# **TAXON**: Murraya koenigii (L.) Spreng.

**SCORE**: *9.0* 

RATING: High Risk

Taxon: Murraya koenigii (L.) Spreng.

Family: Rutaceae

Common Name(s): currybush

Synonym(s): Bergera koenigii L.

curryleaf

Chalcas koenigii (L.) Kurz

Indian bay

Assessor: Chuck Chimera Status: Assessor Approved

End Date: 4 May 2016

WRA Score: 9.0

**Designation:** H(HPWRA)

Rating: High Risk

Keywords: Tropical Tree, Naturalized, Weedy, Suckers, Bird-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	У
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	У
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	У
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	У
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	У
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)	У
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		
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans		
408	Creates a fire hazard in natural ecosystems		
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	У

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	У
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	У
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	У
607	Minimum generative time (years)		
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	У
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed		
706	Propagules bird dispersed	y=1, n=-1	У
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	У
801	Prolific seed production (>1000/m2)		
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	n
803	Well controlled by herbicides	y=-1, n=1	У
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	У
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

# **SCORE**: *9.0*

# **Supporting Data:**

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[No evidence of domestication] "M. koenigii is an aromatic shrub or small tree up to 6 m in height, native to India, Sri Lanka, Myanmar, Indo-China, southern China and Hainan. Mainly occurring in home gardens, it is commonly propagated by cuttings, air layering, or by direct sowing. It tolerates shade and drought, and is sometimes planted as an ornamental or in hedges. Its main importance is for flavoring curries and for chutneys, for which the leaves of this plant are used throughout southern India and in many other countries. The wood is used as fuel and occasionally for agricultural implements or for light construction. The leaf oil is used as a fixative. The leaves and roots have medicinal properties and the fruits are edible. It is suitable as an ornamental tree for homes, gardens and avenues."
	Joseph, S., & Peter, K. V. (1985). Curry leaf (Murraya koenigii), perennial, nutritious, leafy vegetable. Economic Botany, 39(1), 68-73	[No evidence] "Curry leaf (Murraya koenigii, Rutaceae) is an important leafy vegetable and the leaves are widely used in Indian cookery for flavouring foodstuffs. The leaves have a slightly pungent, bitter and feebly acidic taste, and they retain their flavour and other qualities even after drying. Curry leaf is also used in many of the Indian ayurvedic and unani prescriptions. The plant originated in the Tarai region of Uttar Pradesh, India, and at present it is cultivated in Burma, Ceylon, China, Australia and the Pacific Islands. The crop is usually propagated by seeds. A volatile oil, curry leaf oil, produced from the plant has uses in the soap industry. There is need to conserve the variability in the plant to prevent extinction of desirable types"
102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	NA
	T	
103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	NA

Qsn #	Question	Answer
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
	Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	"Guangdong, S Hainan, S Yunnan (Xishuangbanna) [Bhutan, India, Laos, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam]."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"M. koenigii is an aromatic shrub or small tree up to 6 m in height, native to India, Sri Lanka, Myanmar, Indo-China, southern China and Hainan."

202	Quality of climate match data	High
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	

203	Broad climate suitability (environmental versatility)	У
	Source(s)	Notes
	GardenDrum. 2015. How to grow curry leaf tree. http://gardendrum.com/2014/06/04/how-to-grow-curry-leaf-tree/. [Accessed 4 May 2016]	"Curry leaf tree grows well in tropical right through to Mediterranean and temperate climates"
	Missouri Botanical Garden. 2016. Murraya koenigii. http://www.missouribotanicalgarden.org/PlantFinder/Pla ntFinderDetails.aspx?kempercode=d441. [Accessed 4 May 2016]	"Zone: 10 to 12" "Winter hardy to USDA Zones 10-12 where it may be grown in rich, moist, well drained loams in full sun to part shade. Best sited in locations sheltered from strong winds."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[Elevation range exceeds 1000 m, demonstrating environmental versatility] "- Altitude range: 300 - 1500 m - Mean annual rainfall: 1000 - 3000 mm - Rainfall regime: summer; uniform - Dry season duration: 1 - 3 months - Mean annual temperature: 20 - 29°C - Mean maximum temperature of hottest month: 37 - 42°C - Mean minimum temperature of coldest month: 10 - 15°C - Absolute minimum temperature: > 5°C"

204	Native or naturalized in regions with tropical or subtropical climates	У
	Source(s)	Notes

Qsn #	Question	Answer
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 3 May 2016]	"Native: Asia-Temperate China: China - Guangdong, - Yunnan, - Hainan Asia-Tropical Indian Subcontinent: Bangladesh; Bhutan; India - Andhra Pradesh, - Assam, - Bihar, - Himachal Pradesh, - Jammu and Kashmir, - Karnataka, - Kerala, - Meghalaya, - Orissa, - Sikkim, - Tamil Nadu, - Uttar Pradesh, - West Bengal; Nepal; Pakistan; Sri Lanka Indo-China: Laos; Myanmar; Thailand; Vietnam North Indian Ocean: India - Andaman and Nicobar"

205	Does the species have a history of repeated introductions outside its natural range?	У
	Source(s)	Notes
	·	"It has been widely cultivated in South-East Asia and some parts of the United States and Australia. In tropical Africa it is planted in many countries, including Nigeria, Kenya, Tanzania and most of the Indian Ocean Islands, where Indian immigrants settled."

1	Naturalized beyond native range	у
	Source(s)	Notes
	Smith, A.C. 1985. Flora Vitiensis Nova: A New Flora of Fiji (Spermatophytes Only). Volume 3. National Tropical Botanical Garden, Lawai, HI	"As it is seen in Fiji, Murraya koenigii is a shrub or small tree 2-5 m. high, cultivated near sea level and also naturalized along roadsides and in open fields and canefields."
	Atlas of Living Australia. 2016. Murraya koenigii. http://bie.ala.org.au/species/urn:lsid:biodiversity.org.au:apni.taxon:312559#. [Accessed 4 May 2016]	"Endemicity_description: Naturalised species - origin not defined "
	iplantz. 2016. Bergera koenigii. http://www.iplantz.com/plant/215/bergera-koenigii/. [Accessed 4 May 2016]	"It is now cultivated and naturalised in other tropical and subtropical regions, especially where populations of Indians and Sri Lankans have migrated and settled, including countries in Asia, Africa, the West Indies and the South Pacific." "Birds eat the fruit and disperse the seed afar. It is recorded as having naturalised in tropical Australia, where it is classed as a weed of the natural environment. It is also known to sucker profusely from the roots."
	Brisbane City Council. 2016. Weed Identification Tool - curry-leaf tree - Bergera koenigii. http://weeds.brisbane.qld.gov.au/weeds/curry-leaf-tree. [Accessed 4 May 2016]	"Occasionally naturalised in the Moreton district in south-eastern Queensland. Also naturalised in northern Queensland, near Darwin in the north-western parts of the Northern Territory, and on Christmas Island."
	Singh, S., Omreb, P. K., & Mohan, S. M. (2014). Curry leaves (Murraya koenigii Linn. Sprengal)-a mircale plant. Indian Journal of Science Researches, 4(1), 46-52	[Naturalized in this sense may refer to its natural distribution in India] "Curry leaf trees are naturalised in forests and waste land throughout the Indian subcontinent except in the higher parts of the Himalayas. From the Ravi River in Pakistan its distribution extends eastwards towards Assam in India and Chittagong in Bangladesh, and southwards to Tamil Nadu in India."

302 Garden/amenity/disturbance weed y	
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Qsn #	Question	Answer
	Source(s)	Notes
	Brisbane City Council. 2016. Weed Identification Tool - curry-leaf tree - Bergera koenigii. http://weeds.brisbane.qld.gov.au/weeds/curry-leaf-tree. [Accessed 4 May 2016]	"A potential weed of riparian vegetation, forest margins, disturbed rainforests, urban bushland, waste areas and gardens."
	Top Tropicals. 2016. Murraya koenigii. http://toptropicals.com/cgi-bin/garden_catalog/cat.cgi? uid=MURRAYA_KOENIGII&comments=1. [Accessed 4 May 2016]	"Comments Very rank in growth in my house - to the point of being extremely invasive!"
	Llamas, K.A. 2003. Tropical Flowering Plants. Timber Press, Portland, OR	"Heavily self-seeding and weedy."
	GardenDrum. 2015. How to grow curry leaf tree. http://gardendrum.com/2014/06/04/how-to-grow-curry-leaf-tree/. [Accessed 4 May 2016]	"However like Murraya, it is also proving weedy in the bushland areas of the subtropics too, especially in southern Queensland and northern NSW. If you want to grow it there, you'll need to make sure you pick off the berries before the birds find and spread them."
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"It is easily propagated by seed, and in dry areas it produces so many root suckers that it could become a nuisance."
	Gardening Australia. 2010. Fact Sheet: Weed Alert: Curry Plant. http://www.abc.net.au/gardening/stories/s2816576.htm. [Accessed 4 May 2016]	"Jerry warns that "this is not a low maintenance tree and if you want to be environmentally responsible, you're going to have to remove all of the flowers and seeds." In Brisbane the Curry Leaf Tree flowers during the warm seasons and birds adore the seed, spreading them far and wide in their droppings, meaning the tree has significant weed potential."
		"Plants can sucker freely and also spreads by seeds, so it can become invasive. Due to the vigorous suckering, plants are not really very suitable for small gardens[307]"
	Nursery & Garden Industry Australia. 2016. Grow Me Instead - Curry Leaf. http://www.growmeinstead.com.au/plant/curry-leaf.aspx. [Accessed 4 May 2016]	[This website recommends planting other non-invasive alternatives to this plant] "Its berries provide food for birds, who then indiscriminately drop seeds, often in bushland."
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	
3U4 ————————————————————————————————————	Source(s)	n Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

Congeneric weed

305

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Sprena.	
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Qsn #	Question	Answer
	Source(s)	Notes
	Nelson, G. 2010. The Trees of Florida. A Reference and Field Guide. 2nd Edition. Pineapple Press Inc, Sarasota, FL	""Murraya paniculata now listed as a Category II pest plant by the Florida Exotic Pest Plant Council and not recommended for further landscape use."
	Queensland Government. 2016. Weeds of Australia - Murraya paniculata. http://keyserver.lucidcentral.org/weeds/data/media/Html /murraya_paniculata.htm. [Accessed 4 May 2016]	"Mock orange (Murraya paniculata 'Exotica') is regarded as an environmental weed in New South Wales and Queensland. This species was first recorded becoming naturalised in Sandgate, in south-eastern Queensland, in 1963. It is invasive and naturalising in south-eastern and central Queensland and also has the potential to become a serious weed in northern Queensland. Mock orange (Murraya paniculata 'Exotica') is currently ranked among the top 200 most invasive plant species in south-eastern Queensland. It also appears on several local environmental weed lists in this region (e.g. in Hervey Bay City, Maroochy Shire, Caboolture Shire and Redland Shire). In a recent survey of three suburban sub-tropical rainforest patches in Brisbane, it was found that mock orange (Murraya paniculata 'Exotica') had established in low to moderate densities at all study sites. It was also found that this species is capable of growth to maturity beneath an intact rainforest canopy. In New South Wales, mock orange (Murraya paniculata'Exotica') has been recorded in drier lowland sub-tropical rainforests in coastal districts north from Taree. It also appears on environmental weed lists in this region (i.e. in the New South Wales North Coast region, in Byron Shire and Lismore City). It is also seen as a potential environmental weed in the Sydney region."
	White, E. M., Vivian-Smith, G., & Gosper, C. R. (2006). Murraya paniculata: what is the potential for this popular ornamental plant to become an environmental weed. In Proceedings of the 15th Australian Weeds Conference. Weed Management Society of South Australia, Adelaide (pp. 63-66)	"Murraya (Murraya paniculata cv. exotica (L.) Jack) is a popular hedge plant available from commercial nurseries in Australia. It produces fleshy, orange-red fruits from late winter to late spring. Concerns have been raised that recent large-scale plantings have increased the likelihood that murraya will become a bird-dispersed environmental weed in subtropical eastern Australia." "This study demonstrates that murraya is effectively dispersed by birds around Brisbane and can recruit under environmental conditions typically found in this region. Therefore, we recommend that the nursery industry promote native hedging plants local to the area as an environmentally sound alternative for home gardeners."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	China. Vol. 11 (Oxalidaceae through Aceraceae). Science	[No evidence] "Shrubs or trees, to 4 m tall. Leaves 17–31-foliolate; leaflet blades ovate, $2-5\times0.5-2$ cm, base obtuse to rounded and oblique, margin entire or crenulate. Inflorescences terminal, paniculate, many flowered."

402	Allelopathic	
	Source(s)	Notes

Qsn #	Question	Answer
	-11	[Demonstrates allelopathic properties in laboratory settings] "The allelopathic potential of aqueous leaf extract of three different plant species namely Azadirachta indica A. Juss, Murraya koenigii (Linn.) Spreng and Paederia foetida Linn. were observed on Mungbean (Vigna radiata (L.) Wilczek.) seed germination and seedling growth. The experiment was conducted in sterilized Petri dishes for 24 hrs, 48 hrs and 72 hrs time intervals for seed germination and 48 hrs and 72 hrs for root growth. During the experiment, seed germination on account of allelopathic inhibition was found in all levels of leaf extract. Seed germination and radicle length results indicated that the inhibitory effect was proportional to the concentration of the extract and that the inhibitory effect was much pronounced in root growth rather than germination. These results provide preliminary evidence of allelopathic potential of said species on seed germination and radicle growth of Mung bean."

403	Parasitic	n
	Source(s)	Notes
	Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	"Shrubs or trees, to 4 m tall." [Rutaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Adhikari, K. (2015). Ecology demography conservation and management of greater one horned rhinoceros (Rhinoceros unicornis) in Chitwan National Park Nepal. PhD Dissertation. Saurashtra University, Rajkot, India	"Appendix I: List of plant species (with local name and family) eaten by Rhinoceros in Sauraha secotr, CNP in different seasons." [Murraya koenigii - Type = Browse]
	Lamba, B. S. & Tak, P. C. 1982. Ecological factors in relation to cheetal (Chital) population at Corbett National Park. Proceedings of the Symposium on Ecology of Animal Population Pt. 4: 131-138	"At this time the Cheetal were observed to spend comparatively much more time in browsing leaves of the plants like Murraya koenigii and Murraya panilated (family-Rutaceae) etc., which occur in and along the ecotone."
	Dinerstein, E. (2003). Return of the Unicorns: Natural History and Conservation of the Greater-One Horned Rhinoceros. Columbia University Press, New York	"Greater one-horned rhinoceros heavily browse the understory shrubs Coffea benghalensis (baramasi) and Murraya koenigii (laathikat, asare) in the cool season."
	Chhetri, R. B. (2010). Some fodder yielding trees of Meghalaya, Northeast India. Indian Journal of Traditional Knowledge, 9(4), 786-790	"The palatability and lopping cycle were noted by interviewing the breeders. Palatability is the state of different fodders of being agreeable to eat by the cattle. It has been categorized as high, moderate and low, depending on the amount of fodder voluntarily eaten by the cattle." "Table 12 - Enumeration of fodder trees" [Murraya koenigii - Palatability = Moderate]

405	Toxic to animals	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Foliage browsed by animals, but seeds reported to be toxic

Qsn #	Question	Answer
406	Host for recognized pests and pathogens	
	Source(s)	Notes
		"No serious insect or disease problems. Watch for mealy bugs on indoor plants. Root rot may occur if soils are kept too damp."
	Joseph, S., & Peter, K. V. (1985). Curry leaf (Murraya koenigii), perennial, nutritious, leafy vegetable. Economic Botany, 39(1), 68-73	"The curry leaf tree is vulnerable to only a few diseases and pests, such as saprot (Fomes pectinatus), collar rot of seedlings (Rhizoctonia solani), and a leaf spot (Phyllostictina murrayae) (Rangaswamy, 1975). The economic losses due to the above diseases are minimal."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	Pests recorded Insects: Ascotis selenaria imparata Diaphorina citri (Asian citrus psyllid) Parabemisia myricae (bayberry whitefly) Rastrococcus iceryoides (mango mealy bug)  Fungus diseases: Alternaria alternata (alternaria leaf spot) Fomes pectinatus Phyllostictina murrayae Thanatephorus cucumeris (many names, depending on host)  Parasitic plants: Loranthus

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	Notes
	Saini, S. C. & Reddy, GBS. (2013). Acute Toxicity Study of Murraya koenigii. International Journal of Pharmaceutical Science Invention 2(9): 34-36	"Acute toxicity study of Murraya koenigii was carried out against Swiss albino mice. Behavioural assessment and LD 50 study was carried out. Results of present study shows that no mortality was observed at the highest dose level. The acute toxicity studies of crude powder (MCR) and methanol extract (MME) of Curry Leaves (Murraya koinigii) leave showed that they did not possess any toxic effect at the studied dose levels and are safe till the dose level of 9000 mg/kg."
	Dave's Garden. 2016. Curry Tree, Curry Leaf Tree, Curryleaf Tree, Sweet Nim - Murraya koenigii. http://davesgarden.com/guides/pf/go/2548/. [Accessed 4 May 2016]	"Danger: Seed is poisonous if ingested Parts of plant are poisonous if ingested Handling plant may cause skin irritation or allergic reaction"
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[No evidence of toxicity] "Its main importance is for flavoring curries and for chutneys, for which the leaves of this plant are used throughout southern India and in many other countries. The wood is used as fuel and occasionally for agricultural implements or for light construction. The leaf oil is used as a fixative. The leaves and roots have medicinal properties and the fruits are edible. It is suitable as an ornamental tree for homes, gardens and avenues."

Qsn #	Question	Answer
408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	Unknown

409	Is a shade tolerant plant at some stage of its life cycle	у	
	Source(s)	Notes	
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"- Tolerates drought; shade"	
	Matu, E.N., 2011. Murraya koenigii (L.) Spreng. [Internet] Record from PROTA4U. Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 3 May 2016]		
	Staples, G. & Kristiansen, M.S. 1999. Ethnic culinary herbs: a guide to identification and cultivation in Hawaii. University of Hawaii Press, Honolulu, HI	"Thrives in partial shade to full sun."	

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	у	
	Source(s)	Notes	
	Useful Tropical Plants Database. 2016. Murraya koenigii. http://tropical.theferns.info/viewtropical.php?id=Murraya +koenigii. [Accessed 4 May 2016]	"A very easily grown plant, succeeding in most soils and situations [296]. Prefers a fertile, humus-rich, moisture-retentive but well-drained, light soil[200, 307]. Prefers a pH in the range 5.5 - 6.5, tolerating 5 - 7[418]. Established plants are drought tolerant[307]."	
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Soil descriptors - Soil texture: light; medium - Soil drainage: free - Soil reaction: neutral"	
	Dave's Garden. 2016. Curry Tree, Curry Leaf Tree, Curryleaf Tree, Sweet Nim - Murraya koenigii. http://davesgarden.com/guides/pf/go/2548/. [Accessed 4 May 2016]	"Soil pH requirements: 5.6 to 6.0 (acidic)"	
	GardenDrum. 2015. How to grow curry leaf tree. http://gardendrum.com/2014/06/04/how-to-grow-curry-leaf-tree/. [Accessed 4 May 2016]	"The best growing conditions for curry leaf tree are in full sun to light shade and it's not at all fussy about soil type or even too particular about drainage."	

411	Climbing or smothering growth habit	n	
	Source(s)	Notes	
	, , , , , , , , , , , , , , , , , , , ,	"Shrubs or trees, to 4 m tall. Leaves 17–31-foliolate; leaflet blades ovate, 2–5 × 0.5–2 cm, base obtuse to rounded and oblique, margin entire or crenulate. Inflorescences terminal, paniculate, many flowered."	

412 Forms dense thickets n
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S	D	r	e	n	q	

(Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 4 May 2016]  CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK  Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis  Aquatic  Source(s)  Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2008. Flora of	Notes  [No evidence] "Murraya koenigii originates from Pakistan, Sri Lanka and India east to China and Hainan. It has been widely cultivated in South-East Asia and some parts of the United States and Australia. In tropical Africa it is planted in many countries, including Nigeria, Kenya, Tanzania and most of the Indian Ocean Islands, where Indian immigrants settled. "  No evidence  No evidence  No evidence
Matu, E.N., 2011. Murraya koenigii (L.) Spreng. [Internet] Record from PROTA4U. Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 4 May 2016]  CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis  Aquatic  Source(s)  Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2008. Flora of	and India east to China and Hainan. It has been widely cultivated in South-East Asia and some parts of the United States and Australia. In tropical Africa it is planted in many countries, including Nigeria, Kenya, Tanzania and most of the Indian Ocean Islands, where Indian immigrants settled. "  No evidence  No evidence
International, Wallingford, UK Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis  Aquatic  Source(s) Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2008. Flora of	No evidence
China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis  Aquatic  Source(s)  Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of	n
Source(s) Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2008. Flora of	
Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2008. Flora of	Notes
China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Terrestrial tree] "Shrubs or trees, to 4 m tall." "Moist forests; 500–1600 m."
Grass	n Nata-a
Source(s)  USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 3 May 2016]	Notes  "Family: Rutaceae Subfamily: Aurantioideae Tribe: Clauseneae"
	n Natas
USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 3 May 2016]	"Family: Rutaceae Subfamily: Aurantioideae Tribe: Clauseneae"
Geophyte (herbaceous with underground storage organs bulbs, corms, or tubers)	n
Source(s)	Notes
Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press. Beijing & St.	"Shrubs or trees, to 4 m tall. Leaves 17–31-foliolate; leaflet blades ovate, 2–5 × 0.5–2 cm, base obtuse to rounded and oblique, margin entire or crenulate."
Louis	
[/ U 20 D [/ G C	Nitrogen fixing woody plant  Source(s)  SDA, ARS, Germplasm Resources Information Network, 016. National Plant Germplasm System [Online atabase]. http://www.ars-grin.gov/npgs/index.html. Accessed 3 May 2016]  eophyte (herbaceous with underground storage organs bulbs, corms, or tubers)  Source(s)  /u, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2008. Flora of hina. Vol. 11 (Oxalidaceae through Aceraceae). Science ress & Missouri Botanical Garden Press, Beijing & St.

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Qsn #	Question	Answer
	Source(s)	Notes
	[[Editors] DR()] A (Diant Resources of Francal Africa	"Murraya koenigii is widely cultivated; as there is a large variation in chemical constituents of plants from different provenances, it seems unlikely that it is threatened by genetic erosion."

602	Produces viable seed	у	
	Source(s)	Notes	
	Matu, E.N., 2011. Murraya koenigii (L.) Spreng. [Internet] Record from PROTA4U. Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 3 May 2016]	"Murraya koenigii can be propagated by seed, root cuttings or root suckers. Seeds should be sown immediately after harvesting, as they are only viable for about 3 weeks."	
	Staples, G. & Kristiansen, M.S. 1999. Ethnic culinary herbs: a guide to identification and cultivation in Hawaii. University of Hawaii Press, Honolulu, HI	"Seed: Propagated readily from seed, which is abundantly produced. Clean seeds and remove fruit pulp before planting."	

603	Hybridizes naturally	
Source(s)		Notes
	, - ,	[Unknown] "About 12 species: E, S, and SE Asia, Australia, SW Pacific islands; nine species (five endemic) in China."

604	Self-compatible or apomictic	
	Source(s)	Notes
	China. Vol. 11 (Oxalidaceae through Aceraceae). Science	[Self-compatibility unknown] "Flowers bisexual, ellipsoid to obovoid, or narrowly so or subcylindric in bud." "Inflorescences terminal, paniculate, many flowered. Flowers 5-merous, ellipsoid in bud. Sepals ovate, less than 1 mm."

605	Requires specialist pollinators	n	
	Source(s)	Notes	
	Layek, U., Bhakat, R. K., & Karmakar, P. 2015. Foraging behavior of Apis florea fabricius during winter and spring-summer in Bankura and Paschim Medinipur Districts, West Bengal. Global Journal of Bio-Science and Biotechnology 4(3): 255-263	"TABLE 2. List of plant species foraged by Apis florea during December to May in Bankura and Paschim Medinipur districts, West Bengal (N= nectar, P= pollen grains, N+P= Nectar and pollen grain both)." [Murraya koenigii visited for nectar]	
	Thakur, M., & Mattu, V. (2010). The role of butterfly as flower visitors and pollinators in Shiwalik Hills of western Himalayas. Asian Journal of Experimental Biological Sciences, 1(4): 822-825	"The papilionids were found to be very common in the low altitude areas of Shiwalik hills as flower visitors. Only one species, Cramer was collected from the plants of Murraya at the elevation of 700m."	

Spre	ng.	
Qsn #	Question	Answer
	Begum, N., & Mandal, S. (2015). Survey of plants in the rural belt of Birbhum district, West Bengal with reference to pollination calendar. International Journal of Current Microbiology and Applied Sciences, 4(5): 1118-1131	Murraya koenigii = Entomophilous
606	Reproduction by vegetative fragmentation	у
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"It is easily propagated by seed, and in dry areas it produces so many root suckers that it could become a nuisance."
	Morton, J.F. 1976. Pestiferous spread of many ornamental and fruit species in South Florida. Proceedings of the Florida State Horticultural Society 89: 348-353	"Murraya koenigii Spreng. CURRY-LEAF TREE. India, Southeast Asia, Java. Suckers excessively from roots."
	1	Υ
607	Minimum generative time (years)	
	Source(s)	Notes
	iplantz. 2016. Bergera koenigii. http://www.iplantz.com/plant/215/bergera-koenigii/. [Accessed 4 May 2016]	"It is a fast growing, small evergreen tree or shrub that can reach heights of up to 6 m (20 ft) under ideal conditions and with a canopy almost as wide, although it is more typically 2 to 3 m (6.6 to 9.8 ft) tall with a dense, wide-spreading crown."
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Brisbane City Council. 2016. Weed Identification Tool - curry-leaf tree - Bergera koenigii. http://weeds.brisbane.qld.gov.au/weeds/curry-leaf-tree. [Accessed 4 May 2016]	"This species reproduces by seed, which are mostly spread into nearby bushland by birds and other animals that eat the fruit."
702	Propagules dispersed intentionally by people	у
	Source(s)	Notes
	Matu, E.N., 2011. Murraya koenigii (L.) Spreng. [Internet] Record from PROTA4U. Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 4 May 2016]	"It has been widely cultivated in South-East Asia and some parts of the United States and Australia. In tropical Africa it is planted in many countries, including Nigeria, Kenya, Tanzania and most of the Indian Ocean Islands, where Indian immigrants settled."
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"not often grown in Hawaii's gardens."
	1	Γ
703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes

Qsn #	Question	Answer
	Plant. http://www.abc.net.au/gardening/stories/s2816576.htm. [Accessed 4 May 2016]	"this is not a low maintenance tree and if you want to be environmentally responsible, you're going to have to remove all of the flowers and seeds." [Possible that seeds could contaminate other potted plants growing in vicinity, but this seems an unlikely dispersal vector]

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Tadwalkar, M.D., Joglekar, A. M., Mhaskar, M., Kanade, R. B., Chavan, B., Watve, A. V., Ganeshaiah, K. N. & Patwardhan, A. A. (2012). Dispersal modes of woody species from the northern Western Ghats, India. Tropical Ecology, 53(1): 53-67	"Appendix Table 1. List of species and their dispersal attributes" [Murraya koenigii - D M = Z = Zoochorous (Animal dispersed]

705	Propagules water dispersed	
	Source(s)	Notes
	Inttn://weeds prispane aid gov aii/weeds/ciirrv-leat-tree	[Fleshy-fruited, but potentially water-dispersed if growing in riparian areas] "A potential weed of riparian vegetation, forest margins, disturbed rainforests, urban bushland, waste areas and gardens."

06	Propagules bird dispersed	у
	Source(s)	Notes
	iplantz. 2016. Bergera koenigii. http://www.iplantz.com/plant/215/bergera-koenigii/. [Accessed 4 May 2016]	"Birds eat the fruit and disperse the seed afar. It is recorded as having naturalised in tropical Australia, where it is classed as a weed of the natural environment. It is also known to sucker profusely from the roots."
	Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	"Fruit bluish black, ovoid to oblong, 1–1.5 cm, 1- or 2-seeded." [Potentially Yes]
	Bird Ecology Study Group. 2012. Asian Koel takes Murraya koenigii fruits. http://www.besgroup.org/2013/09/19/yellow-vented-bulbul-eating-murraya-koenigii-fruit/. [Accessed 3 May 2016]	"Steffi Koh's image of the female Asian Koel (Eudynamys scolopacea) eating fruits of the Indian curry tree (Murraya koenigii) is a new plant record. The photograph was taken in the afternoon around Telok Kurau in Singapore."
	Bird Ecology Study Group. 2013. Yellow-vented Bulbul eating Murraya koenigii fruit. http://www.besgroup.org/2013/09/19/yellow-vented-bulbul-eating-murraya-koenigii-fruit/. [Accessed 3 May 2016]	"This Yellow-vented Bulbul (Pycnonotus goiavier) took some time to pluck a ripe fruit of the Indian Curry Tree (Murraya koenigii), then found it too large to swallow. It proceeded to bash the fruit against the tree branch before consuming it on the ground. The bird returned to the clump of fruit and repeated the actions all over again. The Asian Koel (Eudynamys scolopacea), with a much wider gape, has no trouble swallowing the fruit"

Qsn #	Question	Answer
	Vendan, S.E. & Kaleeswaran, B 2011. Plant dispersal by Indian flying fox Pteropus giganteus in Madurai region, India. Elixir Bio-Diversity 30: 1810-1813	[Dispersed by flying foxes] "In the present study, the seeds of the following species were found to be dispersed by P. giganteus namely Anacardium occidentale, Borassus flabellifer, Calophyllum inophyllum, Carcia papaya, Eugenia jambolana, Ficus sp., Madhuca indica, Mangifera indica, Murraya koenigi, Nerium indicum, Phoenix dactylifera, Pithecellobium dulce, Polyalthia longifolia, Prosopis juliflora, Psidium guajava, Tamarindus indica, Terminalia arjuna, Terminallia cattappa and Ziziphus sp."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	"Fruit bluish black, ovoid to oblong, 1–1.5 cm, 1- or 2-seeded." [Unlikely. Fruits seeds lack means of external attachment]

708	Propagules survive passage through the gut	у
	Source(s)	Notes
	, , , , , , , , , , , , , , , , , , , ,	"On Jun 11, 2003, Dinu from Mysore, India (Zone 10a) wrote: The blakish berries are a favourite of the Koels, which also disperse the seeds. I have found seedlings esp. under the trees - the koels' droppings with the seeds grow new plants."
	Brisbane City Council. 2016. Weed Identification Tool - curry-leaf tree - Bergera koenigii. http://weeds.brisbane.qld.gov.au/weeds/curry-leaf-tree. [Accessed 4 May 2016]	"This species reproduces by seed, which are mostly spread into nearby bushland by birds and other animals that eat the fruit."

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	Louis	"Fruit bluish black, ovoid to oblong, 1–1.5 cm, 1- or 2-seeded." [Unlikely. Fruit & seeds relatively large]
	Llamas, K.A. 2003. Tropical Flowering Plants. Timber Press, Portland, OR	"Heavily self-seeding and weedy." [Densities unknown]

802	Evidence that a persistent propagule bank is formed (>1 yr)	n
	Source(s)	Notes
	Matu, E.N., 2011. Murraya koenigii (L.) Spreng. [Internet] Record from PROTA4U. Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa, Wageningen, Netherlands. http://www.prota4u.org/search.asp. [Accessed 3 May 2016]	"Seeds should be sown immediately after harvesting, as they are only viable for about 3 weeks."

Qsn #	Question	Answer
803	Well controlled by herbicides	У
	Source(s)	Notes
	·	"As well as the seeds being a problem, the roots spread out quite a way from the tree and have the ability to sucker, sprouting new trees. If you spray the suckers with a systemic herbicide, you'll kill the whole tree."
	Brisbane City Council. 2016. Weed Identification Tool - curry-leaf tree - Bergera koenigii. http://weeds.brisbane.qld.gov.au/weeds/curry-leaf-tree. [Accessed 4 May 2016]	[Efficacy of herbicide treatments unspecified] "Impact and control methods Basal bark or Stem injection or Cut stump then Foliar spray"

804	Tolerates, or benefits from, mutilation, cultivation, or fire	у
	Source(s)	Notes
	Plant. http://www.abc.net.au/gardening/stories/s2816576.htm.	[Tolerates frequent pruning] "Jerry prunes them off, near ground level and pours boiling water over the wound. This reduces sucker regrowth without killing the plant. The only drawback is that this should be done every month."
	http://gardendrum.com/2014/06/04/how-to-grow-curry-	[Tolerates frequent pruning] "Prune your curry plant a couple of times a year to keep it bushy – and you'll want to harvest the leaves anyway, so this should be easy."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

## **SCORE**: *9.0*

**RATING:** High Risk

### **Summary of Risk Traits:**

#### High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Thrives in tropical climates
- Naturalized in Australia, Fiji & possibly elsewhere
- Weedy in gardens & cultivated landscapes
- Other Murraya species have become invasive
- · Potentially allelopathic
- Seeds reported to be toxic
- Shade tolerant
- Tolerates many soil types
- · Reproduces by seeds & root suckers
- Seeds dispersed by birds & intentionally by people
- Tolerates & resprouts after regular pruning

#### Low Risk Traits

- Widely cultivated source of flavoring for curries & chutneys
- Unarmed (no spines, thorns or burrs)
- · Palatable to grazing animals
- Ornamental
- · Seeds reported to quickly lose viability
- Herbicides may provide effective control