United States Department of Agriculture

Weed Risk Assessment for *Oxalis hispidula* Zucc. (Oxalidaceae) – Bristly wood sorrel

United States Department of Agriculture

Animal and Plant Health Inspection Service

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Version 1

Image courtesy of A. González (González, 2015)

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Introduction Plant Protection and Quarantine (PPQ) regulates noxious weeds under the authority of the Plant Protection Act (7 U.S.C. § 7701-7786, 2000) and the Federal Seed Act (7 U.S.C. § 1581-1610, 1939). A noxious weed is defined as "any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment" (7 U.S.C. § 7701-7786, 2000). We use the PPQ weed risk assessment (WRA) process (PPQ, 2015) to evaluate the risk potential of plants, including those newly detected in the United States, those proposed for import, and those emerging as weeds elsewhere in the world.

The PPQ WRA process includes three analytical components that together describe the risk profile of a plant species (risk potential, uncertainty, and geographic potential; PPQ, 2015). At the core of the process is the predictive risk model that evaluates the baseline invasive/weed potential of a plant species using information related to its ability to establish, spread, and cause harm in natural, anthropogenic, and production systems (Koop et al., 2012). Because the predictive model is geographically and climatically neutral, it can be used to evaluate the risk of any plant species for the entire United States or for any area within it. We then use a stochastic simulation to evaluate how much the uncertainty associated with the risk analysis affects the outcomes from the predictive model. The simulation essentially evaluates what other risk scores might result if any answers in the predictive model might change. Finally, we use Geographic Information System (GIS) overlays to evaluate those areas of the United States that may be suitable for the establishment of the species. For a detailed description of the PPQ WRA process, please refer to the *PPQ Weed Risk Assessment Guidelines* (PPQ, 2015), which is available upon request.

We emphasize that our WRA process is designed to estimate the baseline—or unmitigated—risk associated with a plant species. We use evidence from anywhere in the world and in any type of system (production, anthropogenic, or natural) for the assessment, which makes our process a very broad evaluation. This is appropriate for the types of actions considered by our agency (e.g., Federal regulation). Furthermore, risk assessment and risk management are distinctly different phases of pest risk analysis (e.g., IPPC, 2015). Although we may use evidence about existing or proposed control programs in the assessment, the ease or difficulty of control has no bearing on the risk potential for a species. That information could be considered during the risk management (decision making) process, which is not addressed in this document.

	***Oxalis hispidula* Zucc. – Bristly wood sorrel**
Species Information	Family: Oxalidaceae Synonyms: *Oxalis canelonesensis* R. Knuth; *O. paraguayensis* Chodat; *O. paraguayensis* var. *pauciflora* R. Knuth; *O. uruguayensis* Arechav.; *O. venustula* Arechav. (The Plant List, 2013). Common name: Bristly wood sorrel (Alabama Plant Atlas, 2015). Botanical description: *Oxalis hispidula* is a perennial herbaceous plant that grows to 30 cm in height. Small bulbs at the base of the plant produce only basal leaves bearing three leaflets. Flowers are pink or purple. It is found in short grass, along roadsides, and in riparian areas (Grigoletto, 2013; Horne et al., 2013; Tolosa, 2015). Initiation: In 2007, a naturalized population of *Oxalis hispidula* was observed in Baldwin County, Alabama. In 2013, another population approximately 35 kilometers away was detected. These were the first detections of *O. hispidula* in the United States and outside its native range (Horne et al., 2013). Consequently, the PPQ Weeds Cross Functional Working Group requested that we fully evaluate it with a weed risk assessment. Foreign distribution: *Oxalis hispidula* is native to Argentina, Brazil, Paraguay, and Uruguay (Horne et al., 2013). It is not known to occur elsewhere. U.S. distribution and status: *Oxalis hispidula* occurs in one county in Alabama, where it appears to be naturalized (Horne et al., 2013). WRA area[1]: Entire United States, including territories.

1. *Oxalis hispidula* analysis

Establishment/Spread Potential

The recent findings of two *O. hispidula* populations in Alabama are the first records of this species outside its native range (Horne et al., 2013). These populations are well established and we do not know if they are likely to spread or how they are likely to behave if not controlled. We found little information about seed production and dispersal ability of the taxon, although *Oxalis* spp. spread primarily by seed (eFloras, 2011; Flora Costaricensis, 1991). Based on its presence in roadside habitats in its native range (Horne et al., 2013; Tolosa, 2015), we believe that *O. hispidula* is likely to be dispersed by mowing and vehicular activities (e.g., road construction, mud clinging to cars and tires). *Oxalis hispidula* has only been found outside its native range once, and we had very high uncertainty for this risk element due to lack of information about its biology (e.g., seed production and dispersal).

Risk score = -2 Uncertainty index = 0.36

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

Impact Potential

Oxalis hispidula occurs along roadsides, in riparian areas, and in areas dominated by short grasses (Grigoletto, 2013; Tolosa, 2015). It has not been reported as a weed of any system in its native range, and although it is apparently established in Alabama, it does not appear to be causing problems there (Horne et al., 2013). We had average uncertainty for this risk element.

Risk score = 1.1 Uncertainty index = 0.17

Geographic Potential

Based on three climatic variables, we estimate that about eight percent of the United States is suitable for the establishment of *O. hispidula* (Fig. 1). This predicted distribution is based on the species' known distribution elsewhere in the world and includes point-referenced localities and areas of occurrence. The map for *O. hispidula* represents the joint distribution of Plant Hardiness Zones 9-11, areas with 80-100+ inches of annual precipitation, and the following Köppen-Geiger climate classes: tropical savanna, humid subtropical, and marine west coast.

The area of the United States shown to be climatically suitable (Fig. 1) is likely overestimated since our analysis considered only three climatic variables. Other environmental variables, such as soil and habitat type, may further limit the areas in which this species is likely to establish. *Oxalis hispidula* is known to grow in grass along roadsides, near bodies of water, and in wet ditches in humid locations (Cervi et al., 1988; Grigoletto, 2013; Tolosa, 2015).

Entry Potential

We did not assess the entry potential of *Oxalis hispidula* because it is already present in the United States (Horne et al., 2013).

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

2. Results

Model Probabilities: P(Major Invader) = 1.9%
P(Minor Invader) = 37.1%
P(Non-Invader) = 61.0%

Risk Result = Low Risk
Secondary Screening = Not Applicable

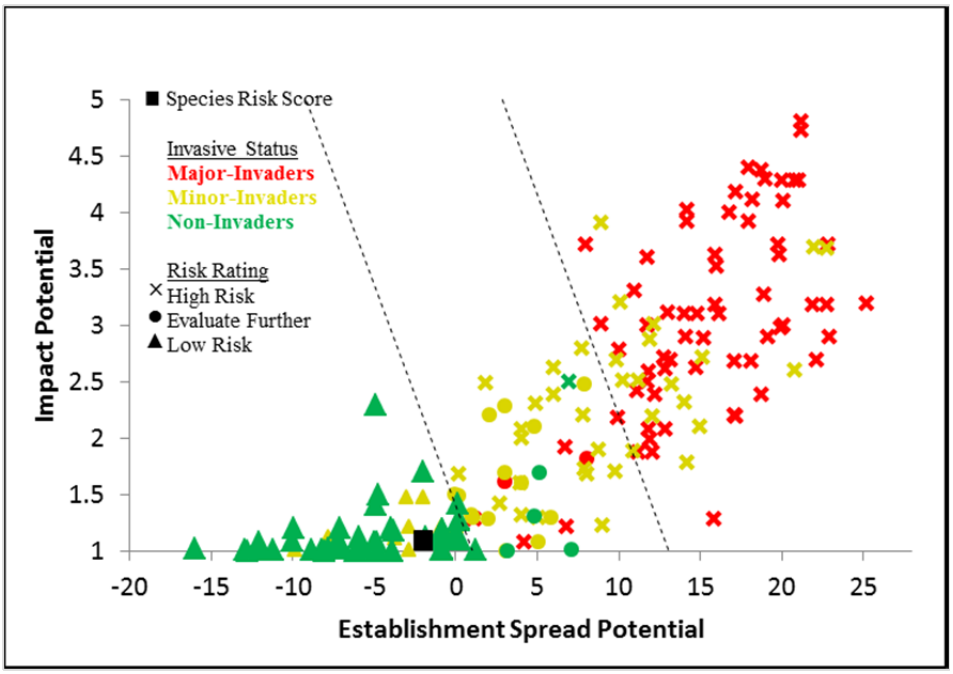

Figure 2. *Oxalis hispidula* risk score (black box) relative to the risk scores of species used to develop and validate the PPQ WRA model (other symbols). See Appendix A for the complete assessment.

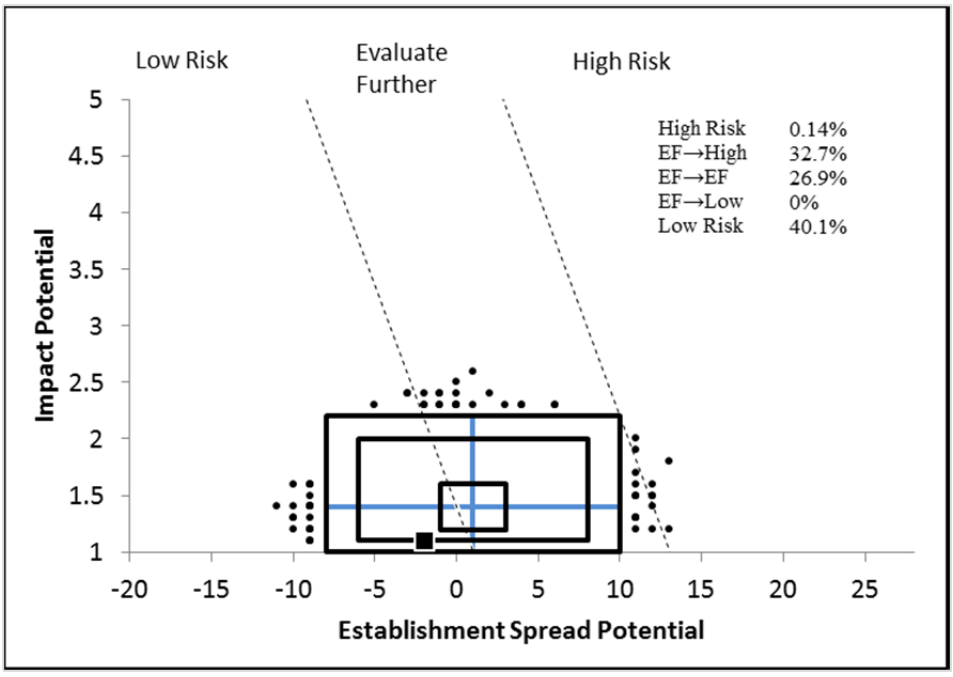

Figure 3. Model simulation results (N=5,000) for uncertainty around the risk score for *Oxalis hispidula*. The blue "+" symbol represents the medians of the simulated outcomes. The smallest box contains 50 percent of the outcomes, the second 95 percent, and the largest 99 percent.

3. Discussion

The result of the weed risk assessment for *O. hispidula* is Low Risk (Fig. 2). As discussed above, we had very high uncertainty for the establishment/spread risk element. This is reflected in the large distribution of simulated risk scores along the x-axis in Figure 3. In contrast, we had an average level of uncertainty for impact potential, because, although not well-studied, *O. hispidula* is not known to have caused any impacts to agricultural or natural systems in its native range. Although our uncertainty analysis largely confirmed the Low Risk rating (about 40 percent of iterations), both the risk model results [P(Minor Invader) = 37.1%] and uncertainty analysis results (Fig. 3) indicate that it could be a minor invader. Note that 60 percent of outcomes in the uncertainty analysis were either Evaluate Further or High risk. Such a wide range of results is typical for assessments with high uncertainty and observed risk scores near a risk threshold.

The Alabama report of *O. hispidula* is the first report of this species beyond its native range (Horne et al., 2013). It is not clear how this species entered the United States, particularly since we found no evidence of cultivation. *Oxalis hispidula* is not considered a weed in its native range and we found no evidence that it is being controlled. However, given its probable status as a Minor Invader (see above), the lack of history elsewhere in the world, and the fact that other *Oxalis* species are weeds (Holm et al., 1979; LeStrange et al., 2014; Royo-Esnal and López, 2012), we recommend that managers monitor this species.

4. Literature Cited

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Appendix A. Weed risk assessment for *Oxalis hispidula* Zucc. (Oxalidaceae). Below is all of the evidence and associated references used to evaluate the risk potential of this taxon. We also include the answer, uncertainty rating, and score for each question. The Excel file, where this assessment was conducted, is available upon request.

Question ID	Answer - Uncertainty	Score	Notes (and references)
ESTABLISHMENT/SPREAD POTENTIAL			
ES-1 [What is the taxon's establishment and spread status outside its native range? (a) Introduced elsewhere =>75 years ago but not escaped; (b) Introduced <75 years ago but not escaped; (c) Never moved beyond its native range; (d) Escaped/Casual; (e) Naturalized; (f) Invasive; (?) Unknown]	e - low	2	*Oxalis hispidula* is native to Argentina, Brazil, Paraguay, and Uruguay (Horne et al., 2013). The species was recently detected outside its native range for the first time when two naturalized populations approximately 35 km apart were found in Alabama (Horne et al., 2013). The author notes that "populations appear to be securely established". It has not been reported as present elsewhere in the world. Alternate answers for the Monte Carlo simulation were "d" and "f".
ES-2 (Is the species highly domesticated)	n - low	0	We found no evidence that *O. hispidula* is domesticated. It does not appear to be cultivated anywhere (Dave's Garden, 2015).
ES-3 (Weedy congeners)	y - negl	1	The genus *Oxalis* contains 34 species considered invasive (Royo-Esnal and López, 2012). Many *Oxalis* species exhibit weedy behavior: *Oxalis corniculata*, *O. purpurata*, and *O. semiloba* are considered serious weeds, and numerous others are principal weeds (Holm et al., 1979). *Oxalis pes-caprae* is a universal weed of horticulture and natural areas (LeStrange et al., 2014).
ES-4 (Shade tolerant at some stage of its life cycle)	n - mod	0	We found no direct evidence of shade tolerance. In its native range it is found in open areas (Grigoletto, 2013) and in short grass, along streams, roadsides, and in "mountain areas" (Tolosa, 2015). In Alabama it occurs in ditches and grows to the forest edge (Horne et al., 2013).
ES-5 (Plant a vine or scrambling plant, or forms tightly appressed basal rosettes)	n - negl	0	*Oxalis hispidula* is a small, herbaceous plant; it is not a vine or a plant with tightly appressed basal rosette of leaves (Horne et al., 2013).
ES-6 (Forms dense thickets, patches, or populations)	n - mod	0	We found no evidence.
ES-7 (Aquatic)	n - negl	0	This taxon is not aquatic and does not appear to be an obligate wetland species. It is found along roadsides and in wet ditches (Cervi et al., 1988; Horne et al., 2013).
ES-8 (Grass)	n - negl	0	This species is a member of the Oxalidaceae and therefore not a grass (Grigoletto, 2013).
ES-9 (Nitrogen-fixing woody plant)	n - negl	0	This species is a member of the Oxalidaceae, a family that is not known to contain species that fix nitrogen (Martin and Dowd, 1990). Furthermore, it is not a woody plant (Horne et al., 2013).
ES-10 (Does it produce viable seeds or spores)	y - high	1	Plants in Alabama were noted to bear immature capsules (Horne et al., 2013). We used high

Question ID	Answer - Uncertainty	Score	Notes (and references)
			uncertainty because we found no direct evidence or description of viable seeds for this species.
ES-11 (Self-compatible or apomictic)	? - max	0	Unknown. We found no information about this species' breeding system.
ES-12 (Requires specialist pollinators)	? - max		Unknown. We found no information regarding pollination.
ES-13 [What is the taxon's minimum generation time? (a) less than a year with multiple generations per year; (b) 1 year, usually annuals; (c) 2 or 3 years; (d) more than 3 years; or (?) unknown]	c - high	0	We found no information regarding generation time; however, *O. hispidula* is a perennial herbaceous plant that is unlikely to require more than three years to reproduce. Consequently, we answered "c." Because we could not rule out that it produces one or more generations per year, the alternate answers for the uncertainty analysis were "b" and "a."
ES-14 (Prolific reproduction)	? - max	0	Unknown.
ES-15 (Propagules likely to be dispersed unintentionally by people)	y - high	1	*Oxalis hispidula* is often found along roadsides in its native range and was found in "disturbed roadside right-of-ways and adjacent ditches" in its introduced range in Alabama (Horne et al., 2013; Tolosa, 2015). Consequently, we believe it can be dispersed unintentionally by vehicles along roadways (e.g., seeds in mud on vehicles).
ES-16 (Propagules likely to disperse in trade as contaminants or hitchhikers)	n - mod	-1	We found no evidence that it is a trade contaminant. Because this species is not known to be an agricultural weed or to occur in agricultural areas, it seems unlikely to be dispersed as a contaminant of trade.
ES-17 (Number of natural dispersal vectors)	0	-4	Fruit and seed traits used for questions ES-17a through ES-17e: *Oxalis* spp. fruit is a dehiscing capsule. Seeds are small, ovoid, and sometimes ridged, with a fleshy integument. Seeds are explosively ejected from the capsule when ripe (eFloras, 2011; Flora Costaricensis, 1991).
ES-17a (Wind dispersal)	n - mod		We found no information regarding *O. hispidula* seed traits. However, because most members of the genus *Oxalis* forcefully eject their seeds, and because their seeds do not generally appear to be adapted to wind dispersal, we answered no with moderate uncertainty.
ES-17b (Water dispersal)	? - max		Unknown.
ES-17c (Bird dispersal)	? - max		Unknown. The seeds of *Oxalis* species typically are not fleshy when ripe and do not produce hooks, burrs, or other obvious systems for attachment (eFloras, 2011; Flora Costaricensis, 1991). Birds eat the seeds of some species of *Oxalis*, but it is unknown whether the seeds survive the digestive process (Hilty, 2015; Judd, 1898).
ES-17d (Animal external dispersal)	n - high		The fruit and seeds of *Oxalis* species typically do not produce hooks, burrs, or other obvious systems for attachment (eFloras, 2011; Flora Costaricensis, 1991), so we answered no with high uncertainty. Although we found no evidence

Question ID	Answer - Uncertainty	Score	Notes (and references)
			for this, the small seeds may get trapped in the fur of animals passing by plants.
ES-17e (Animal internal dispersal)	? - max		Unknown. Small mammals eat the seeds of some *Oxalis* species, but it is unknown whether the seeds survive the digestion process (Hilty, 2015).
ES-18 (Evidence that a persistent (>1yr) propagule bank (seed bank) is formed)	? - max	0	Unknown.
ES-19 (Tolerates/benefits from mutilation, cultivation or fire)	? - max	0	Unknown. We found no evidence of its behavior in response to disturbance.
ES-20 (Is resistant to some herbicides or has the potential to become resistant)	n - mod	0	We found no evidence that *O. hispidula* is resistant to herbicides or that it occurs in areas likely to be sprayed routinely. Neither this species nor any congener is listed as resistant by Heap (2015). Because herbicide resistance develops primarily in agricultural weeds, and this species is not an agricultural weed, we used moderate uncertainty.
ES-21 (Number of cold hardiness zones suitable for its survival)	3	-1	
ES-22 (Number of climate types suitable for its survival)	3	0	
ES-23 (Number of precipitation bands suitable for its survival)	3	-1	
IMPACT POTENTIAL			
General Impacts			
Imp-G1 (Allelopathic)	? - max		Unknown. We found no information regarding allelopathy.
Imp-G2 (Parasitic)	n - negl	0	Members of Oxalidaceae are not known to be parasitic (Nickrent, 2009).
Impacts to Natural Systems			
Imp-N1 (Changes ecosystem processes and parameters that affect other species)	n - mod	0	We found no evidence that this species can alter ecosystem processes. Because *O. hispidula* is not known to be a weed of natural areas, we used moderate uncertainty for most questions in this sub-element.
Imp-N2 (Changes habitat structure)	n - mod	0	We found no evidence.
Imp-N3 (Changes species diversity)	n - mod	0	We found no evidence.
Imp-N4 (Is it likely to affect federal Threatened and Endangered species?)	n - mod	0	*Oxalis hispidula* seems unlikely to affect any Threatened and Endangered species, as it grows along roadsides in its only introduced range (Horne et al., 2013).
Imp-N5 (Is it likely to affect any globally outstanding ecoregions?)	n - mod	0	*Oxalis hispidula* often grows in short grass and along roadways (Tolosa, 2015) and is unlikely to occur in a globally outstanding ecoregion.
Imp-N6 [What is the taxon's weed status in natural systems? (a) Taxon not a weed; (b) taxon a weed but no evidence of control; (c) taxon a weed and evidence of control efforts]	a - low	0	We found no evidence that *O. hispidula* exhibits weedy behavior in natural areas. Alternate answers for the Monte Carlo simulation were both "b."
Impact to Anthropogenic Systems (cities, suburbs, roadways)			
Imp-A1 (Negatively impacts personal property, human safety, or public	n - mod	0	*Oxalis hispidula* is a small herbaceous species found in natural areas and along roadsides (Horne

Question ID	Answer - Uncertainty	Score	Notes (and references)
infrastructure)			et al., 2013; Tolosa, 2015); however, it has not been observed to cause negative impacts in these areas. It seems unlikely that it would significantly impact anthropogenic areas.
Imp-A2 (Changes or limits recreational use of an area)	n - low	0	*Oxalis hispidula* grows to 30 cm in height and does not appear to exhibit characteristics that would limit use of any areas (Tolosa, 2015).
Imp-A3 (Affects desirable and ornamental plants, and vegetation)	? - max		We found no evidence that it impacts desirable plants in anthropogenic systems. However, because this species has naturalized in this kind of disturbed system and because so little is known about it, we answered unknown.
Imp-A4 [What is the taxon's weed status in anthropogenic systems? (a) Taxon not a weed; (b) Taxon a weed but no evidence of control; (c) Taxon a weed and evidence of control efforts]	a - mod	0	Two populations of *O. hispidula* were recently detected along roadsides in Alabama, and any plans to treat or monitor the populations are unknown at this time. Because this species seems unlikely to be specifically targeted for management, we chose only "b" as the alternate answer for the Monte Carlo simulation.
Impact to Production Systems (agriculture, nurseries, forest plantations, orchards, etc.)			
Imp-P1 (Reduces crop/product yield)	n - mod	0	We found no evidence that *O. hispidula* is a weed of agricultural systems or that it occurs in these systems. Consequently, we answered no for most of the questions in this sub-element and used moderate uncertainty.
Imp-P2 (Lowers commodity value)	n - mod	0	We found no evidence.
Imp-P3 (Is it likely to impact trade?)	n - mod	0	We found no evidence.
Imp-P4 (Reduces the quality or availability of irrigation, or strongly competes with plants for water)	n - low	0	We found no evidence that *O. hispidula* is or is likely to be exceptionally competitive for water.
Imp-P5 (Toxic to animals, including livestock/range animals and poultry)	y - mod	0.1	Members of the genus *Oxalis* contain calcium oxalates which sometimes cause kidney disease in grazing animals and colic in horses when eaten in large quantities (Auld and Medd, 1987; Hanson, 2008; Rekhis and Amara, 1990).
Imp-P6 [What is the taxon's weed status in production systems? (a) Taxon not a weed; (b) Taxon a weed but no evidence of control; (c) Taxon a weed and evidence of control efforts]	a - low	0	We found no evidence that *O. hispidula* is a weed of agriculture. Alternate answers for the Monte Carlo simulation were both "b."
GEOGRAPHIC POTENTIAL			Unless otherwise indicated, the following evidence represents geographically referenced points obtained from the Global Biodiversity Information Facility (GBIF, 2014).
Plant hardiness zones			
Geo-Z1 (Zone 1)	n - negl	N/A	We found no evidence that it occurs in this hardiness zone.
Geo-Z2 (Zone 2)	n - negl	N/A	We found no evidence that it occurs in this hardiness zone.
Geo-Z3 (Zone 3)	n - negl	N/A	We found no evidence that it occurs in this hardiness zone.
Geo-Z4 (Zone 4)	n - negl	N/A	We found no evidence that it occurs in this hardiness zone.

Question ID	Answer - Uncertainty	Score	Notes (and references)
Geo-Z5 (Zone 5)	n - negl	N/A	We found no evidence that it occurs in this hardiness zone.
Geo-Z6 (Zone 6)	n - negl	N/A	We found no evidence that it occurs in this hardiness zone.
Geo-Z7 (Zone 7)	n - negl	N/A	We found no evidence that it occurs in this hardiness zone.
Geo-Z8 (Zone 8)	n - mod	N/A	We found no evidence that it occurs in this hardiness zone.
Geo-Z9 (Zone 9)	y - negl	N/A	Argentina, Brazil, and Uruguay. Two occurrences in the United States in Alabama (Horne et al., 2013).
Geo-Z10 (Zone 10)	y - negl	N/A	Argentina, Brazil, and Paraguay.
Geo-Z11 (Zone 11)	y - high	N/A	One point in Uruguay.
Geo-Z12 (Zone 12)	n - high	N/A	We found no evidence that it occurs in this hardiness zone.
Geo-Z13 (Zone 13)	n - negl	N/A	We found no evidence that it occurs in this hardiness zone.
Köppen -Geiger climate classes			
Geo-C1 (Tropical rainforest)	n - negl	N/A	We found no evidence that it occurs in this climate class.
Geo-C2 (Tropical savanna)	y - mod	N/A	One point in Paraguay.
Geo-C3 (Steppe)	n - negl	N/A	We found no evidence that it occurs in this climate class.
Geo-C4 (Desert)	n - negl	N/A	We found no evidence that it occurs in this climate class.
Geo-C5 (Mediterranean)	n - negl	N/A	We found no evidence that it occurs in this climate class.
Geo-C6 (Humid subtropical)	y - negl	N/A	Argentina, Brazil, Paraguay, and Uruguay. Two occurrences in the United States in Alabama (Horne et al., 2013).
Geo-C7 (Marine west coast)	y - mod	N/A	One point in Uruguay.
Geo-C8 (Humid cont. warm sum.)	n - negl	N/A	We found no evidence that it occurs in this climate class.
Geo-C9 (Humid cont. cool sum.)	n - negl	N/A	We found no evidence that it occurs in this climate class.
Geo-C10 (Subarctic)	n - negl	N/A	We found no evidence that it occurs in this climate class.
Geo-C11 (Tundra)	n - negl	N/A	We found no evidence that it occurs in this climate class.
Geo-C12 (Icecap)	n - negl	N/A	We found no evidence that it occurs in this climate class.
10-inch precipitation bands			
Geo-R1 (0-10 inches; 0-25 cm)	n - negl	N/A	We found no evidence that it occurs in this precipitation band.
Geo-R2 (10-20 inches; 25-51 cm)	n - negl	N/A	We found no evidence that it occurs in this precipitation band.
Geo-R3 (20-30 inches; 51-76 cm)	n - negl	N/A	We found no evidence that it occurs in this precipitation band.
Geo-R4 (30-40 inches; 76-102 cm)	n - negl	N/A	We found no evidence that it occurs in this precipitation band.
Geo-R5 (40-50 inches; 102-127 cm)	n - negl	N/A	We found no evidence that it occurs in this precipitation band.

Question ID	Answer - Uncertainty	Score	Notes (and references)
Geo-R6 (50-60 inches; 127-152 cm)	n - negl	N/A	We found no evidence that it occurs in this precipitation band.
Geo-R7 (60-70 inches; 152-178 cm)	n - negl	N/A	We found no evidence that it occurs in this precipitation band.
Geo-R8 (70-80 inches; 178-203 cm)	n - high	N/A	We found no evidence that it occurs in this precipitation band.
Geo-R9 (80-90 inches; 203-229 cm)	y - negl	N/A	Argentina, Brazil, and Uruguay. Two occurrences in the United States in Alabama (Horne et al., 2013).
Geo-R10 (90-100 inches; 229-254 cm)	y - negl	N/A	Argentina, Brazil, and Paraguay, Uruguay. Two occurrences in the United States in Alabama (Horne et al., 2013).
Geo-R11 (100+ inches; 254+ cm)	y - high	N/A	One point on edge of zone in Uruguay.
ENTRY POTENTIAL			
Ent-1 (Plant already here)	y - negl	1	Two naturalized *Oxalis hispidula* populations were recently detected in the United States in Alabama (Horne et al., 2013).
Ent-2 (Plant proposed for entry, or entry is imminent)	-	N/A	
Ent-3 (Human value & cultivation/trade status)	-	N/A	
Ent-4 (Entry as a contaminant)			
Ent-4a (Plant present in Canada, Mexico, Central America, the Caribbean or China)	-	N/A	
Ent-4b (Contaminant of plant propagative material (except seeds))	-	N/A	
Ent-4c (Contaminant of seeds for planting)	-	N/A	
Ent-4d (Contaminant of ballast water)	-	N/A	
Ent-4e (Contaminant of aquarium plants or other aquarium products)	-	N/A	
Ent-4f (Contaminant of landscape products)	-	N/A	
Ent-4g (Contaminant of containers, packing materials, trade goods, equipment or conveyances)	-	N/A	
Ent-4h (Contaminants of fruit, vegetables, or other products for consumption or processing)	-	N/A	
Ent-4i (Contaminant of some other pathway)	-	N/A	
Ent-5 (Likely to enter through natural dispersal)	-	N/A	