Africa; and, the west tropical Africa countries of Benin, Burkina Faso, Ivory Coast, Ghana, Guinea, Liberia, Nigeria, Senegal and Sierra Leone (Coursey, 1967; Wilkin, 2001). In Asia, <i>D. bulbifera</i> exists as a native species in two distinct regions referred to by the USDA, ARS, National Genetic Resources Program (GRIN) as Asia-Temperate (namely, China) and Asia-Tropical which is composed of the Indian subcontinent, Indo-China and Malesia. Countries of the Indian subcontinent in which <i>D. bulbifera</i> is native include: Bhutan, India, Nepal and Sri Lanka. <i>D. bulbifera</i> is native to the Indo-China countries of Cambodia, Laos, Myanmar, Thailand and Vietnam. The Malesia countries where <i>D. bulbifera</i> is native</p>
2.02		Native range is well known, no computer analysis conducted

2.03	<p>1. The University of Melbourne. Köppen-Geiger Climate Map of the World. http://people.eng.unimelb.edu.au/mpeel/koppen.html (Accessed: 14 April 2016)</p> <p>2. Flach and Rumawas, eds. (1996) Plant Resources of South-East Asia. No. 9. Plants yielding non-seed carbohydrates. Backhuys Publishers, Leiden.</p> <p>3. US National Plant Germplasm System. https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?14186 (Accessed: 14 April 2016)</p> <p>4. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 15 April 2016)</p>	<p>1. Native or naturalized in Köppen-Geiger Climate Zones Af, Am, Aw, BWh, BSh, Cwa, Cwb, and Cfa.</p> <p>2. "The most prolific and widespread of all <i>Dioscorea</i> spp., occurring from the Atlantic coast of Africa to the remotest islands of the Pacific. It is the only major edible yam native to two continents. It occurs wild and is cultivated all over South-East Asia."</p> <p>3. "Native: Africa: East Tropical Africa: Tanzania; Uganda West Tropical Africa: Burkina Faso; Cote D'Ivoire; Ghana; Guinea; Liberia; Nigeria; Senegal; Sierra Leone, West-Central Tropical Africa: Cameroon Western Indian Ocean: Madagascar; Mauritius; Reunion, Asia-Temperate; China: China; Asia-Tropical: Indian Subcontinent: India; Nepal; Sri Lanka, Indo-China: Cambodia; Laos; Myanmar; Thailand; Vietnam, Malesia: Indonesia; Malaysia; Papua New Guinea; Philippines; Australasia: Australia: Australia - Northern Territory, - Queensland, - Western Australia"</p> <p>4. "The native range of <i>D. bulbifera</i> in Africa includes: the east tropical Africa countries of Tanzania and Uganda; the southern African countries of Zambia, Zimbabwe, Malawi, Mozambique and Namibia; Cameroon in west-central tropical Africa; and, the west tropical Africa countries of Benin, Burkina Faso, Ivory Coast, Ghana, Guinea, Liberia, Nigeria, Senegal and Sierra Leone (Coursey, 1967; Wilkin, 2001). In Asia, <i>D. bulbifera</i> exists as a native species in two distinct regions referred to by the USDA, ARS, National Genetic Resources Program (GRIN) as Asia-Temperate (namely, China) and Asia-Tropical which is composed of the Indian subcontinent, Indo-China and Malesia. Countries of the Indian subcontinent in which <i>D. bulbifera</i> is</p>
------	--	---

2.04	<p>1. Climate Charts. World Climate Maps. http://www.climate-charts.com/World-Climate-Maps.html#rain (Accessed: 14 April 2016) 2. US National Plant Germplasm System. https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?14186 (Accessed: 14 April 2016) 3. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 15 April 2016)</p>	<p>1. Native or naturalized in areas with rainfall in these ranges. 2. "Native: Africa: East Tropical Africa: Tanzania; Uganda, West Tropical Africa: Burkina Faso; Cote D'Ivoire; Ghana; Guinea; Liberia; Nigeria; Senegal; Sierra Leone, West-Central Tropical Africa: Cameroon, Western Indian Ocean: Madagascar; Mauritius; Reunion, Asia-Temperate; China: China; Asia-Tropical: Indian Subcontinent: India; Nepal; Sri Lanka, Indo-China: Cambodia; Laos; Myanmar; Thailand; Vietnam, Malesia: Indonesia; Malaysia; Papua New Guinea; Philippines; Australasia: Australia - Northern Territory, - Queensland, - Western Australia" 3. "The native range of <i>D. bulbifera</i> in Africa includes: the east tropical Africa countries of Tanzania and Uganda; the southern African countries of Zambia, Zimbabwe, Malawi, Mozambique and Namibia; Cameroon in west-central tropical Africa; and, the west tropical Africa countries of Benin, Burkina Faso, Ivory Coast, Ghana, Guinea, Liberia, Nigeria, Senegal and Sierra Leone (Coursey, 1967; Wilkin, 2001). In Asia, <i>D. bulbifera</i> exists as a native species in two distinct regions referred to by the USDA, ARS, National Genetic Resources Program (GRIN) as Asia-Temperate (namely, China) and Asia-Tropical which is composed of the Indian subcontinent, Indo-China and Malesia. Countries of the Indian subcontinent in which <i>D. bulbifera</i> is native include: Bhutan, India, Nepal and Sri Lanka. <i>D. bulbifera</i> is native to the Indo-China countries of Cambodia, Laos, Myanmar, Thailand and Vietnam. The Malesia countries where <i>D. bulbifera</i> is native include Indonesia, Malaysia, Papua New Guinea and the Philippines. <i>D. bulbifera</i> is also indigenous to portions of northern coastline of Australia: Queensland, the Northern Territory and Western Australia. To date, in addition to the wide distribution of <i>D. bulbifera</i> in its native range, it is naturalized in Central and South America and the West Indies, and cultivated in Oceania and the West Indies."</p>
2.05	<p>1. Wagner, Herbst, and Sohmer (1999) Manual of the flowering plants of Hawai'i. University of Hawai'i Press/Bishop Museum Press, Honolulu. 2. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 19 April 2016) 3. CABI Invasive Species Compendium. http://www.cabi.org/isc/datasheet/19295 (Accessed: 26 April 2016)</p>	<p>1. "Native to Asia and Africa, widely cultivated and now spread from the Atlantic coast of Africa throughout the Pacific and more recently to the Neotropics" 2. "To date, in addition to the wide distribution of <i>D. bulbifera</i> in its native range, it is naturalized in Central and South America and the West Indies, and cultivated in Oceania and the West Indies" 3. "<i>D. bulbifera</i> was extensively introduced to tropical and subtropical regions of the world to be used as a food crop."</p>
3.01	<p>1. Martin (1974) Tropical yams and their potential. Part 2. <i>Dioscorea bulbifera</i>. USDA Agricultural Handbook No. 466. Washington, D.C. 2. Smith (1979) <i>Flora Vitiensis Nova: A New Flora of Fiji</i>. Vol. 1. Pacific Tropical Botanical Garden. 3. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 19 April 2016) 4. CABI Invasive Species Compendium. http://www.cabi.org/isc/datasheet/19295 (Accessed: 26 April 2016)</p>	<p>1. "<i>D. bulbifera</i> is not native to the Western Hemisphere. Nevertheless, it is so widespread that it is noted in most floras of the tropical countries of Central and South America." 2. naturalized in Fiji (an aboriginal introduction) 3. "To date, in addition to the wide distribution of <i>D. bulbifera</i> in its native range, it is naturalized in Central and South America and the West Indies, and cultivated in Oceania and the West Indies" 4. "Currently, <i>D. bulbifera</i> is widely naturalized and cultivated in tropical and subtropical areas in America, the West Indies, and Pacific Islands"</p>
3.02	<p>1. CABI Invasive Species Compendium. http://www.cabi.org/isc/datasheet/19295 (Accessed: 26 April 2016)</p>	<p>ALL FLORIDA DATA 1. "Weeds such as air potato generally invade open or disturbed areas – following a burn, clear "<i>D. bulbifera</i> is a monocotyledonous, dioecious, herbaceous perennial vine, which has been described as one of the most aggressive weeds ever introduced into the United States (Florida Exotic Pest Plant Council, 2008)."</p>
3.03	<p>1. Holm (1979) <i>A Geographical Atlas of World Weeds</i>. John Wiley and Sons.</p>	<p>1. Considered a serious weed of agriculture in western Polynesia.</p>

3.04	<p>1. USDA Plants Database 2. PIER 3. UF Institute of Food and Agricultural Sciences. https://plants.ifas.ufl.edu/plant-directory/dioscorea-bulbifera/ (Accessed: 15 April 2016) 2. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 15 March 2016) 3. Global Compendium of Weeds. http://www.hear.org/gcw/species/dioscorea_bulbifera/ (Accessed: 26 April 2016) 4. CABI Invasive Species Compendium. http://www.cabi.org/isc/datasheet/19295 (Accessed: 26 April 2016)</p>	<p>1. Currently, this species is classified as a "noxious weed" in Alabama and Florida 2. invasive species in Cuba, the Bahamas, Puerto Rico and Pacific Islands including Hawaii, Fiji, French Polynesia, Niue and Palau 3. "Due to its ability to displace native species and disrupt natural processes such as fire and water flow, air potato has been listed as one of Florida's most invasive plant species since 1993, and was placed on the Florida Noxious Weed List by the Florida Department of Agriculture and Consumer Services in 1999." 2. "As an aggressive high-climbing vine, air potato grows into and often over the tops of low-lying vegetation and into tree canopies." 3. environmental weed 4. "This fast growing plant forms dense colonies that engulf native vegetation, climbing high into mature tree canopies and shading-out trees and shrubs in the understory (Langeland et al., 1998; Moriwasa, 1999; Florida Exotic Pest Plant Council, 2008) This species has the potential to completely out-compete vegetation communities by displacing native species, changing community structures and altering ecological functions (Florida Exotic Pest Plant Council, 2008; 2011)."</p>
3.05	<p>1. Weber (2003) Invasive Plant Species of the World. CABI Publishing. 2. Global Compendium of Weeds. http://www.hear.org/gcw/scientificnames/scinamed.htm (Accessed: 26 April 2016) 3. UF Institute of Food and Agricultural Sciences. https://plants.ifas.ufl.edu/plant-directory/dioscorea-alata/ (Accessed: 26 April 2016)</p>	<p>2. <i>D. alata</i> considered an environmental weed in tropical Africa and the southeastern U. 2. <i>Dioscorea alata</i> is listed as a noxious weed. <i>Dioscorea batatas</i> and <i>Dioscorea oppositifolia</i> are listed as environmental weeds. 3. "<i>Dioscorea alata</i>- Ecological threat- Some stands forming blankets of shingled leaves over native vegetation and able to cover even mature trees."</p>
4.01	<p>1. Flach and Rumawas, eds. (1996) Plant Resources of South-East Asia. No. 9. Plants yielding non-seed carbohydrates. Backhuys Publishers, Leiden. 2. Wagner, Herbst, and Sohmer (1999) Manual of the flowering plants of Hawai'i. University of Hawai'i Press/Bishop Museum Press, Honolulu. 3. UF Institute of Food and Agricultural Sciences. https://plants.ifas.ufl.edu/plant-directory/dioscorea-bulbifera/ (Accessed: 15 April 2016) 4. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 15 April 2016)</p>	<p>1. no description of these traits 2. stems never with prickles 3. no description of these traits 4. no description of these traits</p>
4.02		no evidence
4.03		no evidence
4.04	<p>1. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 15 April 2016) 2. Smithsonian Marine Station at Fort Pierce. http://www.sms.si.edu/irlspec/Dioscorea_bulbifera.htm (Accessed: 27 April 2016)</p>	<p>1. "Tubers and/or aerial bulbils of unpalatable varieties of <i>D. bulbifera</i> have been used to create poisons for various uses" 2. "appear to be little impacted by feeding from raccoons, feral pigs, and other animals"</p>
4.05	<p>1. Martin (1974) Tropical yams and their potential. Part 2. <i>Dioscorea bulbifera</i>. USDA Agricultural Handbook No. 466. Washington, D.C.</p>	<p>1. "On the island of Java the aerial tubers are used to make fish poison."</p>
4.06	<p>1. Flach and Rumawas, eds. (1996) Plant Resources of South-East Asia. No. 9. Plants yielding non-seed carbohydrates. Backhuys Publishers, Leiden.</p>	<p>1. "Fungal leaf spots afflict most of the species in the field. <i>D. bulbifera</i> is moderately susceptible to attack by the yam nematode (<i>Scutellonema bradys</i>)." 2. "In West Africa, the pests affecting <i>D. bulbifera</i> include the beetle species <i>Heteroligus meles</i> and <i>Prionoryctes cuniculus</i> [<i>Prionoryctes capreolus</i>] (Coleoptera: Scarabaeidae); the scale species <i>Aspidiella hartii</i> (Homoptera: Diaspidadae); two leaf beetles <i>Liliocercis livida</i> and <i>Lema armata</i> (Coleoptera: Chrysomelidae); and the yam weevil <i>Palaeopus dioscoreae</i> (Coleoptera: Curculionidae) (Pursglove, 1972; Ekanayake and Asiedu, 2003). In Asia, the beetle species <i>Liliocercis impressa</i> (Coleoptera: Chrysomelidae) has been reported from Nepal, Bangladesh, India, Malaysia, Burma, Sri Lanka and throughout Southeast Asia and China (Yu, 1993; Florida Exotic Pest Plant Council, 2008)."; no evidence that this species is a significant primary or alternate host of crop pests or pathogens</p>
4.07	<p>1. Flach and Rumawas, eds. (1996) Plant Resources of South-East Asia. No. 9. Plants yielding non-seed carbohydrates. Backhuys Publishers, Leiden. 2. UF Institute of Food and Agricultural Sciences. https://plants.ifas.ufl.edu/plant-directory/dioscorea-bulbifera/ (Accessed: 15 April 2016) 3. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 15 April 2016)</p>	<p>1. Bulbils from wild plants are boiled and sometimes also soaked in water to remove toxic substances before being eaten. Tubers from wild plants are nauseous and poisonous. 2. "Although considered to be a species of yam, these plants are very toxic and should not be consumed." 3. "Tubers and/or aerial bulbils of unpalatable varieties of <i>D. bulbifera</i> have been used to create poisons for various uses"</p>

4.08	<p>1. US Forest Service. http://www.fs.fed.us/database/feis/plants/vine/diospp/all.html#FIRE%20EFFECTS%20AND%20MANAGEMENT (Accessed: 26 April 2016)</p>	<p>1. "Altered fire frequency, severity, or behavior in habitats invaded by yams was not described in the available literature (2009). However, yams typically grow into tree canopies ([30], reviews by [51,66,78]). In areas where surface fires would have been common in the absence of yam vines, yam ladder fuels could encourage crown fires. Many field observations indicate that the weight of yams can break stems of supporting vegetation and cause mortality of trees and shrubs (reviews by [51,66,78]). Increased dead material in areas where yams have killed associated vegetation could increase fire frequency, intensity, or severity. Although these changes in fire regimes and behavior are speculative, they highlight the need for more information about how yams may affect the fire ecology of invaded habitats."</p>
4.09	<p>1. Wagner, Herbst, and Sohmer (1999) Manual of the flowering plants of Hawai'i. University of Hawai'i Press/Bishop Museum Press, Honolulu. 2. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 15 April 2016) 3. CABI Invasive Species Compendium. http://www.cabi.org/isc/datasheet/19295 (Accessed: 26 April 2016)</p>	<p>1. In Hawaii "naturalized primarily in mesic areas, especially shaded mesic valleys and disturbed mesic forest" 2. "In its native range, seeds and bulbils of <i>D. bulbifera</i> grow in partially to fully shaded areas" 3. "<i>D. bulbifera</i> is adapted to partially to fully shaded conditions"</p>
4.10	<p>1. Flach and Rumawas, eds. (1996) Plant Resources of South-East Asia. No. 9. Plants yielding non-seed carbohydrates. Backhuys Publishers, Leiden. 2. Martin (1974) Tropical yams and their potential. Part 2. <i>Dioscorea bulbifera</i>. USDA Agricultural Handbook No. 466. Washington, D.C. 3. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 15 April 2016) 4. Smithsonian Marine Station at Fort Pierce. http://www.sms.si.edu/irlspec/Dioscorea_bulbifera.htm (Accessed: 27 April 2016)</p>	<p>1. "Yams need fertile soils..., rich in organic matter" 2. "<i>D. bulbifera</i> grows best in a loamy soil, preferably high in organic material." 3. "In its native range, <i>D. bulbifera</i> grows in loamy soils and soils of loose clay that have good drainage (Martin, 1974; Wilkin, 2001). In Florida, <i>D. bulbifera</i> is found from the northern most counties to the Keys. The primary soil orders found supporting growth of the plant, from the most frequent to least frequent are: Spodosols, Entisols, Histosols, Entisols underlain by limestone, and an Alfisol/Utisol mix." 4. "Bulbils can last a year or more on the ground and still sprout, and soil contact in not necessary for sprouting."</p>
4.11	<p>1. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA. 2. UF Institute of Food and Agricultural Sciences. https://plants.ifas.ufl.edu/plant-directory/dioscorea-bulbifera/ (Accessed: 15 April 2016) 3. CABI Invasive Species Compendium. http://www.cabi.org/isc/datasheet/19295 (Accessed: 26 April 2016)</p>	<p>1. growth habit: vine, forb/herb 2. "Air potato can grow extremely quickly, roughly 8 inches per day. It typically climbs to the tops of trees and has a tendency to take over native plants." 3. "<i>D. bulbifera</i> has escaped from cultivated areas and spreads rapidly into natural forest, climbing into the canopy of mature trees and forming dense stands "</p>
4.12	<p>1. Nehrling (1944) in Schultz (1993) Element Stewardship Abstract for <i>Dioscorea bulbifera</i>. The Nature Conservancy, Arlington, VA. 2. CABI Invasive Species Compendium. http://www.cabi.org/isc/datasheet/19295 (Accessed: 26 April 2016) 3. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 26 April 2016)</p>	<p>1. capable of forming "impenetrable masses" 2. "This fast growing plant forms dense colonies that engulf native vegetation, climbing high into mature tree canopies and shading-out trees and shrubs in the understory" 3. "Several authors indicated that the primary ecological threat of air potato is its ability to climb vegetation and form dense canopies that shade out the understory"</p>
5.01	<p>1. Invasive Species Specialist Group. http://www.iucngisd.org/gisd/species.php?sc=1220 (Accessed: 26 April 2016) 2. CABI Invasive Species Compendium. http://www.cabi.org/isc/datasheet/19295 (Accessed: 26 April 2016)</p>	<p>1. "System : Terrestrial" 2. Terrestrial</p>
5.02	<p>1. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA. 2. USDA Plants Database. http://plants.usda.gov/core/profile?symbol=DIBU (Accessed: 14 April 2016) 3. UF Institute of Food and Agricultural Sciences. https://plants.ifas.ufl.edu/plant-directory/dioscorea-bulbifera/ (Accessed: 15 April 2016)</p>	<p>1. Dioscoreaceae 2. "Growth habit: Forb/herb, vine" 3. "It is an herbaceous twining vine, growing 70 feet or more in length."</p>
5.03	<p>1. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA. 2. Texas Invasives. http://texasinvasives.org/plant_database/detail.php?symbol=DIBU (Accessed: 26 March 2016)</p>	<p>1. Dioscoreaceae 2. "Herbaceous, high climbing vines"</p>

5.04	1. Flach and Rumawas, eds. (1996) Plant Resources of South-East Asia. No. 9. Plants yielding non-seed carbohydrates. Backhuys Publishers, Leiden. 2. UF Institute of Food and Agricultural Sciences. https://plants.ifas.ufl.edu/plant-directory/dioscorea-bulbifera/ (Accessed: 15 April 2016) 3. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 15 April 2016)	1. produces underground tubers and numerous aerial bulbils 2. "large tubers are formed underground, some reaching over 6 inches in diameter" 3. "Subterranean tubers of the Dioscorea belong to one of two main types: perennial tubers, which survive for the lifetime of the plant, and annual tubers, which are renewed yearly"
6.01	1. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 15 April 2016)	1. "D. bulbifera reproduces quickly and prolifically by bulbil propagation."; no evidence of substantial reproductive failure
6.02	1. Martin (1974) Tropical yams and their potential. Part 2. Dioscorea bulbifera. USDA Agricultural Handbook No. 466. Washington, D.C. 2. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 15 April 2016) 3. CABI Invasive Species Compendium. http://www.cabi.org/isc/datasheet/19295 (Accessed: 26 April 2016)	1. "Fresh seeds germinate readily in soil or on wet filter paper in 2 to 3 weeks." 2. "The unilaterally winged seed typical of D. bulbifera found growing in less densely vegetated areas of the plant's native range", "In its native range, air potato reproduces sexually by seed" 3. "This species is a fast growing plant that can be dispersed by seed, underground tubers, and bulbils which sprout forming new plants"
6.03		no evidence
6.04	1. Flach and Rumawas, eds. (1996) Plant Resources of South-East Asia. No. 9. Plants yielding non-seed carbohydrates. Backhuys Publishers, Leiden. 2. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 15 April 2016) 3. CABI Invasive Species Compendium. http://www.cabi.org/isc/datasheet/19295 (Accessed: 26 April 2016)	1. dioecious 2. "Air potato is a dioecious, with male and female flowers occurring on separate plants." 3. "dioecious, herbaceous perennial"
6.05	1. Martin (1974) Tropical yams and their potential. Part 2. Dioscorea bulbifera. USDA Agricultural Handbook No. 466. Washington, D.C. 2. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 15 April 2016)	1. flowers attract bees and other insects 2. "Staminate flowers have evolved in such a way as to force any insect entering them to contact the anthers (Coursey, 1967). Coursey (1967) states that the aromatic smells produced by many of the Dioscorea species serve as attractants for nocturnal insect species which do not require visual attractants. In general, very little has been documented about insect pollination of Dioscorea spp., and nothing is known about pollinators of D. bulbifera. Observations by Sadik and Okereke (1975) lead to the identification of a thrips (Larothrips sp.) that was found to be moving pollen from the staminate flowers to the pistillate flowers of D. cayenensis subsp. rotundata."
6.06	1. Flach and Rumawas, eds. (1996) Plant Resources of South-East Asia. No. 9. Plants yielding non-seed carbohydrates. Backhuys Publishers, Leiden 2. UF Institute of Food and Agricultural Sciences. https://plants.ifas.ufl.edu/plant-directory/dioscorea-bulbifera/ (Accessed: 15 April 2016) 3. CABI Invasive Species Compendium. http://www.cabi.org/isc/datasheet/19295 (Accessed: 26 April 2016)	1. "D. bulbifera is propagated by bulbils or by tubers." 2. "Vegetative reproduction is the primary mechanism of spread." 3. "This species is a fast growing plant that can be dispersed by seed, underground tubers, and bulbils which sprout forming new plants"
6.07	1. Flach and Rumawas, eds. (1996) Plant Resources of South-East Asia. No. 9. Plants yielding non-seed carbohydrates. Backhuys Publishers, Leiden. 2. Martin (1974) Tropical yams and their potential. Part 2. USDA Agricultural Handbook. http://naldc.nal.usda.gov/naldc/download.xhtml?id=CAT87208471 (Accessed: 26 April 2016)	1. The period from planting to harvesting is about 7-9 months. 2. "Seedlings grow to mature size and flower in 1 year (unusual among yams)"
7.01	1. Schultz (1993) Element Stewardship Abstract for Dioscorea bulbifera. The Nature Conservancy, Arlington, VA. 2. UF Institute of Food and Agricultural Sciences. https://plants.ifas.ufl.edu/plant-directory/dioscorea-bulbifera/ (Accessed: 15 April 2016) 3. CABI Invasive Species Compendium. http://www.cabi.org/isc/datasheet/19295 (Accessed: 26 April 2016)	1. Dumping of tubers or bulbils can spread the species. 2. "How these bulbils are spread is speculative, but it appears movement of contaminated brush, debris or soil is the primary mechanism. Mowers and other brush-cutting equipment may also disperse long distances, either through contaminated equipment or throwing of the bulbils during the mowing operation." 3. "Pathway Vectors - Debris and waste associated with human activities - Tubers and bulbils"
7.02	1. Flach and Rumawas, eds. (1996) Plant Resources of South-East Asia. No. 9. Plants yielding non-seed carbohydrates. Backhuys Publishers, Leiden. 2. CABI Invasive Species Compendium. http://www.cabi.org/isc/datasheet/19295 (Accessed: 26 April 2016) 3. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 26 April 2016)	1. D. bulbifera is cultivated all over SouthEast Asia. 2. "D. bulbifera was extensively introduced to tropical and subtropical regions of the world to be used as a food crop." 3. "Although not a major crop species, edible varieties of D. bulbifera are grown by subsistence and traditional farmers and in —home gardensll in some of the more remote regions of Mesoamerica and South America (i.e., Chiapas, Mexico and São Paulo, Brazil) (Bressan et al., 2005; Vogl, 2002)"
7.03		no evidence

7.04	1. Flach and Rumawas, eds. (1996) Plant Resources of South-East Asia. No. 9. Plants yielding non-seed carbohydrates. Backhuys Publishers, Leiden. 2. Martin (1974) Tropical yams and their potential. Part 2. Dioscorea bulbifera. USDA Agricultural Handbook No. 466. Washington, D.C. 3. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 15 March 2016) 4. CABI Invasive Species Compendium. http://www.cabi.org/isc/datasheet/19295 (Accessed: 26 April 2016)	1. fruits and seeds winged 2. "The seeds are eventually dislodged by the wind and may be carried some distance from the plant. The seed is surrounded by a membranous falcate wing, which is hooked at its attachment to the placenta." 3. "The unilaterally winged seed typical of <i>D. bulbifera</i> found growing in less densely vegetated areas of the plant's native range has evolved into its present shape to allow for whirling flight in windy conditions (Coursey, 1967)" 4. "Seeds are dispersed by wind."
7.05	1. Coursey (1967) Yams: an Account of the Nature, Origins, Cultivation and Utilisation of the Useful Members of the Dioscoreaceae. Longmans, London. 2. UF Institute of Food and Agricultural Sciences. https://plants.ifas.ufl.edu/plant-directory/dioscorea-bulbifera/ (Accessed: 15 April 2016) 3. CABI Invasive Species Compendium. http://www.cabi.org/isc/datasheet/19295 (Accessed: 26 April 2016)	1. "It has been noted that mature bulbils are less dense than water, whereas immature ones, like the underground tubers, are denser. This suggests a modification to aid dispersal by flood waters." 2. "Water is also a major means of dispersal, so care must be taken to first eliminate populations along water bodies where bulbils may be easily spread. In addition, extra time must be utilized after flood events, as spread may be extensive." 3. "Bulbils can float in water, suggesting that flood-waters may be a form of dispersal for this species (Hammer, 1998)."
7.06	1. UF Institute of Food and Agricultural Sciences. https://plants.ifas.ufl.edu/plant-directory/dioscorea-bulbifera/ (Accessed: 15 April 2016)	1. "Spread via birds and other animals may occur, but this has not been confirmed."
7.07		no evidence
7.08		no evidence
8.01	1. Flach and Rumawas, eds. (1996) Plant Resources of South-East Asia. No. 9. Plants yielding non-seed carbohydrates. Backhuys Publishers, Leiden. 2. Martin (1974) Tropical yams and their potential. Part 2. Dioscorea bulbifera. USDA Agricultural Handbook No. 466. Washington, D.C.	1. " <i>D. bulbifera</i> flowers profusely...and produces seed abundantly." 2. up to 6 seeds per capsule
8.02	1. CABI Invasive Species Compendium. http://www.cabi.org/isc/datasheet/19295 (Accessed: 26 April 2016) 2. Smithsonian Marine Station at Fort Pierce. http://www.sms.si.edu/irlspec/Dioscorea_bulbifera.htm (Accessed: 27 April 2016)	1. "Has propagules that can remain viable for more than one year" 2. "Bulbils can last a year or more on the ground and still sprout, and soil contact is not necessary for sprouting."
8.03	1. Schultz (1993) Element Stewardship Abstract for <i>Dioscorea bulbifera</i> . The Nature Conservancy, Arlington, VA. 2. Langeland (2003) Natural area weeds: air potato (<i>Dioscorea bulbifera</i>). University of Florida, IFAS Extension, SS AGR 164 (http://edis.ifas.ufl.edu/pdf/AG/AG11200.pdf) 3. UF Institute of Food and Agricultural Sciences. https://plants.ifas.ufl.edu/plant-directory/dioscorea-bulbifera/ (Accessed: 15 April 2016) 4. Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/AirpotatoManagementPlan_Final.pdf (Accessed: 19 April 2016)	1. "Round-Up herbicide can be used as a foliar spray and will kill above ground growth but the subterranean tuber will frequently resprout." 2. "The herbicides Garlon 3A diluted with water to 1.25%- 2.0% (1.6-2.6 ounces per gallon of spray) or Garlon 4 diluted with water to 0.5%-2.0% (0.6-2.6 ounces per gallon of spray) are effective for controlling air potato when sprayed onto the foliage." 3. "Chemical control is one of the most effective means of control for air potato, but single applications will generally not provide complete control. This is due to resprouting of bulbils or underground tubers. A dilution of triclopyr (Garlon 3A at 1 to 2% solution or Garlon 4 at 0.5 to 2% solution) in water can be an effective control for air potato when applied as a foliar application. Be sure to include a non-ionic surfactant at 0.25% (10 mls or 2 teaspoons per gallon of spray solution). A 2 to 3% solution of glyphosate (Roundup, etc.) can also be effective. These herbicides are systemic (move throughout plant tissue) so care must be exercised to minimize off-target damage. If air potato vines are growing up into trees or other desirable species, vines should be cut or pulled down to minimize damage to the desirable vegetation." 4. See Figure 16 for evidence of chemical management killing desirable plants that are likely to be present
8.04	1. Schultz (1993) Element Stewardship Abstract for <i>Dioscorea bulbifera</i> . The Nature Conservancy, Arlington, VA.	1. "Air potato stems appear to be readily killed by fire, although resprouting from the tuber is rapid." 2. "Tolerates, or benefits from, cultivation, browsing pressure, mutilation, fire etc"

8.05	<p>1. UF Institute of Food and Agricultural Sciences. https://plants.ifas.ufl.edu/plant-directory/dioscorea-bulbifera/ (Accessed: 15 April 2016) 2. CABI Invasive Species Compendium. http://www.cabi.org/isc/datasheet/19295 (Accessed: 26 April 2016)</p>	<p>1. "Host range testing conducted at the IPRL quarantine facility prior to field-release demonstrated that both Nepalese and Chinese biotypes of the air potato beetles would only feed and complete development on <i>Dioscorea bulbifera</i> (Pemberton et al. 2010, Center et al. 2013). They do not feed on any other species of <i>Dioscorea</i>, including the Florida native species, <i>D. floridana</i> and <i>D. villosa</i>, or the other invasive yam in Florida, <i>D. alata</i>. Based on this safety data, a permit for field release was granted in February 2011. The first beetle field-releases were made by USDA/ARS in November 2011 at Long Key Natural Area in Broward County and at Kendall Indian Hammock Park in Miami-Dade County. The Florida Department of Agriculture and Consumer Services, Division of Plant Industry (DPI) joined the rearing and release program in 2012, and the combined efforts by the IPRL and DPI have resulted in the release of over 145,000 beetles at 175 sites in 32 counties. Beetle survival and establishment has been demonstrated at several release sites, and resulted in a reduced height of vines, decreased bulbil production, and most importantly, an increase in native vegetation. Releases and evaluation of impact will continue in 2014." 2. "In West Africa, the pests affecting <i>D. bulbifera</i> include the beetle species <i>Heteroligus meles</i> and <i>Prionoryctes cuniculus</i> [<i>Prionoryctes capreolus</i>] (Coleoptera: Scarabaeidae); the scale species <i>Aspidiella hartii</i> (Homoptera: Diaspididae); two leaf beetles <i>Liliocercis livida</i> and <i>Lema armata</i> (Coleoptera: Chrysomelidae); and the yam weevil <i>Palaeopus dioscoreae</i> (Coleoptera: Curculionidae) (Pursglove, 1972; Ekanayake and Asiedu, 2003). In Asia, the beetle species <i>Liliocercis impressa</i> (Coleoptera: Chrysomelidae) has been reported from Nepal, Bangladesh, India, Malaysia, Burma, Sri Lanka and throughout Southeast Asia and China (Yu, 1993; Florida Exotic Pest Plant Council, 2008)."; no evidence that these species are found naturally in the US</p>
------	--	--