

Taxon: *Calliandra haematocephala*

Family: Fabaceae

Common Name(s): bellota  
pompon  
powderpuff tree  
red powderpuff

Synonym(s): *Calliandra inaequilatera* Rusby

Assessor: Chuck Chimera

Status: Assessor Approved

End Date: 13 Jul 2015

WRA Score: 4.0

Designation: EVALUATE

Rating: Evaluate

Keywords: Tropical Tree, Naturalized, Unarmed, Ornamental, Dehiscent Pods

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)		
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	y
302	Garden/amenity/disturbance weed		
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed		
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	y=1, n=-1	n
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens	y=1, n=0	y
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems		

Qsn #	Question	Answer Option	Answer
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)	y=1, n=0	y
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	y
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	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
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		
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		
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	y=1, n=-1	y
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
	Barneby, R. C. (1998). Silk tree, guanacaste, monkey's earring: a generic system of the synandrous Mimosaceae of the Americas. Part III. <i>Calliandra</i> . <i>Memoirs of the New York Botanical Garden</i> , 74(3): 1-223	[Cultivars exist, but no evidence of domestication] "Parts of the <i>C. haematocephala</i> complex have been revised by Cowan (1963) and by Nevhng and Elias (1971). Cowan recognized <i>C. haematocephala</i> sens. str., which is widespread in cultivation but not exactly matched by any wild plant, as specifically distinct from <i>C. inaequilatera</i> Rusby, which is known from native populations as well as from cultivars."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2015. 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
	Barneby, R. C. (1998). Silk tree, guanacaste, monkey's earring: a generic system of the synandrous Mimosaceae of the Americas. Part III. <i>Calliandra</i> . <i>Memoirs of the New York Botanical Garden</i> , 74(3): 1-223	"native and locally abundant in the foothills of the Bolivian Andes, between 14°S and 18°S latitude"

202	Quality of climate match data	High
	Source(s)	Notes
	Barneby, R. C. (1998). Silk tree, guanacaste, monkey's earring: a generic system of the synandrous Mimosaceae of the Americas. Part III. <i>Calliandra</i> . <i>Memoirs of the New York Botanical Garden</i> , 74(3): 1-223	[Native range and regions of introduction well known.]

203	Broad climate suitability (environmental versatility)	
	Source(s)	Notes
	Gilman, E.F. & Watson, D.G. 1993, <i>Calliandra haematocephala</i> . Powderpuff. Fact Sheet ST-108. Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. <a href="http://hort.ifas.ufl.edu/">http://hort.ifas.ufl.edu/</a> . [Accessed ]	"USDA hardiness zones: 9B through 11"

Qsn #	Question	Answer
	Missouri Botanical Garden. 2015. <i>Calliandra haematocephala</i> . <a href="http://www.missouribotanicalgarden.org/">http://www.missouribotanicalgarden.org/</a> . [Accessed 10 Jul 2015]	"Zone: 9 to 11" ... "Winter hardy to USDA Zones 9-11 where it is best grown in moist, fertile soils in full sun."
	Tropicos.org. 2015. Tropicos [Online Database]. Missouri Botanical Garden. <a href="http://www.tropicos.org/">http://www.tropicos.org/</a> . [Accessed 10 Jul 2015]	Collected from 25 m elevation, 18°12'30"N latitude, to 1470 m, 06°15'00"N.

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Barneby, R. C. (1998). Silk tree, guanacaste, monkey's earring: a generic system of the synandrous Mimosaceae of the Americas. Part III. <i>Calliandra</i> . <i>Memoirs of the New York Botanical Garden</i> , 74(3): 1-223	"In seasonally dry subtropical woodland and woodland-savanna transition, 240-800 m., native and locally abundant in the foothills of the Bolivian Andes, between 14°S and 18°S latitude"

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Gann, G.D., and Collaborators. 2001-2015. The Floristic Inventory of South Florida Database Online. The Institute for Regional Conservation. Delray Beach, FL. <a href="http://regionalconservation.org/">http://regionalconservation.org/</a> . [Accessed 10 Jul 2015]	"Native Range: Bolivia; widely cultivated and sometimes naturalized elsewhere."
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed 10 Jul 2015]	"widely cultivated"

301	Naturalized beyond native range	y
	Source(s)	Notes
	Wunderlin, R.P. 1982. Guide to the Vascular Plants of Central Florida. University Press of Florida, Gainesville, FL	"C, haematocephala ... Disturbed sites. Rare; Escambia and Brevard Cos. Native to tropical America. Escaped from cultivation."
	Morton, J.F. 1976. Pestiferous spread of many ornamental and fruit species in South Florida. <i>Proceedings of the Florida State Horticultural Society</i> 89: 348-353	" <i>Calliandra haematocephala</i> Hassk. RED POWERPUFF. Tropical America. Locally spontaneous from seed."
	Chong, K.Y., Tan, H.T.W. & Corlett, R.T. 2009. A Checklist of the Total Vascular Plant Flora of Singapore: Native, Naturalized and Cultivated Species. Raffles Museum of Biodiversity Research, National University of Singapore, Singapore	" <i>Calliandra haematocephala</i> Hassk.; Fabaceae; cultivated only"
	Negi, P. S., & Hajra, P. K. 2007. Alien flora of Doon Valley, Northwest Himalaya. <i>Current Science</i> 92(7): 968-978	"Naturalized and widely cultivated exotics are marked by asterisks in the enumeration." [ <i>Calliandra haematocephala</i> is listed as present but not naturalized]
	Csurhes, S. & Edwards, R. 1998. Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	"Perhaps one of the most common species is <i>C. haematocephala</i> ('red powder puff'), an open-crowned, leguminous shrub. It often produces seedlings in gardens. It is native to Central America and has been planted around the world for ornament."

Qsn #	Question	Answer
	Gann, G.D., and Collaborators. 2001-2015. The Floristic Inventory of South Florida Database Online. The Institute for Regional Conservation. Delray Beach, FL. <a href="http://regionalconservation.org/">http://regionalconservation.org/</a> . [Accessed 10 Jul 2015]	"SOUTH FLORIDA Native Status: Not Native, Naturalized"
	Pelser, P.B., J.F. Barcelona & D.L. Nickrent (eds.). 2011 onwards. Co's Digital Flora of the Philippines. <a href="http://www.philippineplants.org">www.philippineplants.org</a>	[Not native, not naturalized] " <i>Calliandra haematocephala</i> Hassk., Retzia 1 (1855) 216; --Backer & Bakh.f., Fl. Java 1 (1963) 555; --Nielsen, Fl. Males. ser. 1, 11 (1992) 212; --Rojo, Rev. Lexicon Philip. Trees (1999) 255. Tropical South America. Widely cultivated as an ornamental."

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	Referenced as a weed, but no description of impacts

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

304	Environmental weed	
	Source(s)	Notes
	Mandal, G., & Joshi, S. P. (2015). Plant Invasion: Dynamics and habitat invasion capacity of invasive species in Western Indian Himalaya. <i>Annali di Botanica</i> , 5: 1-16	[ <i>Calliandra haematocephala</i> described as invasive. Impacts unspecified] "The understory of all the habitats was found to be fully occupied by variety of invasive species such as <i>Alternanthera ficooides</i> , <i>Alternanthera pungens</i> , <i>Antigonon leptopus</i> , <i>Apium leptophyllum</i> , <i>Aristolochia littoralis</i> , <i>Bauhinia galpinii</i> , <i>Bougainvillea spectabilis</i> , <i>Calliandra haematocephala</i> ..." ... "all three habitats were found being occupied by many invasive species having potentials to dominate the local plant communities (i.e., that have the greatest invasion intensities) such as <i>Alternanthera ficooides</i> , <i>Alternanthera pungens</i> , <i>Antigonon leptopus</i> , <i>Apium leptophyllum</i> , <i>Aristolochia littoralis</i> , <i>Bauhinia galpinii</i> , <i>Bougainvillea spectabilis</i> , <i>Calliandra haematocephala</i> ..."

305	Congeneric weed	y
	Source(s)	Notes
	Hauser, S., Nyajou, M. & Zapfack, L. 2006. Farmer's perception and use of planted <i>Calliandra calothyrsus</i> fallow in southern Cameroon. Conference on International Agricultural Research for Development. Tropentag 2006. University of Bonn, October 11-13, 2006	"The invasive character of <i>Calliandra</i> is a concern to many farmers who have abandoned this fallow. While the initial establishment was problematic, requiring scarifying seed and raising trees in nurseries, the species is capable to spread and establish in the surrounding fallows and crop. Strong superficial roots impede tools and <i>Calliandra</i> is perceived by many farmers as a weed. <i>Calliandra</i> can be controlled by herbicides such as glyphosate yet, under the usual manual control regime of farmers it re-sprouts rather quickly."

Qsn #	Question	Answer
	Ecocrop. 2007. <i>Calliandra calothyrsus</i> , FAO, Rome, Italy. <a href="http://ecocrop.fao.org/ecocrop/srv/en/cropView?id=4042">http://ecocrop.fao.org/ecocrop/srv/en/cropView?id=4042</a> . [Accessed 10 Jul 2015]	[ <i>Calliandra calothyrsus</i> ] "It is so hardy and reproduces so easily that it may become a weed of sorts and may be difficult to keep in check."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Gargiullo, M.B., Magnuson, B.L & Kimball, L.D. 2008. A Field Guide to Plants of Costa Rica. Oxford University Press US, New York, NY	[No evidence] "Shrub 1- 7 m tall, branches spreading. Leaves alternate, stalk 1- 2 cm, blade twice evenly pinnate, pinnae each with 6-10 pairs of leaflets 1- 4 cm long, 0.5- 1.5 cm wide, usually curved, tip with small, abrupt point, base unequal, upper leaflets larger than the lower."

402	Allelopathic	
	Source(s)	Notes
	Thijssen, R. (1995). Weeds and trees. ILEIA Newsletter, 11 (3): 20	[Unknown. Allelopathy reported in genus] "This phenomenon has been defined as the chemical warfare between plants. Extracts or leachates from various plant parts of different species have shown to inhibit seed germination or growth of other plants. An exciting new finding by KWAP in western Kenya is that <i>Calliandra calothyrsus</i> , a popular agroforestry species for animal fodder and firewood production, can considerably reduce infestation of maize fields with the parasitic weed <i>Striga</i> . A pot experiment with <i>Calliandra</i> green manure showed a reduction in the presence of the, for this area, most important agricultural pest with almost 70% (Table 2). Field observations of this species interplanted with maize confirmed this finding."

403	Parasitic	n
	Source(s)	Notes
	Barneby, R. C. (1998). Silk tree, guanacaste, monkey's earring: a generic system of the synandrous Mimosaceae of the Americas. Part III. <i>Calliandra</i> . Memoirs of the New York Botanical Garden, 74(3): 1-223	"Macrophyllidious shrubs and treelets 1-5 m tall..." [Fabaceae. Not parasitic]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Gutteridge, R. C. & Shelton, H. M. 1994. Forage Tree Legumes in Tropical Agriculture. CAB International, Wallingford, UK	"Table 4.3.1. A list of secondary compounds found in some forage tree legume species." [ <i>Calliandra haematocephala</i> listed as a forage tree. Contains a pipelicolic acid derivative] ... "Pipelicolic acid, a non-protein amino acid, and its derivatives have been isolated from the leaves of <i>C. haematocephala</i> (Marker et al. 1979) and these compounds were shown to have insecticidal properties (Romeo 1984). The effects of these compounds on sheep is not known, but it does seem possible that some may be useful as stock and human medicines. "

Qsn #	Question	Answer
	<p>Paterson, R.T. 1994. Use of Trees by Livestock, Calliandra. Natural Resource Institute. Chatham, UK</p>	<p>[Members of genus used as fodder &amp; forage] "The species which has attracted most attention for its capacity to produce both fuelwood and foliage for either green manure or fodder is <i>C. calothyrsus</i>, a small tree which grows to about 10 m in height. It is of Central and South American origin, occurring naturally in moist, tropical regions up to an altitude of some 1500 m. While it grows up to 2000 m in Kenya, production is limited at this altitude, probably by the low temperatures (Lowry and Macklin,1988). It appears to do best with annual rainfall in the range of 2000-4000 mm (NRC,1983). While it will grow in areas that receive 700-1000 mm rain/year, productivity is reduced by low rainfall (Akkasaeng et al., 1989). It is evergreen in humid environments but will shed its leaves during a long, dry season. Under conditions of severe drought, young stems and branches may die back, but they usually regrow when the rains return. Mature branches become brittle and may be easily broken by animals, although this is not a problem where judicious cutting is practised. The palatability of the foliage appears to be variable but it is accepted, at least in limited quantities and when mixed with other feeds, by most livestock, including sheep, goats, cattle and water buffalo (Brewbaker et al., 1983; NRC,1983; Baggio and Heuveldop,1984). It has been classified as unpalatable to rabbits, although they consumed significant amounts of it, when mixed with grass and herbaceous leaves. Foliage of other fodder trees such as <i>Leucaena leucocephala</i> and <i>Albizia falcataria</i> were eaten in much larger quantities (Raharjo and Cheeke, 1985). In Java, <i>Calliandra</i> leaf meal is used at levels of up to 5% in diets for chickens (Panjaitan,1988)."</p>

405	Toxic to animals	n
	Source(s)	Notes
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence
	WRA Specialist. 2015. Personal Communication	No evidence. Used as forage

406	Host for recognized pests and pathogens	y
	Source(s)	Notes
	<p>Gilman, E.F. &amp; Watson, D.G.1993, <i>Calliandra haematocephala</i>. Powderpuff. Fact Sheet ST-108. Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. <a href="http://hort.ifas.ufl.edu/">http://hort.ifas.ufl.edu/</a>. [Accessed ]</p>	<p>"Pest resistance: long-term health usually not affected by pests" ... "While usually pest-free, Powderpuff bush can be occasionally infested by mites, caterpillars, or other chewing insects."</p>
	<p>Missouri Botanical Garden. 2015. <i>Calliandra haematocephala</i>. <a href="http://www.missouribotanicalgarden.org/">http://www.missouribotanicalgarden.org/</a>. [Accessed 10 Jul 2015]</p>	<p>"Problems: No serious insect or disease problems. Watch for caterpillars, spider mites and aphids."</p>

Qsn #	Question	Answer
	Hamon, A. B. (1978) Acacia whitefly, <i>Tetraleurodes acacia</i> (Quaintance) (Homoptera: Aleyrodidae). Entomology Circular No. 190, Division of Plant Industry, Florida Department of Agriculture and Consumer Services	" <i>Tetraleurodes acaciae</i> (Quaint.), which was first recorded on <i>Acacia</i> and more recently was observed causing heavy damage to <i>Calliandra haematocephala</i> in Florida. For control, several spray formulations of diazinon, dimethoate, malathion, oxydemeton-methyl (Meta-Systox-R) and demeton (Systox) are recommended. "
	Howard, F.W., Pemberton, R.W., Hodges, G.S., Steinberg, B., McLean, D. & Liu, H. 2006. Host Plant Range of Lobate Lac Scale, <i>Paratachardina lobata</i> , in Florida. Proceedings of the Florida State Horticultural Society 119: 398-408	[ <i>Calliandra haematocephala</i> listed among hosts] "Abstract. A list of host plant species of lobate lac scale, <i>Paratachardina lobata</i> (Chamberlin) (Hemiptera: Coccoidea: Kerriidae), in southern Florida was compiled from the authors' observations and records of the Florida State Collection of Arthropods. This scale insect was found on 307 plant species, nearly all of which are dicotyledonous trees, shrubs, or lianas. Hosts included plant species grown for fruits and as ornamentals, several weeds, and eighty-three species native to southern Florida. In addition to tropical plants, which predominate in this region, it was found on many temperate zone plants whose ranges extend to southern Florida. Seventeen plant species were consistently highly infested at different sites, and are thus considered highly susceptible; of these, ten are plants native to Florida."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Quattrocchi, U.. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Antioxidant, antibacterial" [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	
	Source(s)	Notes
	Barneby, R. C. (1998).Silk tree, guanacaste, monkey's earring: a generic system of the synandrous Mimosaceae of the Americas. Part III. <i>Calliandra</i> . <i>Memoirs of the New York Botanical Garden</i> , 74(3): 1-223	[Occurs in dry forests, but no evidence of increased fire risk] "In seasonally dry subtropical woodland and woodland-savanna transition"

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Rauch, F.D. & Weissich, P.R. 2000. Plants for Tropical Landscapes: A Gardener's Guide. University of Hawaii Press, Honolulu, HI	"It prefers full sun in a rich, well-drained soil..."
	Gilman, E.F. & Watson, D.G. 1993, <i>Calliandra haematocephala</i> . Powderpuff. Fact Sheet ST-108. Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. <a href="http://hort.ifas.ufl.edu/">http://hort.ifas.ufl.edu/</a> . [Accessed ]	"Light requirement: tree grows in part shade/part sun; tree grows in full sun"



Qsn #	Question	Answer
	Missouri Botanical Garden. 2015. <i>Calliandra haematocephala</i> . <a href="http://www.missouribotanicalgarden.org/">http://www.missouribotanicalgarden.org/</a> . [Accessed 10 Jul 2015]	"Sun: Full sun"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Gilman, E.F. & Watson, D.G. 1993, <i>Calliandra haematocephala</i> . Powderpuff. Fact Sheet ST-108. Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. <a href="http://hort.ifas.ufl.edu/">http://hort.ifas.ufl.edu/</a> . [Accessed ]	"Soil tolerances: clay; loam; sand; slightly alkaline; acidic; well-drained"
	Missouri Botanical Garden. 2015. <i>Calliandra haematocephala</i> . <a href="http://www.missouribotanicalgarden.org/">http://www.missouribotanicalgarden.org/</a> . [Accessed 10 Jul 2015]	"Tolerates wide range of soils including somewhat poor ones. Keep soils consistently moist."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Barneby, R. C. (1998). Silk tree, guanacaste, monkey's earring: a generic system of the synandrous Mimosaceae of the Americas. Part III. <i>Calliandra</i> . <i>Memoirs of the New York Botanical Garden</i> , 74(3): 1-223	"Macrophyllidious shrubs and treelets 1-5 m tall..." [Not climbing]

412	Forms dense thickets	n
	Source(s)	Notes
	Wunderlin, R.P. 1982. <i>Guide to the Vascular Plants of Central Florida</i> . University Press of Florida, Gainesville, FL	[No evidence] "C, <i>haematocephala</i> ... Disturbed sites. Rare; Escambia and Brevard Cos. Native to tropical America. Escaped from cultivation."
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2010. <i>Flora of China</i> . Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Cultivated in gardens of Fujian, Guangdong, Taiwan"
	Barneby, R. C. (1998). Silk tree, guanacaste, monkey's earring: a generic system of the synandrous Mimosaceae of the Americas. Part III. <i>Calliandra</i> . <i>Memoirs of the New York Botanical Garden</i> , 74(3): 1-223	[No evidence] "In seasonally dry subtropical woodland and woodland-savanna transition, 240-800 m., native and locally abundant in the foothills of the Bolivian Andes,"

501	Aquatic	n
	Source(s)	Notes
	Barneby, R. C. (1998). Silk tree, guanacaste, monkey's earring: a generic system of the synandrous Mimosaceae of the Americas. Part III. <i>Calliandra</i> . <i>Memoirs of the New York Botanical Garden</i> , 74(3): 1-223	[Terrestrial] "Macrophyllidious shrubs and treelets 1-5 m tall ..." ... "In seasonally dry subtropical woodland and woodland-savanna transition..."

502	Grass	n
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed 10 Jul 2015]	"Family: Fabaceae (alt. Leguminosae) subfamily: Mimosoideae tribe: Ingeae. Also placed in: Mimosaceae"

503	<b>Nitrogen fixing woody plant</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Giller, K. E. 2001. Nitrogen Fixation in Tropical Cropping Systems. CABI Publishing, Wallingford, UK	"Calliandra nodulates predominantly with fast-growing rhizobia and shares a loose cross- inoculation group with Leucaena and Gliricidia..."

504	<b>Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Barneby, R. C. (1998). Silk tree, guanacaste, monkey's earring: a generic system of the synandrous Mimosaceae of the Americas. Part III. Calliandra. Memoirs of the New York Botanical Garden, 74(3): 1-223	"Macrophyllidious shrubs and treelets 1-5 m tall..."

601	<b>Evidence of substantial reproductive failure in native habitat</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Barneby, R. C. (1998). Silk tree, guanacaste, monkey's earring: a generic system of the synandrous Mimosaceae of the Americas. Part III. Calliandra. Memoirs of the New York Botanical Garden, 74(3): 1-223	[No evidence] "In seasonally dry subtropical woodland and woodland-savanna transition, 240-800 m., native and locally abundant in the foothills of the Bolivian Andes, between 14°S and 18°S latitude, the dispersal given in greater detail under the varieties; widely dispersed in cultivation."

602	<b>Produces viable seed</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Gilman, E.F. & Watson, D.G. 1993, Calliandra haematocephala. Powderpuff. Fact Sheet ST-108. Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. <a href="http://hort.ifas.ufl.edu/">http://hort.ifas.ufl.edu/</a> . [Accessed 13 Jul 2015]	"Propagation is by seed or cuttings."
	Oakman, H. 1995. Harry Oakman's what flowers when: the complete guide to flowering times in tropical and subtropical gardens. Univ. of Queensland Press, St. Lucia, Australia	"raised from seed; origin is Bolivia."

Qsn #	Question	Answer
	<p>Zhao, B. Y., Gao, C. L., Weng, S. F., &amp; Cheng, H. P. (2012). Study on seed germination of <i>Calliandra haematocephala</i>. <i>Guangdong Agricultural Sciences</i>, 9: 016</p>	<p>"The effects of some important factors, such as different germination bed, different chemical reagent(GA3,KNO3,KMnO4) on seed germination of <i>Calliandra haematocephala</i> were studied in present paper. The results indicated that 50 mmol/L KNO3 and 0.1 g/L GA3 could promote seed germinating significantly, while 100 mmol/L KNO3 and 0.3 g/L GA3 restrained seed germinating significantly. The seed in 25℃ thermost presented faster and higher germination rate and germination viability than those in sand, but the growth of seedling in sand was better. Thus, it can be concluded that appropriate treatment could do great help to the seed germination and seedling growth of <i>Calliandra haematocephala</i>."</p>

603	Hybridizes naturally	
	Source(s)	Notes
	<p>Macqueen, D. J., &amp; Hernández, H. M. (1997). A revision of <i>Calliandra</i> series <i>racemosae</i> (Leguminosae: Mimosoideae). <i>Kew Bulletin</i>, 52: 1-50</p>	<p>[Unknown for <i>C. haematocephala</i>. Hybridization in genus]                      "Hybridization between the different species does not necessarily parallel the observed sympatric distributions. Putative hybrids have only been documented between <i>C. calothyrsus</i> and <i>C. houstoniana</i> from herbarium specimens collected in Honduras (Macqueen 1, 2 from Meambar, Comayagua, and Macqueen 511, 512 from Santa Rosa, Copfan) and Mexico (Macqueen 153, 154 from Colotlipa, Guerrero, and Macqueen 322, 323 from Yajal6n, Chiapas), and between <i>C. houstoniana</i> and <i>C. juzepczukii</i> in Mexico (Ocozocautla, Chiapas). As indicated above, it is likely that the sympatric nature of populations of these species is a result of recent colonization into disturbed habitats which occasionally results in hybridization. The small number of putative hybrids in these disturbed areas (eg. shifting agriculture in Meambar, Honduras), supports this hypothesis. No other suspected hybrids between sympatric species have been documented. The only exception to this pattern appears to be <i>C. houstoniana</i> subsp. <i>stylesii</i>, widespread in the Mexican Atlantic coast, which is morphologically intermediate between <i>C. houstoniana</i> and <i>C. calothyrsus</i>, oth of which are present in the Mexican states of Chiapas and Veracruz hinting at a hybrid origin for <i>C. houstoniana</i> subsp. <i>stylesii</i>."</p>

604	Self-compatible or apomictic	
	Source(s)	Notes
	<p>Cruden, R. W., Kinsman, S., Stockhouse, R. E., &amp; Linhart, Y. B. (1976). Pollination, fecundity, and the distribution of moth-flowered plants. <i>Biotropica</i>, 8(3): 204-210</p>	<p>"If <i>Calliandra</i> are self-incompatible as the evidence indicates, geitonogamous pollinations would produce no fruits." [No specific information on breeding system of <i>C. haematocephala</i>]</p>

605	Requires specialist pollinators	n
	Source(s)	Notes
	<p>Cruden, R. W., Kinsman, S., Stockhouse, R. E., &amp; Linhart, Y. B. (1976). Pollination, fecundity, and the distribution of moth-flowered plants. <i>Biotropica</i>, 8(3): 204-210</p>	<p>"It is not surprising that the diurnally flowering <i>Calliadrra haematocephala</i> Hasskarl from the eastern slope of the Andes (Nevling and Elias 1971) shows adaptations for hummingbird-pollination."</p>

Qsn #	Question	Answer
	Dave's Garden. 2015. Red Powder Puff - <i>Calliandra haematocephala</i> . <a href="http://davesgarden.com/guides/pf/go/2313/">http://davesgarden.com/guides/pf/go/2313/</a> . [Accessed 13 Jul 2015]	"This plant is attractive to bees, butterflies and/or birds" ... "Powderpuffs bordering my front walkway, and they are covered with so many bees that the buzzing sound is distinctly audible."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Gilman, E.F. & Watson, D.G. 1993, <i>Calliandra haematocephala</i> . Powderpuff. Fact Sheet ST-108. Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. <a href="http://hort.ifas.ufl.edu/">http://hort.ifas.ufl.edu/</a> . [Accessed 13 Jul 2015]	"Propagation is by seed or cuttings."

607	Minimum generative time (years)	2
	Source(s)	Notes
	Rauch, F.D. & Weissich, P.R. 2000. <i>Plants for Tropical Landscapes: A Gardener's Guide</i> . University of Hawaii Press, Honolulu, HI	"A fast growing shrub from Bolivia, this evergreen reaches 16 feet in height with a 20-foot spread."
	Oakman, H. 1995. <i>Harry Oakman's what flowers when: the complete guide to flowering times in tropical and subtropical gardens</i> . Univ. of Queensland Press, St. Lucia, Australia	"Fast growing in sun or semi-shade"
	WRA Specialist. 2015. Personal Communication	2 year estimate for a fast growing shrubby tree

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2010. <i>Flora of China</i> . Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence, and no means of external attachment] "Legume dull brown, linear-oblongate, 6–11 cm × 5–13 mm, valves elastically open from apex to base along sutures when ripe, reflexed. Seeds 5 or 6, brown, oblong, 7–10 × ca. 4 mm."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Gargiullo, M.B., Magnuson, B.L & Kimball, L.D. 2008. <i>A Field Guide to Plants of Costa Rica</i> . Oxford University Press US, New York, NY	"Native to Bol, widely cultivated as an ornamental."
	Rauch, F.D. & Weissich, P.R. 2000. <i>Plants for Tropical Landscapes: A Gardener's Guide</i> . University of Hawaii Press, Honolulu, HI	[Ornamental] "It makes a good background, enclosure, or informal screen planting and may be used as a specimen or accent plant where room permits."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes

Qsn #	Question	Answer
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2010. Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Legume dull brown, linear-oblongate, 6–11 cm × 5–13 mm, valves elastically open from apex to base along sutures when ripe, reflexed. Seeds 5 or 6, brown, oblong, 7–10 × ca. 4 mm." [No evidence. Pods & seeds relatively large, & unlikely to become an accidental contaminant of produce]

704	Propagules adapted to wind dispersal	
	Source(s)	Notes
	Gargiullo, M.B., Magnuson, B.L & Kimball, L.D. 2008. A Field Guide to Plants of Costa Rica. Oxford University Press US, New York, NY	[Wind may facilitate dispersal of explosively dehisced seeds] "Fruit dry, pod 6-10 cm long, about 1 cm wide, flat with a raised margin, twisting open at maturity to release seeds explosively."

705	Propagules water dispersed	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2010. Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Buoyancy unknown, but generally does not occur in riparian areas] "Legume dull brown, linear-oblongate, 6–11 cm × 5–13 mm, valves elastically open from apex to base along sutures when ripe, reflexed. Seeds 5 or 6, brown, oblong, 7–10 × ca. 4 mm."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Gilman, E.F. & Watson, D.G. 1993, <i>Calliandra haematocephala</i> . Powderpuff. Fact Sheet ST-108. Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. <a href="http://hort.ifas.ufl.edu/">http://hort.ifas.ufl.edu/</a> . [Accessed ]	"Fruit characteristics: does not attract wildlife"
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2010. Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence. Not fleshy-fruited] "Legume dull brown, linear-oblongate, 6–11 cm × 5–13 mm, valves elastically open from apex to base along sutures when ripe, reflexed. Seeds 5 or 6, brown, oblong, 7–10 × ca. 4 mm."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2010. Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No means of external attachment] "Legume dull brown, linear-oblongate, 6–11 cm × 5–13 mm, valves elastically open from apex to base along sutures when ripe, reflexed. Seeds 5 or 6, brown, oblong, 7–10 × ca. 4 mm."

708	Propagules survive passage through the gut	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	Unknown

801	Prolific seed production (>1000/m2)	

Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2010. Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Unlikely given size of trees and seeds] "Shrubs or small trees, deciduous, 1–3 m tall." ... "Legume dull brown, linear-oblongate, 6–11 cm × 5–13 mm, valves elastically open from apex to base along sutures when ripe, reflexed. Seeds 5 or 6, brown, oblong, 7–10 × ca. 4 mm."

<b>802</b>	<b>Evidence that a persistent propagule bank is formed (&gt;1 yr)</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Royal Botanic Gardens Kew. 2008. Seed Information Database (SID). Version 7.1. <a href="http://data.kew.org/sid/">http://data.kew.org/sid/</a> . [Accessed 13 Jul 2015]	[Possibly. Specifics for <i>C. haematocephala</i> unknown] "Storage Behaviour: Orthodox Storage Conditions: Seeds are maintained in the long-term seed store at ILCA (Hanson et al., 1992)"

<b>803</b>	<b>Well controlled by herbicides</b>	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. 2015. Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

<b>804</b>	<b>Tolerates, or benefits from, mutilation, cultivation, or fire</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Gilman, E.F. & Watson, D.G. 1993, <i>Calliandra haematocephala</i> . Powderpuff. Fact Sheet ST-108. Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. <a href="http://hort.ifas.ufl.edu/">http://hort.ifas.ufl.edu/</a> . [Accessed 13 Jul 2015]	"Pruning requirement: requires pruning to develop strong structure" ... "Although plants are damaged by freezing temperatures, they grow back from the base in the spring in USDA hardiness zone 9."
	Oakman, H. 1995. Harry Oakman's what flowers when: the complete guide to flowering times in tropical and subtropical gardens. Univ. of Queensland Press, St. Lucia, Australia	"requires early pruning to keep it compact"

<b>805</b>	<b>Effective natural enemies present locally (e.g. introduced biocontrol agents)</b>	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. 2015. Personal Communication	Unknown

**Summary of Risk Traits:**

## High Risk / Undesirable Traits

- Thrives in tropical climates
- Naturalized in Florida
- Other *Calliandra* species have become invasive
- Tolerates many soil types
- N-Fixing
- Reproduces by seed
- Seeds dispersed by explosively dehisced pods & intentionally by people
- Able to resprout after pruning or cutting

## Low Risk Traits

- Unarmed (no spines, thorns or burrs)
- Provides fodder for livestock
- Non-toxic
- Ornamental
- Not reported to spread vegetatively

## Second Screening Results for Tree/tree-like shrubs

- (A) Shade tolerant or known to form dense stands?> Unknown. Not known to form dense stands. Possibly shade tolerant
- (B) Bird or clearly Wind-dispersed?> Seeds explosively released from pods. Possibly aided by wind
- (C) Life cycle <4 years? Estimated to be under 4 years due to rapid growth rate
- Outcome = Evaluate Further