United States Department of Agriculture

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Animal and Plant Health Inspection Service

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Version 1

Weed Risk Assessment for *Bothriocline laxa* N. E. Br. (Asteraceae) – Kapanthi

Type herbarium specimen for *Bothriocline laxa* [source: Kew RBG, 2014b; reproduced with kind permission of the Board of Trustees of the Royal Botanic Gardens, Kew (Howard, 2014)].

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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 weed risk assessment (WRA)—specifically, the PPQ WRA model (Koop et al., 2012)—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.

Because the PPQ WRA model is geographically and climatically neutral, it can be used to evaluate the baseline invasive/weed potential of any plant species for the entire United States or for any area within it. As part of this analysis, we use a stochastic simulation to evaluate how much the uncertainty associated with the analysis affects the model outcomes. We also use GIS overlays to evaluate those areas of the United States that may be suitable for the establishment of the plant. For more information on the PPQ WRA process, please refer to the document, *Background information on the PPQ Weed Risk Assessment*, which is available upon request.

***Bothriocline laxa* N. E. Br. – Kapanthi**

Species Information

Family: Asteraceae

Synonyms: *Erlangea laxa* (N.E. Br.) S. Moore (Hyde et al., 2014; The Plant List, 2014).

Common names: Kapanthi (Vernon, 1983).

Botanical description: *Bothriocline laxa* is an erect, annual, herbaceous aster (Vernon, 1983) growing up to 1.2 meters tall (Hyde et al., 2014). It has purple discoid flowers aggregated in capitula (i.e., a small head of flowers) bearing 20-25 flowers, and those are organized in inflorescences of 3-12 capitula (Brown, 1894; Kew RBG, 2014a).

Initiation: APHIS received a market access request from South Africa for corn seeds for planting in the United States (South Africa Department of Agriculture Forestry and Fisheries, 2012). During the development of that commodity pest risk analysis, *B. laxa* was identified as a weed of potential concern to the United States. The PPQ Weeds Cross Functional Working Group decided to evaluate this species with a weed risk assessment.

Foreign distribution: This species is native to the countries of Angola, the Democratic Republic of Congo, Kenya, Malawi, Mozambique, South Africa, Swaziland, Tanzania, Zaire, Zambia and Zimbabwe in southern Africa (Hyde et al., 2014; Kew RBG, 2014a; Ojiem et al., 2007; Wells et al., 1986).

U.S. distribution and status: This species is not reported to be distributed in the United States (e.g., Kartesz, 2014; NGRP, 2014)

WRA area[1]: Entire United States, including territories.

[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).

1. *Bothriocline laxa* analysis

Establishment/Spread Potential Very little is known about this species' biology and the factors that affect its ability to establish and spread. Furthermore, because we found no evidence of introduction beyond its native range in southern Africa, we could not infer anything based upon its behavior in other parts of the world. *Bothriocline laxa* is an herbaceous annual that reproduces via seeds (Hyde et al., 2014; Wells et al., 1986). It can be dispersed unintentionally by people because it is associated with agricultural habitats and other disturbed sites (Holm et al., 1979; Wells et al., 1986). Its small seeds are crowned with short, barbed setae or bristles (Hyde et al., 2014), so wind dispersal seems likely, and possibly also dispersal by animals on feathers and fur. We had very high uncertainty for this risk element.
Risk score = 3 Uncertainty index =0.46

Impact Potential *Bothriocline laxa* is reported as an agricultural weed by several sources (Aulakh and Rimkus, 1987; Mabagala and Saettler, 1992; Mashingaidze, 2004; Ojiem et al., 2007; Vernon, 1983; Wells et al., 1986). That also includes Holm et al. (1979), who categorize it as a principal weed of agriculture in Zambia. This species is a quarantine pest in Australia (Randall, 2014). It competes for space, light, water, and nutrients in anthropogenic systems in South Africa (Wells et al., 1986). Along with four other weed species, *B. laxa* reduced rain-fed wheat yields in northern Zambia by 28 percent, which led to research on the efficacy of different weed management strategies (Aulakh and Rimkus, 1987). We found no evidence that it is a weed in natural systems. We had very high uncertainty for this risk element.
Risk score = 2.1 Uncertainty index = 0.44

Geographic Potential Based on three climatic variables, we estimate that about 14.5 percent of the United States is suitable for the establishment of *B. laxa* (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 *B. laxa* represents the joint distribution of Plant Hardiness Zones 8-12, areas with 10-60 inches of annual precipitation, and the following Köppen-Geiger climate classes: humid subtropical, marine west coast, and tropical savanna. Overall, we had very high uncertainty for this evaluation due to the limited number of georeferenced records (24) for this species (GBIF, 2014) and other reported occurrences. In Fig. 1, we did not include a portion of the Gulf Coast region and southern Florida in the map because those areas receive more than 60 inches of annual precipitation. Furthermore, a portion of southeastern Florida is classified as tropical rainforest. Although we found no evidence that *B. laxa* occurs in these climatic conditions, we expect that these areas would be suitable for its establishment.

The area estimated likely represents a conservative estimate as it only uses 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. *Bothriocline laxa* grows in woodlands, grasslands, stream sides, roadsides, cropland, and other dry and disturbed areas and dry areas (Hyde et al., 2014).

Entry Potential *Bothriocline laxa* is not known to be present in the United States. We also found no evidence for any interest in importing it. Because very little is known about this species, we found no direct evidence of natural dispersal mechanisms or pathways for entry into other regions. Consequently, our risk score for this element was zero. This extremely low likelihood of entry is supported by the fact that this species has not been detected beyond its native range. Because *B. laxa* is an agricultural and ruderal weed in southern Africa (Mashingaidze, 2004; Vernon, 1983; Wells et al., 1986), it may contaminate agricultural commodities, or move as a hitchhiker on containers and other conveyances originating from these areas. Furthermore, because this species has barbs on the setae of the seeds (Hyde et al., 2014), it could attach to clothing and other rough surfaces, such as wood.
Risk score = 0 Uncertainty index = 0.27

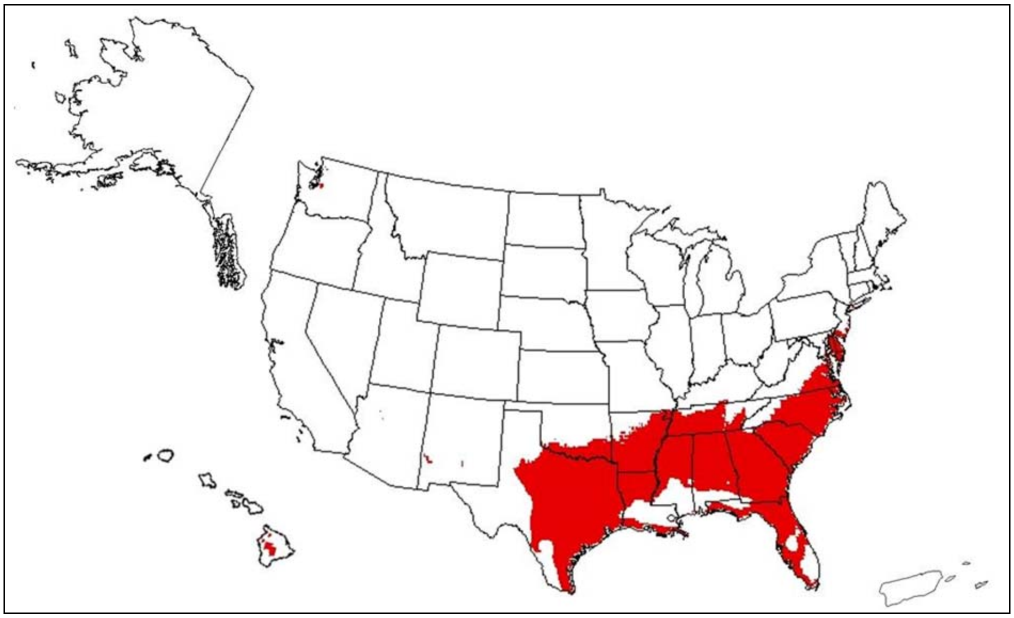

Figure 1. Predicted distribution of *Bothriocline laxa* in the United States. Map insets for Alaska, Hawaii, and Puerto Rico are not to scale.

2. Results

Model Probabilities: P(Major Invader) = 10.3%
P(Minor Invader) = 68.8%
P(Non-Invader) = 20.8%
Risk Result = Evaluate Further
Secondary Screening = Evaluate Further

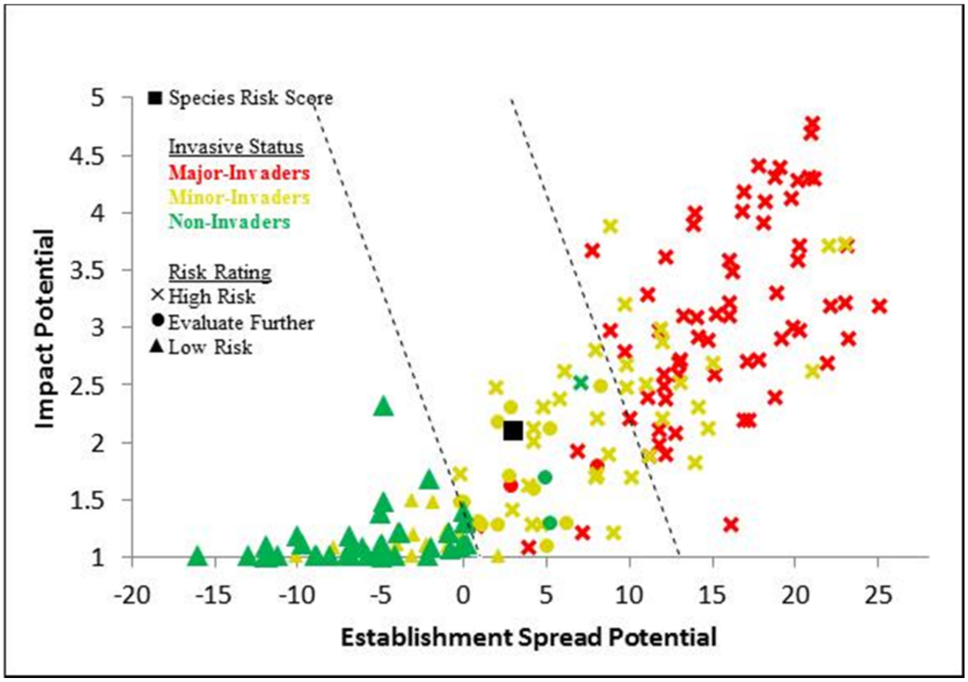

Figure 2. *Bothriocline laxa* risk score (black box) relative to the risk scores of species used to develop and validate the PPQ WRA model (other symbols). See Appendix A for the complete assessment.

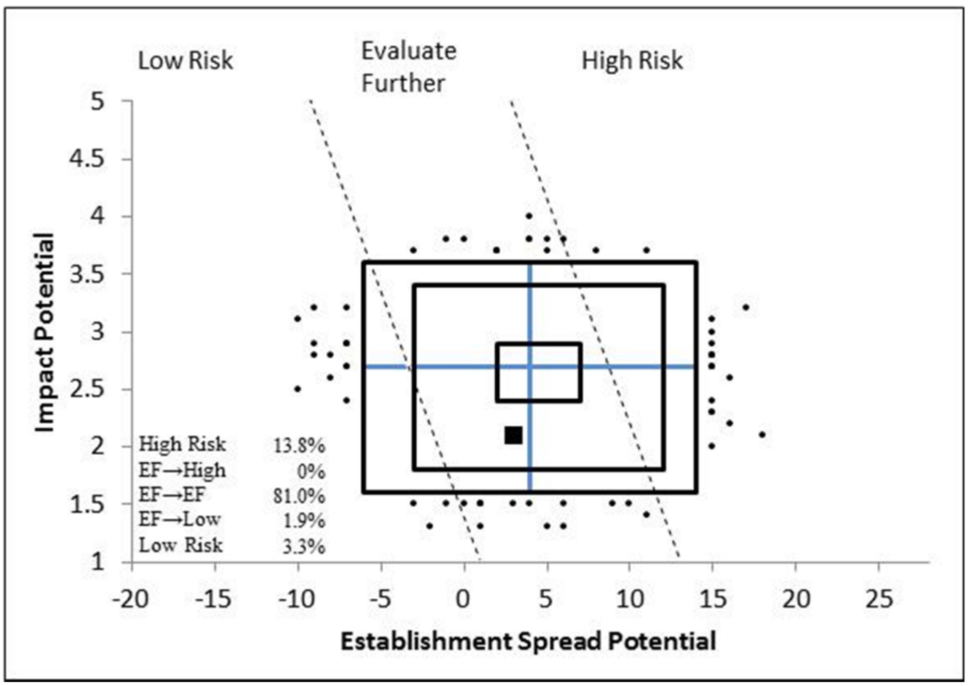

Figure 3. Model simulation results (N=5,000) for uncertainty around the risk score for *Bothriocline laxa*. The blue "+" symbol represents the medians of the simulated outcomes. The smallest box contains 50 percent of the outcomes, the second 95 percent, and the largest 99 percent.

3. Discussion

The result of the weed risk assessment for *B. laxa* is Evaluate Further (Fig. 2). Due to the paucity of information on this species, the overall uncertainty associated with this assessment was very high. We answered ten questions in the establishment/spread and impact risk elements as unknown, and others were answered with high uncertainty. Our uncertainty simulation reflected the high uncertainty: simulated risk scores were distributed across all three risk regions (Fig. 3). Further literature review at this time seems unlikely to reduce this uncertainty any further. Increasing our uncertainty further and making decision making more difficult is the fact that this species has not—so far as known—been moved outside of its native range. Thus, policy makers cannot use behavior elsewhere to inform their decision. Still, *B. laxa* did have a relatively higher risk score for impact compared to other species that occur in this range of establishment/spread scores (Fig. 2). It was also one of 846 species identified as a candidate for listing as a Federal Noxious Weed in the 1980s by USDA botanists and weed scientists (Gunn and Ritchie, 1988).

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Appendix A. Weed risk assessment for *Bothriocline laxa* N. E. Br. (Asteraceae). The following information came from the original risk assessment, which is available upon request (full responses and all guidance). We modified the information to fit on the page.

Question ID	**Answer - Uncertainty**	**Score**	**Notes (and references)**
ESTABLISHMENT/SPREAD POTENTIAL			
ES-1 (Status/invasiveness outside its native range)	c - high	0	*Bothriocline laxa* is native to most countries in southern Africa (Hyde et al., 2014; Kew RBG, 2014a). We found no evidence that it is present outside of this region. Overall, very little information is available on this species. As such, we used high uncertainty. Alternate answers for the Monte Carlo simulation were "b" and "d."
ES-2 (Is the species highly domesticated)	n - negl	0	Because we found no evidence that this species is cultivated, it is highly unlikely it has been domesticated or selected for traits associated with reduced weed potential.
ES-3 (Weedy congeners)	n - low	0	*Bothriocline* is a genus with about 30 species from tropical Africa and Madagascar (Mabberley, 2008). *Bothriocline fusca* is reported as a weed (Randall, 2007); however, we found no evidence that this species or any others in the genus are significant weeds.
ES-4 (Shade tolerant at some stage of its life cycle)	n - high	0	This species grows in "woodland, grassland and stream sides" (Hyde et al., 2014), is "often a weed of roadsides and disturbed ground" (Hyde et al., 2014), and is an agricultural weed (Holm et al., 1979; Wells et al., 1986). This evidence indicates it is adapted to open environments and not shady ones. Consequently we answered no, but used high uncertainty because this isn't direct evidence.
ES-5 (Climbing or smothering growth form)	n - negl	0	*Bothriocline laxa* is an erect, herbaceous plant (Hyde et al., 2014). It is neither a vine nor an herb with a basal rosette.
ES-6 (Forms dense thickets)	? - max	0	Unknown.
ES-7 (Aquatic)	n - negl	0	This species is not an aquatic plant; it is a terrestrial species growing in a variety of such habitats (Hyde et al., 2014; Wells et al., 1986).
ES-8 (Grass)	n - negl	0	This species is not a grass; rather, it is an aster (NGRP, 2014).
ES-9 (Nitrogen-fixing woody plant)	n - negl	0	This species is herbaceous (Brown, 1894) and not woody. Furthermore, the Asteraceae is not one of the plant families known to contain nitrogen-fixing species (Martin and Dowd, 1990).
ES-10 (Does it produce viable seeds or spores)	y - low	1	Reproduces via seeds (Wells et al., 1986).
ES-11 (Self-compatible or apomictic)	? - max	0	Unknown.
ES-12 (Requires special pollinators)	? - max		Unknown.
ES-13 (Minimum generation time)	b - low	1	Annual (Hyde et al., 2014; Wells et al., 1986). Alternate answers for the Monte Carlo simulation were "c" and "a."

Question ID	Answer - Uncertainty	Score	Notes (and references)
ES-14 (Prolific reproduction)	? - max	0	Unknown. This species produces 20-25 flowers in each capitulum (Brown, 1894), and those are organized in inflorescences of 3-12 capitula (Brown, 1894; Kew RBG, 2014a). Images of a few plants indicate that an individual can have from 50 to 100 capitula (Kew RBG, 2014b; Vernon, 1983), and perhaps more. However, we did not find any information on seed production rates, seed viability, or plant density to allow us to answer this question with any certainty.
ES-15 (Propagules likely to be dispersed unintentionally by people)	y - high	1	We did not find any direct evidence to answer this question. Regardless, we answered yes (with high uncertainty) because this species occurs in disturbed and managed habitats that are frequented by people (Vernon, 1983; Wells et al., 1986), and because it possesses barbellate setae on the seeds (Hyde et al., 2014) that could help it attach to clothing.
ES-16 (Propagules likely to disperse in trade as contaminants or hitchhikers)	? - max	0	Unknown.
ES-17 (Number of natural dispersal vectors)	2	0	Fruit and seed characteristics for ES-17a through ES-17e: Fruit is an achene (Brown, 1894) that is about 1.2 to 1.5 mm long (Hyde et al., 2014). "Pappus of a few caducous barbellate setae 1-3 mm" (Hyde et al., 2014).
ES-17a (Wind dispersal)	y - high		We found no direct evidence about wind dispersal for this species. Many asters produce small seeds that have a crown of short tufted setae (Zomlefer, 1994) and may be considered wind dispersed. A similar herbaceous aster, *Praxelis clematidea*, produces seeds that are 2–3 mm long and topped with a tuft of 15–40 bristles (the pappus) (Holland, 2006; Veldkamp, 1999); this species is considered wind-dispersed over short distances (Laidlaw, 2013; Waterhouse, 2003, 2014). We answered yes for *B. laxa* but used high uncertainty because the evidence was based on a similar species.
ES-17b (Water dispersal)	n - high		We found no evidence but the species may disperse via water, since it grows along streams in southern Africa (Hyde et al., 2014).
ES-17c (Bird dispersal)	? - max		We found no direct evidence. However, we answered unknown because the setae (i.e., the bristles) have barbs that may help seeds attach to feathers.
ES-17d (Animal external dispersal)	y - high		We found no direct evidence. However, because the setae possess barbs, they may readily attach to animal fur. A similar species, *Praxelis clematidea*, also possesses barbed setae (Zhengyi et al., 2014) and is reported to be spread by animals (CRC Weed Management, 2003; Laidlaw, 2013). Consequently, we answered yes, but with high uncertainty because the evidence was based on a similar species.
ES-17e (Animal internal dispersal)	n - mod		We found no evidence.
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.

Question ID	Answer - Uncertainty	Score	Notes (and references)
ES-20 (Is resistant to some herbicides or has the potential to become resistant)	n - mod	0	We found no evidence that this species is resistant to herbicides, and in fact, some herbicides provide good control (e.g., Aulakh and Rimkus, 1987). Neither this species nor any member of its genus is known to be resistant to herbicides (Heap, 2014).
ES-21 (Number of cold hardiness zones suitable for its survival)	5	0	
ES-22 (Number of climate types suitable for its survival)	3	0	
ES-23 (Number of precipitation bands suitable for its survival)	5	0	
IMPACT POTENTIAL			
General Impacts			
Imp-G1 (Allelopathic)	n - high	0	We found no evidence.
Imp-G2 (Parasitic)	n - negl	0	We found no direct evidence that this species is parasitic. This species is not a member of a plant family known to contain parasitic plant species (Heide-Jorgensen, 2008; Nickrent, 2009).
Impacts to Natural Systems			
Imp-N1 (Change ecosystem processes and parameters that affect other species)	n - high	0	We found no evidence that this species behaves invasively or has impacts in natural systems; however, this is not surprising given that this species has not been moved outside of its natural range where it may be controlled by coevolved herbivores and pathogens. Because we don't know how this species would behave outside its native range and because there is so little known about it, we answered all of the questions in this section with high uncertainty. We could have also answered all of the questions in this subelement as unknown due to a lack of history outside of its native range. However, because this species is an herbaceous annual that is weedy in production systems, it does not seem likely to become a weed of natural areas outside of its native range.
Imp-N2 (Change community structure)	n - high	0	We found no evidence.
Imp-N3 (Change community composition)	n - high	0	We found no evidence.
Imp-N4 (Is it likely to affect federal Threatened and Endangered species)	n - high	0	We found no evidence.
Imp-N5 (Is it likely to affect any globally outstanding ecoregions)	n - high	0	We found no evidence.
Imp-N6 (Weed status in natural systems)	a - high	0	We found no evidence. Alternate answers for the Monte Carlo simulation were both "b."
Impact to Anthropogenic Systems (cities, suburbs, roadways)			
Imp-A1 (Impacts human property, processes, civilization, or safety)	n - mod	0	We found no evidence. Because an annual herbaceous species seems unlikely to have these kinds of impacts, we answered no with moderate uncertainty.
Imp-A2 (Changes or limits recreational use of an area)	n - mod	0	We found no evidence. Because an annual herbaceous species seems unlikely to have these kinds of impacts, we answered no with moderate uncertainty.
Imp-A3 (Outcompetes, replaces, or otherwise affects desirable plants and vegetation)	n - high	0	We found no evidence.

Question ID	Answer - Uncertainty	Score	Notes (and references)
Imp-A4 (Weed status in anthropogenic systems)	b - high	0.1	A ruderal weed (Wells et al., 1986). Alternate answers for the Monte Carlo simulation were "a" and "c."
Impact to Production Systems (e.g., agriculture, nurseries, forest plantations, orchards, etc.)			
Imp-P1 (Reduces crop/product yield)	y - mod	0.4	Along with four other weed species, *B. laxa* reduced wheat yield by 28 percent from 1985 to 1987 (Aulakh and Rimkus, 1987). It is categorized as competitive for space, light, water, and nutrients in the *Catalogue of Problem Plants in South Africa* (Wells et al., 1986). We used moderate uncertainty because the impacts reported in the first reference were also due to other species, and because the second reference was not a primary reference.
Imp-P2 (Lowers commodity value)	? - max		We found no direct evidence. Because it is an agricultural weed and is reported to reduce yield (see evidence under Imp-P1 and Imp-P6), it might lower commodity value. However, without specific evidence, we answered unknown.
Imp-P3 (Is it likely to impact trade)	? - max		This species is a quarantine pest in Australia (Randall, 2014). However, because we did not find any direct evidence of it moving in trade and because we used unknown for ES-16, we answered unknown for this question as well.
Imp-P4 (Reduces the quality or availability of irrigation, or strongly competes with plants for water)	n - high	0	We found no evidence that this species reduces water availability more so than other competing plant species.
Imp-P5 (Toxic to animals, including livestock/range animals and poultry)	n - mod	0	We found no evidence.
Imp-P6 (Weed status in production systems)	c - mod	0.6	One of the five main weed species present in rain-fed wheat in northern Zambia, where it along with the other species reduce wheat yield and are controlled with herbicides and/or hand weeding (Aulakh and Rimkus, 1987). A principle weed of agriculture in Zambia (Holm et al., 1979) and an agrestal weed in South Africa (Wells et al., 1986). Present in maize in Zimbabwe (Mashingaidze, 2004). Categorized as an important arable weed of Zambia (Vernon, 1983), but no information on impacts or why it is important was provided. Weed of maize in western Kenya (Ojiem et al., 2007). Weed in bean growing areas of northern Tanzania (Mabagala and Saettler, 1992). 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.
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 - low	N/A	We found no evidence that it occurs in this hardiness zone.
Geo-Z8 (Zone 8)	y - mod	N/A	A few points in South Africa.
Geo-Z9 (Zone 9)	y - negl	N/A	A few points in South Africa.

Question ID	Answer - Uncertainty	Score	Notes (and references)
Geo-Z10 (Zone 10)	y - negl	N/A	A few points in South Africa. One point in Zambia and one in Tanzania.
Geo-Z11 (Zone 11)	y - mod	N/A	Two points in Tanzania.
Geo-Z12 (Zone 12)	y - high	N/A	One point in Tanzania. This species occurs throughout southern Africa (Hyde et al., 2014; Kew RBG, 2014a; Wells et al., 1986), which includes this zone.
Geo-Z13 (Zone 13)	n - high	N/A	We found no specific evidence it occurs in this hardiness zone. Although this zone occurs in southern Africa, it has a limited extent.
Köppen-Geiger climate classes			
Geo-C1 (Tropical rainforest)	n - high	N/A	One point in tropical savanna near the boundary of this climate class, but no points in tropical rainforest.
Geo-C2 (Tropical savanna)	y - mod	N/A	A few points in Tanzania.
Geo-C3 (Steppe)	n - high	N/A	We found no direct evidence it occurs in this climate class. Although this climate class is common in southern Africa, none of the points from GBIF are in this drier region. Furthermore, this species is not reported to occur in Botswana, which is predominantly characterized by a steppe climate.
Geo-C4 (Desert)	n - low	N/A	We found no evidence that it occurs in this climate class.
Geo-C5 (Mediterranean)	n - low	N/A	We found no evidence that it occurs in this climate class.
Geo-C6 (Humid subtropical)	y - negl	N/A	South Africa, Tanzania, and Zambia. Occurs in subtropical areas in South Africa (Wells et al., 1986).
Geo-C7 (Marine west coast)	y - mod	N/A	One point in Zimbabwe. Also, this species occurs throughout southern Africa (Hyde et al., 2014; Kew RBG, 2014a; Wells et al., 1986), which includes this climate class.
Geo-C8 (Humid cont. warm sum.)	n - mod	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 - high	N/A	One point in the 10-20 inch band, near the edge of this band. Another point near the edge in Tanzania.
Geo-R2 (10-20 inches; 25-51 cm)	y - low	N/A	A few points in South Africa, and one in Tanzania.
Geo-R3 (20-30 inches; 51-76 cm)	y - low	N/A	A few points in South Africa and Swaziland.
Geo-R4 (30-40 inches; 76-102 cm)	y - low	N/A	A few points in South Africa and Swaziland.
Geo-R5 (40-50 inches; 102-127 cm)	y - mod	N/A	One point in Zimbabwe.
Geo-R6 (50-60 inches; 127-152 cm)	y - high	N/A	One point on edge in Zambia.
Geo-R7 (60-70 inches; 152-178 cm)	n - high	N/A	This band occurs in small and scattered areas in southern Africa, but we found no direct evidence this species occurs in this precipitation band.
Geo-R8 (70-80 inches; 178-203 cm)	n - low	N/A	We found no evidence that it occurs in this precipitation band.
Geo-R9 (80-90 inches; 203-229 cm)	n - negl	N/A	We found no evidence that it occurs in this precipitation band.
Geo-R10 (90-100 inches; 229-254 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-R11 (100+ inches; 254+ cm)	n - negl	N/A	We found no evidence that it occurs in this precipitation band.
ENTRY POTENTIAL			
Ent-1 (Plant already here)	n - low	0	We found no evidence this species is present in the United States.
Ent-2 (Plant proposed for entry, or entry is imminent)	n - negl	0	This species has not been proposed for entry, nor is its entry imminent.
Ent-3 (Human value & cultivation/trade status)	a - mod	0	We found no evidence this species is cultivated or positively valued. Some aspects of its biochemistry have been studied (Bohlmann and Zdero, 1977; Galán et al., 1990), but we found no evidence that this was for commercial development of the plant.
Ent-4 (Entry as a contaminant)			
Ent-4a (Plant present in Canada, Mexico, Central America, the Caribbean or China)	n - negl		We found no evidence that this species has been moved outside of its native range in southern Africa.
Ent-4b (Contaminant of plant propagative material (except seeds))	n - high	0	We found no evidence.
Ent-4c (Contaminant of seeds for planting)	? - max		We found no evidence that this species is a contaminant of seeds for planting, but because it occurs in agricultural areas it may become associated with agricultural seed.
Ent-4d (Contaminant of ballast water)	n - high	0	We found no evidence.
Ent-4e (Contaminant of aquarium plants or other aquarium products)	n - high	0	We found no evidence that this species is associated with aquarium products. We note however, that it grows along streams in southern Africa (Hyde et al., 2014).
Ent-4f (Contaminant of landscape products)	n - high	0	We found no evidence.
Ent-4g (Contaminant of containers, packing materials, trade goods, equipment or conveyances)	? - max		We found no evidence. However because it is a ruderal and agrestal weed (see Imp-P6 and Imp-A4), it likely occurs in areas associated with packing, shipping, and trade, and may thus contaminate a trade pathway.
Ent-4h (Contaminants of fruit, vegetables, or other products for consumption or processing)	? - max		We found no evidence. However because it is a ruderal and agrestal weed (see Imp-P6 and Imp-A4), it may contaminate some agricultural commodities.
Ent-4i (Contaminant of some other pathway)	? - max		Because this species has barbellate setae on the seeds (Hyde et al., 2014), it is likely to readily attach to clothing, and other rough surfaces such as wood.
Ent-5 (Likely to enter through natural dispersal)	n - low	0	This species has not been reported to occur near the United States and thus is unlikely to enter naturally.