

**Taxon:** *Tillandsia xerographica* Rohweder

**Family:** Bromeliaceae

**Common Name(s):** xerographic air plant

**Synonym(s):** *Tillandsia kruseana* Matuda

**Assessor:** Chuck Chimera

**Status:** Assessor Approved

**End Date:** 16 Feb 2022

**WRA Score:** -3.0

**Designation:** L

**Rating:** Low Risk

**Keywords:** Epiphyte, Ornamental, Outcrossing, Slow-Growing, Wind-Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	n
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	n
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle		
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		

Qsn #	Question	Answer Option	Answer
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation		
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	>3
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m <sup>2</sup> )		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides		
804	Tolerates, or benefits from, mutilation, cultivation, or fire		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

**Supporting Data:**

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Luther, H. E. (1994). A guide to the species of <i>Tillandsia</i> regulated by Appendix II of CITES. <i>Selbyana</i> , 15: 112-131	[No evidence of domestication] "Distribution. Native in dry forests from southwestern Mexico to El Salvador, Guatemala and Nicaragua (?) at elevations of 150-700 meters. Status in Horticulture. Very common in cultivation."
102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	NA
103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	NA
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	High
	Source(s)	Notes
	Smith, L. B., & Downs, R. J. (1977). <i>Tillandsioideae</i> (Bromeliaceae). <i>Flora Neotropica</i> , 14(2), 663-1492	"Distribution. Epiphytic or rarely terrestrial, 200--600 m alt, southern Mexico, Guatemala, Salvador."
202	Quality of climate match data	High
	Source(s)	Notes
	Smith, L. B., & Downs, R. J. (1977). <i>Tillandsioideae</i> (Bromeliaceae). <i>Flora Neotropica</i> , 14(2), 663-1492	"Distribution. Epiphytic or rarely terrestrial, 200--600 m alt, southern Mexico, Guatemala, Salvador."
203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Rutherford, C., Groves, M. & Sajeva, M. (2018). <i>Succulent Plants A guide to CITES-listed species</i> . Rutherford Groves Publishing, London	" <i>Tillandsia xerographica</i> is native to southern Mexico, Guatemala, El Salvador and likely to occur in Honduras. It is restricted to semi-arid habitats, mainly dry forests and thorn scrub, at elevations of 140-700 m above sea level."
	NC State Extension. (2022). <i>Tillandsia xerographica</i> . <a href="https://plants.ces.ncsu.edu/plants/tillandsia-xerographica/">https://plants.ces.ncsu.edu/plants/tillandsia-xerographica/</a> . [Accessed 14 Feb 2022]	"USDA Plant Hardiness Zone: 9b, 9a, 10b, 10a, 11b, 11a"
204	Native or naturalized in regions with tropical or subtropical climates	y

Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Smith, L. B., & Downs, R. J. (1977). Tillandsioideae (Bromeliaceae). Flora Neotropica, 14(2), 663–1492	"Distribution. Epiphytic or rarely terrestrial, 200--600 m alt, southern Mexico, Guatemala, Salvador."
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence in Hawaiian Islands

<b>205</b>	<b>Does the species have a history of repeated introductions outside its natural range?</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Luther, H. E. (1994). A guide to the species of Tillandsia regulated by Appendix II of CITES. Selbyana, 15: 112-131	"Status In Horticulture. Very common in cultivation."
	Rutherford, C., Groves, M. & Sajeve, M. (2018). Succulent Plants A guide to CITES-listed species. Rutherford Groves Publishing, London	"Tillandsia harrisii and in particular T. xerographica are in commercial trade and cultivation both in range States, in particular Guatemala, and non-range States (e.g. US, Colombia). European nurseries have established "Tillandsia farms" in these countries, exporting plants to Europe. All three species are available as live plants online although availability of T. kammii is very limited."
	WRA Specialist. (2022). Personal Communication	No evidence

<b>301</b>	<b>Naturalized beyond native range</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence in Hawaiian Islands

<b>302</b>	<b>Garden/amenity/disturbance weed</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

<b>303</b>	<b>Agricultural/forestry/horticultural weed</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

<b>304</b>	<b>Environmental weed</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

Qsn #	Question	Answer
305	<b>Congeneric weed</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Johnson, J. D.; Halliwell, R. S. (1973) Compounds for the control of ball moss. Plant Disease Reporter 57(1): 81-83	"In field trials in south-west Texas in 1970-71, good control of <i>Tillandsia recurvata</i> on the evergreen <i>Quercus virginiana</i> was obtained by spring with Cu(OH) <sub>2</sub> (Kocide 101) at 4-8 lb/100 gal water."
	Cardenas, C. H. (1971) Observations on <i>Tillandsia recurvata</i> and its control by means of herbicides. Revista de la Facultad de Agronomia, Universidad Central de Venezuela 6(2): 43-72	"In parts of Venezuela the epiphyte <i>Tillandsia recurvata</i> is sufficiently abundant to kill whole trees or their main branches. Its mode of propagation is described. In the laboratory detached plants were readily killed by submergence in various herbicidal solutions."

401	<b>Produces spines, thorns or burrs</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Luther, H. E. (1994). A guide to the species of <i>Tillandsia</i> regulated by Appendix II of CITES. Selbyana, 15: 112-131	"Plant usually an epiphyte, rarely a lithophyte, nearly stemless, 10-100 cm tall, usually single; roots tough, wiry, ca. 1 mm in diameter, tan to brown. Leaves densely arranged, spreading to recurving (more or less erect or secund erect in young offsets), rarely twisted and pendent, 35 to 100 in number, light grey to silver-white, usually forming a full, pseudobulbous rosette. Leaf sheaths broadly ovate, 6-10 cm wide, inflated, brown but densely subappressed white lepidote except at the extreme base. Leaf blades narrowly triangular to nearly linear, acute to long attenuate, 30-75 cm long, 2-5 cm wide, channeled but becoming plane distally, usually obtusely ribbed, 1-2 mm thick, tough and leathery, very densely covered with coarse subspreading white trichomes and appearing nearly smooth and usually very white (occasionally tinged with pink). Scape erect, variable but always exserted above the leafy rosette. Scape bracts like the leaves, nearly always recurving."

Qsn #	Question	Answer
402	Allelopathic	
	Source(s)	Notes
	Valencia-Díaz, S., Flores-Palacios, A., Rodruíguez-López, V., & Jimenez-Aparicio, A. R. (2012). Effects of <i>Tillandsia recurvata</i> extracts on the seed germination of <i>Tillandsia</i> spp. <i>Allelopathy Journal</i> , 29(1): 125-135	[Unknown. No evidence, but allelopathic chemicals documented in other species] "Abstract: Epiphytes associate intraspecifically, but it is unclear whether the dominant species exerts a negative effect on its competitors through allelopathy. <i>Tillandsia recurvata</i> is the dominant epiphyte in the tropical dry forest of central Mexico. It has phytotoxic properties, therefore inhibits the seed germination of other epiphytic bromeliads, which may effect its associations. Nearest neighbor (NN) distance from each bromeliad was measured and the bromeliad associations were characterized as intra or interspecific. Leachates and organic extracts from <i>T. recurvata</i> were used in seed germination trials of <i>Tillandsia</i> . All species have a conspecific as their NN, but interespecific associations indicate that <i>T. recurvata</i> was less frequent NN for all <i>Tillandsia</i> . <i>T. recurvata</i> leachates and organic extracts inhibited the germination of all <i>Tillandsia</i> species. This research demonstrates the inhibitory potential of <i>T. recurvata</i> on its competitors; however its association patterns were not explained. Other ecological factors may account for its dominance and associations."

403	Parasitic	n
	Source(s)	Notes
	Luther, H. E. (1994). A guide to the species of <i>Tillandsia</i> regulated by Appendix II of CITES. <i>Selbyana</i> , 15: 112-131	"Plant usually an epiphyte, rarely a lithophyte, nearly stemless, 10-100 cm tall, usually single; roots tough, wiry, ca. 1 mm in diameter, tan to brown." [No evidence]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Smith, J.G. (1896). <i>Fodder and Forage Plants: Exclusive of the Grasses</i> . Government Printing Office, Washington, D.C.	[Unknown. <i>Tillandsia usneoides</i> palatable to cattle] "An epiphyte belonging to the Pineapple family, abundant in Florida and the Gulf States, where it is a characteristic feature of the forests with its long stems hanging in festoons from the tree trunks and branches. Cattle eat it, and it adds considerable value to the woodland pastures."

405	Toxic to animals	n
	Source(s)	Notes
	Plant Care Today. (2022). Growing <i>Tillandsia Xerographica</i> : Caring For The King of Air Plants. <a href="https://plantcaretoday.com/tillandsia-xerographica.html">https://plantcaretoday.com/tillandsia-xerographica.html</a> . [Accessed 15 Feb 2022]	"These plants are not toxic, but some people and animals experience negative reactions after ingesting pieces of the flowers, stems, or leaves."
	Sprouts and Stems. (2020). Air Plants: A <i>Tillandsia Xerographica</i> Care Guide. <a href="https://www.sproutsandstems.com/air-plants-a-tillandsia-xerographica-care-guide/">https://www.sproutsandstems.com/air-plants-a-tillandsia-xerographica-care-guide/</a> . [Accessed 15 Feb 2022]	" <i>Tillandsia xerographica</i> is non-toxic to cats and dogs. However, its best practice to keep your plants out of your furry friends' reach."

Qsn #	Question	Answer
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence
	Wagstaff, D.J. (2008). International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Plant Care Today. (2022). Growing Tillandsia Xerographica: Caring For The King of Air Plants. <a href="https://plantcaretoday.com/tillandsia-xerographica.html">https://plantcaretoday.com/tillandsia-xerographica.html</a> . [Accessed 15 Feb 2022]	"Scale insects and mealybugs are the biggest threats to the king of air plants."
	Shoot Gardening. (2022). Tillandsia xerographica (King of air plants). <a href="https://www.shootgardening.co.uk">https://www.shootgardening.co.uk</a> . [Accessed 15 Feb 2022]	"Specific pests - Aphids , Glasshouse red spider mite , Red spider mite (box and other) Diseases - Generally disease free."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Plant Care Today. (2022). Growing Tillandsia Xerographica: Caring For The King of Air Plants. <a href="https://plantcaretoday.com/tillandsia-xerographica.html">https://plantcaretoday.com/tillandsia-xerographica.html</a> . [Accessed 15 Feb 2022]	"These plants are not toxic, but some people and animals experience negative reactions after ingesting pieces of the flowers, stems, or leaves."
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence
	Wagstaff, D.J. (2008). International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Luther, H. E. (1994). A guide to the species of Tillandsia regulated by Appendix II of CITES. Selbyana, 15: 112-131	"Native in dry forests from southwestern Mexico to El Salvador, Guatemala and Nicaragua(?) at elevations of 150-700 meters." ... "Plant usually an epiphyte, rarely a lithophyte, nearly stemless, 10-100 cm tall, usually single; roots tough, wiry, ca. 1 mm in diameter, tan to brown." [An epiphyte with no evidence of flammability or increased fire risk]

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Shoot Gardening. (2022). Tillandsia xerographica (King of air plants). <a href="https://www.shootgardening.co.uk">https://www.shootgardening.co.uk</a> . [Accessed 15 Feb 2022]	"Light - Partial Shade"

Qsn #	Question	Answer
	NC State Extension. (2022). <i>Tillandsia xerographica</i> . <a href="https://plants.ces.ncsu.edu/plants/tillandsia-xerographica/">https://plants.ces.ncsu.edu/plants/tillandsia-xerographica/</a> . [Accessed 15 Feb 2022]	"Light: Full sun (6 or more hours of direct sunlight a day) Partial Shade (Direct sunlight only part of the day, 2-6 hours)"
	Plant Care Today. (2022). Growing <i>Tillandsia Xerographica</i> : Caring For The King of Air Plants. <a href="https://plantcaretoday.com/tillandsia-xerographica.html">https://plantcaretoday.com/tillandsia-xerographica.html</a> . [Accessed 15 Feb 2022]	"The air plant thrives in direct sunlight when grown indoors or outdoors."
	Hromadnik, L. (2010). <i>Tillandsia xerographica</i> in Guatemala. <i>Journal of the Bromeliad Society</i> , 60(6), 267-272	[Cultivated in shaded conditions] "The biggest nursery visited is registered just since 1999. It consists of 3 ha shaded area (will be increased to 28 ha) and a dry forest of 1.5 k.m2 within the original (natural) distribution area of <i>Tillandsia xerographica</i> ."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	Notes
	Plant Care Today. (2022). Growing <i>Tillandsia Xerographica</i> : Caring For The King of Air Plants. <a href="https://plantcaretoday.com/tillandsia-xerographica.html">https://plantcaretoday.com/tillandsia-xerographica.html</a> . [Accessed 15 Feb 2022]	"As with other air plants like <i>Tillandsia ionantha</i> and <i>Tillandsia cyanea</i> , <i>Tillandsia xerographica</i> doesn't need soil."
	Smith, L. B., & Downs, R. J. (1977). <i>Tillandsioideae</i> (Bromeliaceae). <i>Flora Neotropica</i> , 14(2), 663–1492	"Epiphytic or rarely terrestrial"

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Luther, H. E. (1994). A guide to the species of <i>Tillandsia</i> regulated by Appendix II of CITES. <i>Selbyana</i> , 15: 112-131	[Epiphytic, not climbing] "Plant usually an epiphyte, rarely a lithophyte, nearly stemless, 10-100 cm tall, usually single; roots tough, wiry, ca. 1 mm in diameter, tan to brown."

412	Forms dense thickets	n
	Source(s)	Notes
	Hromadnik, L. (2010). <i>Tillandsia xerographica</i> in Guatemala. <i>Journal of the Bromeliad Society</i> , 60(6), 267-272	"A two-year inventory done by the University of Guatemala regarding <i>Tillandsia xerographica</i> in their former natural habitat released for the remaining population an average density of seven individuals to even less than one plant per km2!"
	Smith, L. B., & Downs, R. J. (1977). <i>Tillandsioideae</i> (Bromeliaceae). <i>Flora Neotropica</i> , 14(2), 663–1492	"Epiphytic or rarely terrestrial, 200--600 m alt"

501	Aquatic	n
	Source(s)	Notes
	Smith, L. B., & Downs, R. J. (1977). <i>Tillandsioideae</i> (Bromeliaceae). <i>Flora Neotropica</i> , 14(2), 663–1492	"Epiphytic or rarely terrestrial, 200--600 m alt"

502	Grass	n
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/">https://npgsweb.ars-grin.gov/</a> . [Accessed 14 Feb 2022]	Family: Bromeliaceae Subfamily: Tillandsioideae Tribe: Tillandsieae

503	Nitrogen fixing woody plant	n
	<b>Source(s)</b>	<b>Notes</b>
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/">https://npgsweb.ars-grin.gov/</a> . [Accessed 14 Feb 2022]	Family: Bromeliaceae Subfamily: Tillandsioideae Tribe: Tillandsieae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	<b>Source(s)</b>	<b>Notes</b>
	Luther, H. E. (1994). A guide to the species of <i>Tillandsia</i> regulated by Appendix II of CITES. <i>Selbyana</i> , 15: 112-131	"Plant usually an epiphyte, rarely a lithophyte, nearly stemless, 10-100 cm tall, usually single; roots tough, wiry, ca. 1 mm in diameter, tan to brown."

601	Evidence of substantial reproductive failure in native habitat	n
	<b>Source(s)</b>	<b>Notes</b>
	García, M., & Chocano, H. O. (2008). Case Study 7: <i>Tillandsia xerographica</i> . WG 2 – Perennials. In CITES NDF Workshop Case Studies.	[Overharvesting and habitat loss contributing to rarity in part of range] "The species is listed on Criterion 1 of the List of Threatened Species from Guatemala (LEA, Spanish acronym). It means that free export and trade of specimens collected from the wild are banned, even if used for scientific or reproductive purposes. Only specimens that are part of or are derived from plants reproduced through proven methods may be commercialized."

Qsn #	Question	Answer
602	Produces viable seed	y
	Source(s)	Notes
	Air Plant City. (2022). Growing Tillandsia Xerographica By Seed. <a href="https://www.airplantcity.com/blogs/featured-blogs/tillandsia-xerographica-seed">https://www.airplantcity.com/blogs/featured-blogs/tillandsia-xerographica-seed</a> . [Accessed 14 Feb 2022]	"The process of growing Xerographica from seeds is arduous and requires time, patience and large investment in both greenhouse infrastructure and workers. In addition to waiting for the plants to bloom to cross pollinate, farmers must also scope out the Xerographica that are producing seeds since not all of them will. Once the seeds are gathered, they are prepared on wind screen material to begin the germination process. After four or five years, hardy seedling Xerographica plants will form and show a regular adult shape but at a much smaller size."
	Luther, H. E. (1994). A guide to the species of Tillandsia regulated by Appendix II of CITES. <i>Selbyana</i> , 15: 112-131	"Tillandsia xerographica is propagated by offsets in very large quantities in Latin America (principally Guatemala) and occasionally seed grown in Europe and USA. Seedlings resemble adult plants in conformation more than do young offsets."

603	Hybridizes naturally	
	Source(s)	Notes
	Smith, L. B., & Downs, R. J. (1977). Tillandsioideae (Bromeliaceae). <i>Flora Neotropica</i> , 14(2), 663–1492	"In Tillandsia interspecific hybrids are rare except in the advanced subgenus Diaphoranthema. Most of these hybrids are natural and thus without vouchers except as the supposed parents are found in the vicinity."
	Isley III, P. T. (1984). Tillandsia X wisdomiana [Description, natural hybrid of Tillandsia xerographica and Tillandsia paucifolia]. <i>Journal Bromeliad Society</i> 34: 123-124	Unable to access journal article, but presumably capable of forming natural hybrids

604	Self-compatible or apomictic	
	Source(s)	Notes
	García, M., & Chocano, H. O. (2008). Case Study 7: Tillandsia xerographica. WG 2 – Perennials. In CITES NDF Workshop Case Studies.	[Possibly self-incompatible if requiring outcrossing] "To succeed in its ovule fecundation T. xerographica requires cross pollination. It begins as from the age of 12 years and it is mainly carried out by birds and insects, hummingbirds, butterflies, moths and some species of bees and bumblebees. That is why it is important that plants are located at a short distance from each other."

Qsn #	Question	Answer
605	<b>Requires specialist pollinators</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Hromadnik, L. (2010). <i>Tillandsia xerographica</i> in Guatemala. <i>Journal of the Bromeliad Society</i> , 60(6), 267-272	"Between the plants hummingbirds hover, pollinating the flowers. On the older inflorescences we found spontaneously germinated seedling, which are collected at a size of 1-2 cm and placed on nets for further cultivation."
	García, M., & Chocano, H. O. (2008). Case Study 7: <i>Tillandsia xerographica</i> . WG 2 – Perennials. In CITES NDF Workshop Case Studies.	"To succeed in its ovule fecundation <i>T. xerographica</i> requires cross pollination. It begins as from the age of 12 years and it is mainly carried out by birds and insects, hummingbirds, butterflies, moths and some species of bees and bumblebees. That is why it is important that plants are located at a short distance from each other."

606	<b>Reproduction by vegetative fragmentation</b>	
	<b>Source(s)</b>	<b>Notes</b>
	García, M., & Chocano, H. O. (2008). Case Study 7: <i>Tillandsia xerographica</i> . WG 2 – Perennials. In CITES NDF Workshop Case Studies.	[Unknown if sprouts can detach and form new plants] "Natural asexual reproduction: In the wilderness it occurs after the flower falls and the seeds mature. It consists in the production of sprouts (asexual sprouts, shoots) from buds that develop in the axil of some leaves. The development period of sprouts in the wild is at least one year before the plant produces another sprout. An adult plant can naturally produce a maximum of three sprouts or shoots before deteriorating and dying. It means that after blooming a mother plant deteriorates and dies in approximately four years."

607	<b>Minimum generative time (years)</b>	<b>&gt;3</b>
	<b>Source(s)</b>	<b>Notes</b>
	García, M., & Chocano, H. O. (2008). Case Study 7: <i>Tillandsia xerographica</i> . WG 2 – Perennials. In CITES NDF Workshop Case Studies.	"It is a xerophytic species of a very slow growth in nature. It takes between 12 to 18 years to develop from seed to flower, although the asexual sprout can reach maturity in fewer years."
	Air Plant City. (2022). Growing <i>Tillandsia Xerographica</i> By Seed. <a href="https://www.airplantcity.com/blogs/featured-blogs/tillandsia-xerographica-seed">https://www.airplantcity.com/blogs/featured-blogs/tillandsia-xerographica-seed</a> . [Accessed 14 Feb 2022]	"Until the past decade, sexual reproduction through seeds has been considered too difficult as plants may take 8 or more years from germination to a full grown "large" plant of about 8 inches in diameter."

701	<b>Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	García, M., & Chocano, H. O. (2008). Case Study 7: <i>Tillandsia xerographica</i> . WG 2 – Perennials. In CITES NDF Workshop Case Studies.	"The plumose seeds are dispersed by the wind."

702	<b>Propagules dispersed intentionally by people</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>

Qsn #	Question	Answer
	Rutherford, C., Groves, M. & Sajeve, M. (2018). Succulent Plants A guide to CITES-listed species. Rutherford Groves Publishing, London	"Tillandsia harrisii and in particular T. xerographica are in commercial trade and cultivation both in range States, in particular Guatemala, and non-range States (e.g. US, Colombia). European nurseries have established "Tillandsia farms" in these countries, exporting plants to Europe. All three species are available as live plants online although availability of T. kammii is very limited."

703	Propagules likely to disperse as a produce contaminant	n
	<b>Source(s)</b>	<b>Notes</b>
	García, M., & Chocano, H. O. (2008). Case Study 7: <i>Tillandsia xerographica</i> . WG 2 – Perennials. In CITES NDF Workshop Case Studies.	"The plumose seeds are dispersed by the wind."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

704	Propagules adapted to wind dispersal	y
	<b>Source(s)</b>	<b>Notes</b>
	García, M., & Chocano, H. O. (2008). Case Study 7: <i>Tillandsia xerographica</i> . WG 2 – Perennials. In CITES NDF Workshop Case Studies.	"The plumose seeds are dispersed by the wind. The plants bloom only once in their life, but the flowers last several months."

705	Propagules water dispersed	n
	<b>Source(s)</b>	<b>Notes</b>
	García, M., & Chocano, H. O. (2008). Case Study 7: <i>Tillandsia xerographica</i> . WG 2 – Perennials. In CITES NDF Workshop Case Studies.	"Epiphytic or lithophytic, acaulescent plant, from 20 – 60 cm in height." ... "The plumose seeds are dispersed by the wind." [Plumose, wind-dispersed seeds. Primarily epiphytic, so secondary dispersal by water would presumably not disperse seeds into a suitable substrate]

706	Propagules bird dispersed	n
	<b>Source(s)</b>	<b>Notes</b>
	García, M., & Chocano, H. O. (2008). Case Study 7: <i>Tillandsia xerographica</i> . WG 2 – Perennials. In CITES NDF Workshop Case Studies.	"The plumose seeds are dispersed by the wind."

707	Propagules dispersed by other animals (externally)	n
	<b>Source(s)</b>	<b>Notes</b>
	García, M., & Chocano, H. O. (2008). Case Study 7: <i>Tillandsia xerographica</i> . WG 2 – Perennials. In CITES NDF Workshop Case Studies.	"The plumose seeds are dispersed by the wind."

708	Propagules survive passage through the gut	n
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	García, M., & Chocano, H. O. (2008). Case Study 7: <i>Tillandsia xerographica</i> . WG 2 – Perennials. In CITES NDF Workshop Case Studies.	"The plumose seeds are dispersed by the wind."

801	Prolific seed production (>1000/m <sup>2</sup> )	
	<b>Source(s)</b>	<b>Notes</b>
	García, M., & Chocano, H. O. (2008). Case Study 7: <i>Tillandsia xerographica</i> . WG 2 – Perennials. In CITES NDF Workshop Case Studies.	"It is a xerophytic species of a very slow growth in nature. It takes between 12 to 18 years to develop from seed to flower, although the asexual sprout can reach maturity in fewer years." [Numbers unknown but probably not. The literature does not suggest that this species produces prolific seed numbers]

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	<b>Source(s)</b>	<b>Notes</b>
	Flores-Palacios, A., Bustamante-Molina, A. B., Corona-López, A. M., & Valencia-Díaz, S. (2015). Seed number, germination and longevity in wild dry forest <i>Tillandsia</i> species of horticultural value. <i>Scientia Horticulturae</i> , 187, 72-79	[Unknown, but seeds of some species are capable of being stored for at least 478 days] "The seeds of all <i>Tillandsia</i> species were capable to germinate in light and dark conditions. Seed longevity in all species was at least 478 days after collection and improved under cool temperatures(7-11°C)."

803	Well controlled by herbicides	
	<b>Source(s)</b>	<b>Notes</b>
	Arny, N.P. (1996). Spanish Moss and Ball Moss. FOR52. University of Florida IFAS Extension, Gainesville, FL <a href="http://edis.ifas.ufl.edu">http://edis.ifas.ufl.edu</a> . [Accessed 15 Feb 2022]	[Unknown. Chemical control of <i>Tillandsia usneoides</i> is effective] "Chemical control of <i>Tillandsia</i> is possible. As of 1996, the following materials are licensed for control of Spanish moss and/or ball moss: TC Tribasic Copper Sulphate, Blue Shield, Basic Copper 53, Micro Flo Basic Copper 53, Micro Flo Copper 3 FL. It should be noted that there is evidence that copper-based herbicides and fungicides may cause damage to tender growth on oak trees. As with all herbicides, when using these materials read and follow label directions carefully."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. (2022). Personal Communication	Unknown. Possibly may resprout after damage to offsets

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. (2022). Personal Communication	Unknown

**Summary of Risk Traits:**

High Risk / Undesirable Traits

- Grows and could spread in regions with tropical climates
- Other *Tillandsia* species have naturalized and become invasive
- Reproduces by wind-dispersed seeds, and intentionally cultivated by people
- May hybridize with other species
- Propagated by offsets; may be able to spread vegetatively

Low Risk Traits

- Widely cultivated with no evidence of naturalization or negative impacts where introduced
- Unarmed (no spines, thorns, or burrs)
- Non-toxic
- Grows best in high light environments (dense shade may inhibit spread)
- Slow growing and with a long time to reproductive maturity from seed (12 to 18 years)