UF IFAS UNIVERSITY of FLORIDA

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

assessment.ifas.ufl.edu

Assessment date 1/21/2020 Assessment completed by Petri and Lieurance

	Cayratia japonica **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	y	2
3.03	Weed of agriculture	n	0
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	y	1
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	n	0
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	n	0
5.01	Aquatic	n	0

5.02	Grass	n	0
5.03	Nitrogen fixing woody plant	n	0
5.04	Geophyte	unk	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	unk	-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	n	-1
7.03	Propagules likely to disperse as a produce contaminant	unk	-1
7.04	Propagules adapted to wind dispersal	n	-1
7.05	Propagules water dispersed	y	1
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)	unk	-1
8.01	Prolific seed production	n	-1
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	unk	-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.	unk	1
	Total Score	**15**	
	Implemented Pacific Second Screening	**No**	
	Risk Assessment Results	**High Risk**	

section	# questions answered	satisfy minimum?
A	11	yes
B	8	yes
C	18	yes
total	37	yes

	Reference	Source data
1.01	1. Gerrath et al. 2015, Taming the wild grape; https://books.google.com/books?id=lNkLCwAAQBAJ&pg=PA68&lpg=PA68&dq=Causonis+japonica&source=bl&ots=qcfYJTPH61&sig=ACfU3U3l3MFxYGe0YVl5Fe7tKvPBBcoGeQ&hl=en&ppis=_e&sa=X&ved=2ahUKEwjro_qzzqnnAhVjh-AKHYm8A6o4FBDoATABegQICRAB#v=onepage&q=Causonis%20japonica&f=false [Accessed 1/29/20] 1. Hansen & Goertzen 2006, Cayratia japonica naturalized in Alabama; https://www.jstor.org/stable/4034148?seq=1#metadata_info_tab_contents [Accessed 1/30/20] 2. van Valkenburg & Bunyapraphatsara 2001, Plant resources of South-East Asia No. 12(2): Medicinal and poisonous plants; https://www.cabi.org/isc/abstract/20013181428 [Accessed 1/30/20] 2. Atlas of Living Australia; https://bie.ala.org.au/species/http://id.biodiversity.org.au/node/apni/2891196 [Accessed 1/30/20]	No evidence of domestication or selection of varieties with reduced weed traits 1. However, the wild type has also been sold as an ornamental 2. The wild type has also been grown for medicinal purposes
1.02		
1.03		
2.01	1. West 2009, Biology and Management of Bushkiller; https://repository.lib.ncsu.edu/bitstream/handle/1840.16/534/etd.pdf?sequence=1&isAllowed=y [Accessed 1/31/20] 2. USDA, PLANTS; https://plants.sc.egov.usda.gov/core/profile?symbol=CAJA7 [Accessed 1/28/20] 2. EDDMapS; https://www.eddmaps.org/species/subject.cfm?sub=13557 [Accessed 1/28/20] 3. Maryland Invasive Species Council; http://mdinvasives.org/iotm/sep-2014/ [Accessed 1/29/20]	No computer analysis was performed 1. West performed CLIMEX model to project potential range in the USA based on the native range data, and found that found that the species is well suited to most of the continental USA including Florida 2. Current distribution in the USA ranges from North Carolina (Zone 6) to Texas (Zone 9) 3. Some reports of individuals in Virginia and Maryland (Zones 6 to 7)
2.02	1. West 2009, Biology and Management of Bushkiller; https://repository.lib.ncsu.edu/bitstream/handle/1840.16/534/etd.pdf?sequence=1&isAllowed=y [Accessed 1/31/20] 2. USDA, National Plant Germplasm System; https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?id=410986 [Accessed 1/29/20] 3. USDA, PLANTS; https://plants.sc.egov.usda.gov/core/profile?symbol=CAJA7 [Accessed 1/29/20]	No computer analysis was performed 1. West performed CLIMEX model to project potential range in the USA based on the native range data, and found that found that the species is well suited to most of the continental USA including Florida 2. Native to China (17 provinces), Japan (5 islands), Korea, Taiwan, Bangladesh, Butah, India (14 states), Nepal, Cambodia, Myanmar, Thailand, Vietnam, Indonesia, Malaysia, and Australia (1 state) 3. Introduced into the southeastern USA (5 states)
2.03	1-4. USDA, National Plant Germplasm System; https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?id=410986 [Accessed 1/29/20]	No computer analysis was performed 1. Based on distribution is southeastern USA, it grows well in Koppen-Geiger class Cfa (humid subtropical) 2. Native to areas of Nepal that are class Cwa 3. Native to areas of Vietnam, Thailand, and Japan that are class Aw/As 4. Native to Indonesia and Malaysia which are in class Af
2.04	1-2. USDA, National Plant Germplasm System; https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?id=410986 [Accessed 1/29/20] 1-2. China Highlights; https://www.chinahighlights.com/jiangsu/weather.htm [Accessed 1/29/20]	1. Native to Jiangsu Sheng, China where the mean annual precipitation is 29-47 inches 2. Native to Taiwan where the average rainfall is 98 inches

2.05	1. USDA, PLANTS; https://plants.sc.egov.usda.gov/core/profile?symbol=CAJA7 [Accessed 1/28/20] 2. Gerrath et al. 2015, Taming the wild grape; https://books.google.com/books?id=lNkLCwAAQBAJ&pg=PA68&lpg=PA68&dq=Causonis+japonica&source=bl&ots=qcfYJTPH61&sig=ACfU3U3I3MFxYGe0YVI5Fe7tKvPBBcoGeQ&hl=en&ppis=_e&sa=X&ved=2ahUKEwjro_qzzqnnAhVjh-AKHYm8A6o4FBDoATABegQICRAB#v=onepage&q=Causonis%20japonica&f=false [Accessed 1/29/20] 2. Bugwood Wiki; https://wiki.bugwood.org/Cayratia_japonica [Accessed 1/29/20] 3. Maryland Invasive Species Council; http://mdinvasives.org/iotm/sep-2014/ [Accessed 1/29/20]	1. Introduced to the southeastern USA in Texas, Louisiana, Mississippi, Alabama, and North Carolina 2. Species is occasionally cultivated as an ornamental in North America 3. Some reports of individuals in Virginia and Maryland
3.01	1. USDA, PLANTS; https://plants.sc.egov.usda.gov/core/profile?symbol=CAJA7 [Accessed 1/28/20] 1. Emerine et al. 2013, Porcelain berry, bushkiller, and Virginia-creeper in interspecific competition; https://www.cambridge.org/core/journals/invasive-plant-science-and-management/article/porcelain-berry-ampelopsis-brevipedunculata-bushkiller-cayratia-japonica-and-virginiacreeper-parthenocissus-quinquefolia-in-interspecific-competition/668CD9EF1928CD9A6B63FF385D99F52E [Accessed 1/30/20] 1. UT Extension; https://extension.tennessee.edu/publications/Documents/W230.pdf [Accessed 1/28/20] 2. EDDMapS; https://www.eddmaps.org/species/subject.cfm?sub=13557 [Accessed 1/28/20]	1. Populations self-sustaining in the southeastern USA in Texas, Louisiana, Mississippi, Alabama, and North Carolina 2. Listed as by North Carolina Noxious Weeds, South Carolina Exotic Pest Plant Council, Alabama Invasive Plant Council Watch List A, Invasive Species of Concern in Maryland
3.02	1. SE-EPPC 2011, Control of Cayratia japonica, Bushkiller, in an urban habitat in Charlotte, NC; https://www.se-eppc.org/wildlandweeds/pdf/Winter2011Spring2012-Matthews-pp6-8.pdf [Accessed 1/28/20] 2. Bugwood Wiki; https://wiki.bugwood.org/Cayratia_japonica [Accessed 1/29/20] 3. Hansen & Goertzen 2006, Cayratia japonica naturalized in Alabama; https://www.jstor.org/stable/4034148?seq=1#metadata_info_tab_contents [Accessed 1/30/20] 4. Ozawa & Yano 2009, Pearl bodies of Cayratia japonica as alternative food for a predatory mite Euseius sojaensis; https://link.springer.com/article/10.1007/s11284-008-0501-5 [Accessed 1/30/20]	1. In North Carolina, the species dominates urban habitats such as lawns, fences, and gardens 2. Species has to be treated repeatedly at the New Orleans Botanical Garden in Louisiana 3. In Alabama, multiple places noted where the species is grown over fences, bushes, and gardens 4. Commonly found around agricultural fields and shrubs
3.03	1. Ozawa & Yano 2009, Pearl bodies of Cayratia japonica as alternative food for a predatory mite Euseius sojaensis; https://link.springer.com/article/10.1007/s11284-008-0501-5 [Accessed 1/30/20]	1. Commonly found around agricultural fields and shrubs
3.04	1. EDDMapS; https://www.eddmaps.org/species/subject.cfm?sub=13557 [Accessed 1/28/20] 2. Government of Western Australia; https://www.agric.wa.gov.au/organisms/79425 [Accessed 1/31/20] 3. Emerine et al. 2013, Porcelain berry, bushkiller, and Virginia-creeper in interspecific competition; https://www.cambridge.org/core/journals/invasive-plant-science-and-management/article/porcelain-berry-ampelopsis-brevipedunculata-bushkiller-cayratia-japonica-and-virginiacreeper-parthenocissus-quinquefolia-in-interspecific-competition/668CD9EF1928CD9A6B63FF385D99F52E [Accessed 1/30/20]	1. Listed as by North Carolina Noxious Weeds, South Carolina Exotic Pest Plant Council, Alabama Invasive Plant Council Watch List A, Invasive Species of Concern in Maryland 2. Declared Pest and Prohibited plant in Western Australia 3. Fast-growing vine climbs existing native plants and either stress the plant by breaking branches due to its weight or block the sunlight for native plants

3.05	1-2. Yeo et al. 2012, Cayratia of Singapore: With a special note on Cayratia japonica; https://lkcnhm.nus.edu.sg/app/uploads/2017/06/2012nis331-338.pdf [Accessed 1/28/20] 1-2. USDA, PLANTS; https://plants.usda.gov/core/profile?symbol=CATR29 [Accessed 1/23/20] 1-2. FNAI; https://www.fnai.org/Invasives/Causonis%20trifolia.pdf [Accessed 1/23/20]	1. Cayratia trifolia (Bush grape) a weedy, potentially invasive, plant that is introduced outside of its native range in Hawaii and Florida (USA) 2. This congener has a similar growth structure and was also distributed for use as a medicinal plant
4.01	1. USDA, PLANTS; https://plants.sc.egov.usda.gov/core/profile?symbol=CAJA7 [Accessed 1/28/20] 1. eFloras; http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200013484 [Accessed 1/28/20] 1. Jackes 1987, Revision of the Australian Vitaceae, 2. Cayratia; https://www.researchgate.net/publication/285786857_Revision_of_the_Australian_Vitaceae_2_Cayratia_Juss [Accessed 1/29/20]	1. These features are not in the description of the species
4.02		No evidence
4.03	1. Parasitic Plants Database; http://www.omnisterra.com/bot/pp_home.cgi [Accessed 1/30/20]	1. Not listed as being a parasitic plant
4.04		No evidence
4.05		No evidence
4.06	1. Hodges et al. 2005, Florida Dept. of Agriculture, Chilli thrips Scirtothrips dorsalis: A new pest thrips for Florida; https://www.fdacs.gov/content/download/68187/file/Pest_Alert_-_Scirtothrips_dorsalis,_Chilli_Thrips.pdf [Accessed 2/3/20] 2-3, 5. Plant Use Net; https://uses.plantnet-project.org/en/Cayratia_(PROSEA) [Accessed 1/29/20] 4. Ozawa & Yano 2009, Pearl bodies of Cayratia japonica as alternative food for a predatory mite Euseius sojaensis; https://link.springer.com/article/10.1007/s11284-008-0501-5 [Accessed 1/30/20] 5. CABI, Phakopsora amelopsidis; https://www.cabi.org/isc/datasheet/40850 [Accessed 1/29/20] 6. USDA, ARS, National Fungus Collections Database; https://nt.ars-grin.gov/fungaldatabases/ [Accessed 1/29/20]	1. Species can serve as a host to Scirtothrips dorsalis (chilli thrips), an exotic pest identified as a threat to over 10 crops in Florida 2. Species is a host of Pseudomonas cissicola, the casual agent of bacterial leaf spot on grape and related genera 3. Species is an alternative host for the Lepidopteran Scrobigera amatrix, which feeds on the leaves of the grapes 4. Pearl bodies of this species are an alternative food source for Euseius sojaensis, a predatory mite 5. The genus, Cayratia, is host to Phakopsora amelopsidis (Ampelopsis rust fungus) and Cristulariella moricola (Cristulariella leaf spot) 6. No records of fungus host
4.07	1. van Valkenburg & Bunyapraphatsara 2001, Plant resources of South-East Asia No. 12(2): Medicinal and poisonous plants; https://www.cabi.org/isc/abstract/20013181428 [Accessed 1/30/20] 1. Atlas of Living Australia; https://bie.ala.org.au/species/http://id.biodiversity.org.au/node/apni/2891196 [Accessed 1/30/20]	No direct evidence of allergies or toxins 1. The wild type has also been grown for medicinal purposes, indicating some level of human consumption
4.08	1. UT Extension; https://extension.tennessee.edu/publications/Documents/W230.pdf [Accessed 1/28/20] 1. Texas Invasives Database; https://texasinvasives.org/plant_database/detail.php?symbol=CAJA7 [Accessed 1/30/20] 1. MSU Extension; http://extension.msstate.edu/publications/bushkiller [Accessed 1/30/20] 2. West 2009, Biology and Management of Bushkiller; https://repository.lib.ncsu.edu/bitstream/handle/1840.16/534/etd.pdf?sequence=1&isAllowed=y [Accessed 1/31/20] 2. Bugwood Wiki; https://wiki.bugwood.org/Cayratia_japonica [Accessed 1/29/20]	Conflicting reports- No primary literature confirming it's a fire ladder, but seems highly likely 1. Species acts as a ladder in forest fires, letting the fire climb higher than normal and causing more damage 2. It is unknown if this species can act as a ladder fuel

4.09	Zhu et al. 2019, Is spontaneous urban vegetation species rich and potential for exploitation? - A case study in Baoji, China; https://www.researchgate.net/profile/Ling_Zhu7/publication/337912613_Is_urban_spontaneous_vegetation_rich_in_species_and_has_potential_for_exploitation-_A_case_study_in_Baoji_China/links/5df86978299bf10bc3612f0b/Is-urban-spontaneous-vegetation-rich-in-species-and-has-potential-for-exploitation-A-case-study-in-Baoji-China.pdf [Accessed 1/30/30] 2. MSU Extension; http://extension.msstate.edu/publications/bushkiller [Accessed 1/30/20]	1. Preference for half-shade 2. Tolerates both sun and shade
4.10	1. MSU Extension; http://extension.msstate.edu/publications/bushkiller [Accessed 1/30/20] 1. Plant Use Net; https://uses.plantnet-project.org/en/Cayratia_(PROSEA) [Accessed 1/29/20] 2. West et al. 2011, Bushkiller response to selected herbicides; https://www.cambridge.org/core/journals/invasive-plant-science-and-management/article/bushkiller-cayratia-japonica-response-to-selected-herbicides/877B403343DE4365AF2D487A37C4C560 [Accessed 1/30/30]	1. Tolerates a range of soil conditions 2. In North Carolina, grows in sandy loam soils
4.11	1. USDA, PLANTS; https://plants.sc.egov.usda.gov/core/profile?symbol=CAJA7 [Accessed 1/28/20] 1. eFloras; http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200013484 [Accessed 1/28/20] 2. Emerine et al. 2013, Porcelain berry, bushkiller, and Virginia-creeper in interspecific competition; https://www.cambridge.org/core/journals/invasive-plant-science-and-management/article/porcelain-berry-ampelopsis-brevipedunculata-bushkiller-cayratia-japonica-and-virginiacreeper-parthenocissus-quinquefolia-in-interspecific-competition/668CD9EF1928CD9A6B63FF385D99F52E [Accessed 1/30/20] 2. UT Institute of Agriculture; https://extension.tennessee.edu/publications/Documents/W230.pdf [Accessed 1/28/20]	1. Species is a herbaceous vine, in the family Vitaceae 2. Fast-growing vine climbs existing native plants and either stress the plant by breaking branches due to its weight or block the sunlight for native plants
4.12	1. Singapore National Parks Flora and Fauna; https://www.nparks.gov.sg/florafaunaweb/flora/7/3/7389 [Accessed 1/29/20] 1. Emerine et al. 2013, Porcelain berry, bushkiller, and Virginia-creeper in interspecific competition; https://www.cambridge.org/core/journals/invasive-plant-science-and-management/article/porcelain-berry-ampelopsis-brevipedunculata-bushkiller-cayratia-japonica-and-virginiacreeper-parthenocissus-quinquefolia-in-interspecific-competition/668CD9EF1928CD9A6B63FF385D99F52E [Accessed 1/30/20]	1. No evidence of forming dense thickets, but species is a perennial and sometimes wood vine (liana) and therefore has potential to obstruct passage
5.01	1. USDA, PLANTS; https://plants.sc.egov.usda.gov/core/profile?symbol=CAJA7 [Accessed 1/28/20] 1. eFloras; http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200013484 [Accessed 1/28/20]	1. Species is a herbaceous vine, in the family Vitaceae
5.02	1. USDA, PLANTS; https://plants.sc.egov.usda.gov/core/profile?symbol=CAJA7 [Accessed 1/28/20] 1. Jackes 1987, Revision of the Australian Vitaceae, 2. Cayratia; https://www.researchgate.net/publication/285786857_Revision_of_the_Australian_Vitaceae_2_Cayratia_Juss [Accessed 1/29/20]	1. Species is a herbaceous vine, in the family Vitaceae

5.03	1. USDA, ARS, National Genetic Resources Program, GRIN; https://www.ars-grin.gov/Rhizobium [Accessed 1/28/20] 1. USDA, PLANTS; https://plants.sc.egov.usda.gov/core/profile?symbol=CAJA7 [Accessed 1/28/20] 1. Jackes 1987, Revision of the Australian Vitaceae, 2. Cayratia; https://www.researchgate.net/publication/285786857_Revision_of_the_Australian_Vitaceae_2_Cayratia_Juss [Accessed 1/29/20]	1. Not listed as having an association with rhizobium 2. Species is in the family Vitaceae
5.04	1. Jackes 1987, Revision of the Australian Vitaceae, 2. Cayratia; https://www.researchgate.net/publication/285786857_Revision_of_the_Australian_Vitaceae_2_Cayratia_Juss [Accessed 1/29/20] 1. Quattrocchi 2012, Medicinal and poisonous plants; https://books.google.com/books?id=-37OBQAAQBAJ&pg=PA860&lpg=PA860&dq=Causonis+japonica&source=bl&ots=8hOwoo9k3_&sig=ACfU3U0y9vsFtbL-JQrsOwC3hSzqpLOF_A&hl=en&ppis=_e&sa=X&ved=2ahUKEwjro_qzzqnnAhVjh-AKHYm8A6o4FBDoATAAegQIChAB#v=onepage&q=Causonis%20japonica&f=false [Accessed 1/29/20] 2. West et al. 2012, Fragment size and planting depth affect the regenerative capacity of Bushkiller; https://www.cambridge.org/core/journals/invasive-plant-science-and-management/article/fragment-size-and-planting-depth-affect-the-regenerative-capacity-of-bushkiller-cayratia-japonica/F57F706270240BF74C1957032D9F8156 [Accessed 1/29/20] 2. eFloras; http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200013484 [Accessed 1/28/20] 2. Maryland Invasive Species Council; http://mdinvasives.org/iotm/sep-2014/ [Accessed 1/29/20]	Geophyte is not always present/described, not observed in photos 1. Species has small or absent tubers 2. Species description does not include tubers, only rhizomes
6.01	1. USDA, National Plant Germplasm System; https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?id=410986 [Accessed 1/29/20] 2. Atlas of Living Australia; https://bie.ala.org.au/species/http://id.biodiversity.org.au/node/apni/2891196 [Accessed 1/30/20] 3. West et al. 2012, Fragment size and planting depth affect the regenerative capacity of bushkiller; https://www.cambridge.org/core/journals/invasive-plant-science-and-management/article/fragment-size-and-planting-depth-affect-the-regenerative-capacity-of-bushkiller-cayratia-japonica/F57F706270240BF74C1957032D9F8156 [Accessed 1/30/20	1. Large and widespread native range 2. In Australia (native range), it is listed as a species of least concern 3. Capable of reproduction by seed and vegetatively in native range
6.02	1. West et al. 2012, Fragment size and planting depth affect the regenerative capacity of bushkiller; https://www.cambridge.org/core/journals/invasive-plant-science-and-management/article/fragment-size-and-planting-depth-affect-the-regenerative-capacity-of-bushkiller-cayratia-japonica/F57F706270240BF74C1957032D9F8156 [Accessed 1/30/20] 2. West et al. 2010, Bushkiller growth in interspecific and intraspecific competition; https://www.cambridge.org/core/journals/weed-science/article/bushkiller-cayratia-japonica-growth-in-interspecific-and-intraspecific-competition/A2DC5081360DDFEAA9A210BFB5220BDF [Accessed 1/30/20] 2. Kakutani et al. 1989, Nectar secretion pattern of the dish-shaped flower, Cayratia japonica, and nectar utilization patterns by insect visitors; https://esj-journals.onlinelibrary.wiley.com/doi/abs/10.1007/BF02513213 [Accessed 1/30/20]	1. Reproduces by seed in native range 2. In North America, only reported to reproduce vegetatively even though pollinators have been observed carrying pollen

6.03	1. Ishikawa et al. 2014, Lineage diversification and hybridization in the Cayratia japonica - Cayratia tenuifolia species complex; https://reader.elsevier.com/reader/sd/pii/S1055790314000463?token=92F54C471E83BD672D467CF44D46DFCDA154B2643A699D2039860A3424C38CD6784EBF9A6ED36458731CE6916086B531 [Accessed 1/31/20] 2. Tsukaya et al. 2012, A hypothesis on the origin of genetic heterozygosity in diploids and triploids in Japanese Cayratia japonica species complex; https://link.springer.com/article/10.1007/s10265-011-0467-1 [Accessed 1/28/20]	1. From a collection of 116 accessions from native habitats, hybrids among the lineages of the Asian C. japonica - C. tenuifolia species complex and among the C. maritima and Asia C. japonica - C. tenuifolia species complex were identified 2. Japanese populations of congeners C. japonica and C. tenuifolia almost certainly arose from repeated hybridization events
6.04	1. West 2009, Biology and Management of Bushkiller; https://repository.lib.ncsu.edu/bitstream/handle/1840.16/534/etd.pdf?sequence=1&isAllowed=y [Accessed 1/31/20] 1. Kakutani et al. 1989, Nectar secretion pattern of the dish-shaped flower, Cayratia japonica, and nectar utilization patterns by insect visitors; https://esj-journals.onlinelibrary.wiley.com/doi/abs/10.1007/BF02513213 [Accessed 1/30/20] 1. Okada et al. 2003, Intra-specific polyploidy and possible occurrence of some genetic types for pollen development in Cayratia japonica; https://www.jstage.jst.go.jp/article/apg/54/1/54_KJ00004623207/_article/-char/ja/ [Accessed 2/3/20] 2. Molina 2009, Floral biology of Philippine morphospecies of the grape relative Leea; https://esj-journals.onlinelibrary.wiley.com/doi/epdf/10.1111/j.1442-1984.2009.00238.x [Accessed 1/27/20]	No direct evidence 1. Research suggests that species may exist in a self-pollinating state and low pollen fertility may explain why some diploid individuals produce fruits and others do not 2. C. japonica, like all other Vitaceae, lack a floral tube and this might theoretically predispose these species to self-pollination because the stamens and stigma simultaneously exist in the flower
6.05	1. Plant Use Net; https://uses.plantnet-project.org/en/Cayratia_(PROSEA) [Accessed 1/29/20] 2. Kakutani et al. 1989, Nectar secretion pattern of the dish-shaped flower, Cayratia japonica, and nectar utilization patterns by insect visitors; https://esj-journals.onlinelibrary.wiley.com/doi/abs/10.1007/BF02513213 [Accessed 1/30/20] 2. Bruno 2017, Bushkiller vine springs back in recent hot and rainy weather; here's what gardeners can do; https://www.theadvocate.com/article_c0d4478c-72db-11e7-9922-fb04d9910e0b.html [Accessed 1/29/20]	1. In Japan (native range), the species is most commonly visited by Lasius niger (ant) and Vespa xanthoptera (wasp) 2. In the introduced range, Apis cerana (eastern honey bees) are commonly seen at the flowers and with pollen on their bodies
6.06	1. West et al. 2012, Fragment size and planting depth affect the regenerative capacity of bushkiller; https://www.cambridge.org/core/journals/invasive-plant-science-and-management/article/fragment-size-and-planting-depth-affect-the-regenerative-capacity-of-bushkiller-cayratia-japonica/F57F706270240BF74C1957032D9F8156 [Accessed 1/30/20] 2. West et al. 2010, Bushkiller growth in interspecific and intraspecific competition; https://www.cambridge.org/core/journals/weed-science/article/bushkiller-cayratia-japonica-growth-in-interspecific-and-intraspecific-competition/A2DC5081360DDFEAA9A210BFB5220BDF [Accessed 1/30/20] 2. EDDMapS; https://www.eddmaps.org/species/subject.cfm?sub=13557 [Accessed 1/28/20]	1. Species has extremely high capacity to regenerate from root fragments 2. Species has only been observed spreading vegetatively in southern USA, even though it forms viable seeds in native range and is visited by pollinators in introduced range
6.07	1. West et al. 2012, Fragment size and planting depth affect the regenerative capacity of Bushkiller; https://www.cambridge.org/core/journals/invasive-plant-science-and-management/article/fragment-size-and-planting-depth-affect-the-regenerative-capacity-of-bushkiller-cayratia-japonica/F57F706270240BF74C1957032D9F8156 [Accessed 1/29/20]	1. Bushkiller roots that are 2.8 inches in length can produce 1 shoot of around 10 inches within 34 days of plants

7.01	1. Emerine et al. 2013, Porcelain berry, bushkiller, and Virginia-creeper in interspecific competition; https://www.cambridge.org/core/journals/invasive-plant-science-and-management/article/porcelain-berry-ampelopsis-brevipedunculata-bushkiller-cayratia-japonica-and-virginiacreeper-parthenocissus-quinquefolia-in-interspecific-competition/668CD9EF1928CD9A6B63FF385D99F52E [Accessed 1/30/20] 2. UT Institute of Agriculture; https://extension.tennessee.edu/publications/Documents/W230.pdf [Accessed 1/28/20] 3. MSU Extension; https://www.gri.msstate.edu/research/ipams/FactSheets/Bushkiller.pdf [Accessed 1/29/20]	1. Found in disturbed forests, moist river bottoms, fallow fields and pastures, and residential areas 2. Tends to invade disturbed areas such as residential areas, fallow fields, overgrazed pasture, and harvested forest 3. Species is primarily spread by human movement
7.02	1-2. West 2009, Biology and Management of Bushkiller; https://repository.lib.ncsu.edu/bitstream/handle/1840.16/534/etd.pdf?sequence=1&isAllowed=y [Accessed 1/31/20] 2. Bugwood Wiki; https://wiki.bugwood.org/Cayratia_japonica [Accessed 1/29/20] 2. Gerrath et al. 2015, Taming the wild grape; https://books.google.com/books?id=lNkLCwAAQBAJ&pg=PA68&lpg=PA68&dq=Causonis+japonica&source=bl&ots=qcfYJTPH61&sig=ACfU3U3I3MFxYGe0YVI5Fe7tKvPBBcoGeQ&hl=en&ppis=_e&sa=X&ved=2ahUKEwjro_qzzqnnAhVjh-AKHYm8A6o4FBDoATABegQICRAB#v=onepage&q=Causonis%20japonica&f=false [Accessed 1/29/20]	1. Bushkiller was not found in nursery catalogs or online for sale in the USA 2. Species has been and is still proposed to still be cultivated as an ornamental in North America as a ground cover and for medicine
7.03	1. Iverson, North Carolina Dept. of Agriculture, Bushkiller: A new noxious weed in NC; https://www.invasiveplantcontrol.com/wp-content/uploads/december_2009/agenda/Bushkiller_DODWorkshop.pdf [Accessed 2/3/20] 2. Ozawa & Yano 2009, Pearl bodies of Cayratia japonica as alternative food for a predatory mite Euseius sojaensis; https://link.springer.com/article/10.1007/s11284-008-0501-5 [Accessed 1/30/20]	No direct evidence 1. Medium risk of introduction to new areas, likely through contamination of nursery stock 2. Commonly found around agricultural fields and shrubs
7.04	1. Jackes 1987, Revision of the Australian Vitaceae, 2. Cayratia; https://www.researchgate.net/publication/285786857_Revision_of_the_Australian_Vitaceae_2_Cayratia_Juss [Accessed 1/29/20]	No evidence of wind dispersal or adaptations to facilitate it 1. Seeds described as 3.5-5 mm by 3-4 mm in size with two shallow grooves on ventral surface
7.05	1. MSU Extension; https://www.gri.msstate.edu/research/ipams/FactSheets/Bushkiller.pdf [Accessed 1/29/20] 1. Houston Advanced Research Center; https://www.galvbayinvasives.org/invasive/P-006 [Accessed 2/3/20] 2. Qui et al. 2016, Archaeobotanical analysis of diverse plant food resources and palaeovegetation at the Zhumucun site, a late Neolithic settlement of the Liangzhu culture in east China; https://reader.elsevier.com/reader/sd/pii/S1040618215301506?token=C3F0753AFA1BBE8ED244CE3F290AF2C46C1828018B344DDBCAC564565A8BE78530E83E33E07518C8510EBBE7FB4D6CA8 [Accessed 1/30/20]	1. Certain natural events such as flooding might be spreading propagules 2. Seeds were able to be floated out of sediment at archeological sites, indicating some buoyancy

7.06	1. Xinhua et al. 2006, Effects of bird seed dispersal on diversity of the invaded plants in several hedge types; https://reader.elsevier.com/reader/sd/pii/S1872203206600292?token=974F23D2D00FACA50E5E095E804D737771DFAF12BCF85680DB4DEF4D8AD767A5E0A551A87958B67988CF92B04F2A28C4 [Accessed 1/31/20] 1. Puyravaud et al. 2003, Rain forest expansion mediated by successional processes in vegetation thickets in the Western Ghats of India; https://onlinelibrary.wiley.com/doi/epdf/10.1046/j.1365-2699.2003.00882.x [Accessed 1/31/20] 2. Singapore National Parks Flora and Fauna; https://www.nparks.gov.sg/florafaunaweb/flora/7/3/7389 [Accessed 1/29/20] 3. West et al. 2010, Bushkiller growth in interspecific and intraspecific competition; https://www.cambridge.org/core/journals/weed-science/article/bushkiller-cayratia-japonica-growth-in-interspecific-and-intraspecific-competition/A2DC5081360DDFEAA9A210BFB5220BDF [Accessed 1/30/20]	1. In native range (China and India), seeds are known to be bird dispersed 2. Small fleshy fruits which might be attractive to animals 3. In North America, there is no evidence of reproduction by seed
7.07	1. Jackes 1987, Revision of the Australian Vitaceae, 2. Cayratia; https://www.researchgate.net/publication/285786857_Revision_of_the_Australian_Vitaceae_2_Cayratia_Juss [Accessed 1/29/20]	No direct evidence 1. Seeds and fruits not described as having adaptations making it likely to attach to animals
7.08	1. 1. Ishikawa et al. 2014, Lineage diversification and hybridization in the Cayratia japonica - Cayratia tenuifolia species complex; https://reader.elsevier.com/reader/sd/pii/S1055790314000463?token=92F54C471E83BD672D467CF44D46DFCDA154B2643A699D2039860A3424C38CD6784EBF9A6ED36458731CE6916086B531 [Accessed 1/31/20] 1. Singapore National Parks Flora and Fauna; https://www.nparks.gov.sg/florafaunaweb/flora/7/3/7389 [Accessed 1/29/20]	No direct evidence 1. Fruits of the Vitaceae family are often eaten by animals (especially mammals and birds) and the species small fleshy fruits might be attractive to animals
8.01	1. West 2009, Biology and Management of Bushkiller; https://repository.lib.ncsu.edu/bitstream/handle/1840.16/534/etd.pdf?sequence=1&isAllowed=y [Accessed 1/31/20] 2. LSU AgCenter; http://www.rnr.lsu.edu/plantid/species/bushkiller/bushkiller.htm [Accessed 1/28/20] 3. Useful Tropical Plants; http://tropical.theferns.info/viewtropical.php?id=Cayratia+japonica [Accessed 1/29/20] 4. Ishikawa et al. 2014, Lineage diversification and hybridization in the Cayratia japonica - Cayratia tenuifolia species complex; https://reader.elsevier.com/reader/sd/pii/S1055790314000463?token=92F54C471E83BD672D467CF44D46DFCDA154B2643A699D2039860A3424C38CD6784EBF9A6ED36458731CE6916086B531 [Accessed 1/31/20]	Not enough evidence to evaluate 1. Seed production does not contribute to invasion risk in North America, as the species does not produce viable seed in introduced range 2. 2 to 4 seeds per fruit 3. Individuals can grow up 2 to 4 meters long 4. Triploid plants have low fertility and rarely bear fruit, and known populations in the United States are thought to all be triploid
8.02	1. West 2009, Biology and Management of Bushkiller; https://repository.lib.ncsu.edu/bitstream/handle/1840.16/534/etd.pdf?sequence=1&isAllowed=y [Accessed 1/31/20] 2. Graham & Hopkins, Soil seed bank of adjacent unlogged rainforest types in North Queensland; https://www.publish.csiro.au/bt/pdf/BT9900261 [Accessed 2/3/20]	No direct evidence 1. Seed dormancy does not contribute to invasion risk in North America, as the species does not produce viable seed in introduced range 2. In Australia (native range), a study found that vines (including Cayratia japonica) contributed to less than 4% of the seed bank across forest types, meaning this species could have a very small seed bank

8.03	1. West 2009, Biology and Management of Bushkiller; https://repository.lib.ncsu.edu/bitstream/handle/1840.16/534/etd.pdf?sequence=1&isAllowed=y [Accessed 1/31/20] 1-2. West et al. 2017, Bushkiller (Cayratia japonica) response to selected herbicides; https://www.cambridge.org/core/journals/invasive-plant-science-and-management/article/bushkiller-cayratia-japonica-response-to-selected-herbicides/877B403343DE4365AF2D487A37C4C560 [Accessed 1/28/20] 2. SE-EPPC 2011, Control of Cayratia japonica, Bushkiller, in an urban habitat in Charlotte, NC; https://www.se-eppc.org/wildlandweeds/pdf/Winter2011Spring2012-Matthews-pp6-8.pdf [Accessed 1/28/20]	1. Highly stress tolerant and able to resist herbicides and it's difficult to spray vines without hitting the plants beneath them, more research is needed to evaluate the effectiveness of multiple-season treatments and control at well established sites 2. Long-term control in greenhouse and small infestations was achieved with imazapyr, sulfometuron, and sulfometuron + metsulfuron (88-99% control after 10mos), but there was not long term control through glyphosate and triclopyr and several years of reapplying was needed for complete eradication
8.04	1. UT Institute of Agriculture; https://extension.tennessee.edu/publications/Documents/W230.pdf [Accessed 1/28/20] 1. West 2009, Biology and Management of Bushkiller; https://repository.lib.ncsu.edu/bitstream/handle/1840.16/534/etd.pdf?sequence=1&isAllowed=y [Accessed 1/31/20]	1. Species can resprout from rhizomes left in soil when attempting to mechanically remove the plant, thus it's likely that if connected plants are broken up there would be a benefit to this treatment
8.05	1. West 2009, Biology and Management of Bushkiller; https://repository.lib.ncsu.edu/bitstream/handle/1840.16/534/etd.pdf?sequence=1&isAllowed=y [Accessed 1/31/20]	No evidence of specific, strongly limiting natural enemies 1. Lack of effective natural controls known in United States (introduced range)