

Taxon: Gomphocarpus fruticosus	Family: Apocynaceae
Common Name(s): balloon cotton Cape cotton duckbush gooseplant milkweed narrow leaf cotton bush wild cotton	Synonym(s): Asclepias decipiens N. E. Br. Asclepias flavida N. E. Br. Asclepias fruticosa L. Asclepias rostrata N. E. Br. Asclepias setosus Forssk.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 16 Mar 2015
WRA Score: 27.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Agricultural Weed, Environmental Weed, Toxic, Wind-Dispersed, Monarch Butterfly Host

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	y
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)	y
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	y
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	y=1, n=0	y
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	y
405	Toxic to animals	y=1, n=0	y

Qsn #	Question	Answer Option	Answer
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	y
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)		
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
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	y=1, n=-1	y
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
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	y
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	y
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	y
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m ²)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y=-1, n=1	y
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
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	[No evidence] "No breeding programs are known to exist for <i>Gomphocarpus fruticosus</i> grown as an ornamental cut-plant, although selection of high-yielding plants with optimal fruit formation is needed to improve its market value."

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
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	" <i>Gomphocarpus fruticosus</i> occurs wild throughout East and southern Africa, South Africa, as well as in Yemen, Oman and Saudi Arabia. In several other African countries, including Senegal, Guinea, Côte d'Ivoire, Cameroon, Sudan, Madagascar and Mauritius, it is naturalized."

202	Quality of climate match data	High
	Source(s)	Notes
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	

Qsn #	Question	Answer
203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Queensland Government. 2015. Weeds of Australia - Narrow-leaved cotton bush - <i>Gomphocarpus fruticosus</i> . http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Gomphocarpus_fruticosus.htm . [Accessed 13 Mar 2015]	"This species grows in a wide range of environments including warm temperate, sub-tropical, tropical and occasionally even semi-arid regions. It is a weed of roadsides, disturbed sites, waste areas, waterways, pastures, open woodlands and fallows."
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	[Elevation range exceeds 1000 m, demonstrating environmental versatility] " <i>Gomphocarpus fruticosus</i> occurs in well-drained, dry sandy soils in grasslands, along road sides, railway lines and abandoned fields, frequently on river banks, in full sun or partial shade, from sea level up to 2500 m altitude."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	" <i>Gomphocarpus fruticosus</i> occurs wild throughout East and southern Africa, South Africa, as well as in Yemen, Oman and Saudi Arabia. In several other African countries, including Senegal, Guinea, Côte d'Ivoire, Cameroon, Sudan, Madagascar and Mauritius, it is naturalized. It is furthermore naturalized and rather common in northern Africa, southern Europe and eastern Australia; in Australia it is considered a noxious weed. In other countries in the tropics and subtropics it has probably escaped from cultivation more recently, and is sometimes naturalized."
	Bullock, A. A. (1952). Notes on African Asclepiadaceae. I. <i>Kew Bulletin</i> , 7(3), 405-426	"The wide ecological tolerance of this species is expressed in its variability..." ... "Geographically <i>G. fruticosus</i> extends from South and South-west Africa northwards through the savannah and semi-arid areas of Central and East Africa to North Africa and the eastern Mediterranean region ; it is recorded also from Madeira and the Canaries and it has been introduced into many parts of the tropics of the Old World, including Australia."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	"In several other African countries, including Senegal, Guinea, Côte d'Ivoire, Cameroon, Sudan, Madagascar and Mauritius, it is naturalized. It is furthermore naturalized and rather common in northern Africa, southern Europe and eastern Australia; in Australia it is considered a noxious weed. In other countries in the tropics and subtropics it has probably escaped from cultivation more recently, and is sometimes naturalized."
	Lau, J. 1986. Specimen Details for <i>Asclepias fruticosa</i> L. ID Number 505899. http://nsdb.bishopmuseum.org/8969701C-29F0-48BB-BB78-1C1B142B590E . [Accessed 13 Mar 2015]	Locality: USA - Hawaii - Oahu - Waimea Arboretum

Qsn #	Question	Answer
301	Naturalized beyond native range	y
	Source(s)	Notes
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	" <i>Gomphocarpus fruticosus</i> occurs wild throughout East and southern Africa, South Africa, as well as in Yemen, Oman and Saudi Arabia. In several other African countries, including Senegal, Guinea, Côte d'Ivoire, Cameroon, Sudan, Madagascar and Mauritius, it is naturalized. It is furthermore naturalized and rather common in northern Africa, southern Europe and eastern Australia; in Australia it is considered a noxious weed. In other countries in the tropics and subtropics it has probably escaped from cultivation more recently, and is sometimes naturalized."
	Parsons, W.T. & Cuthbertson, E.G. 2001. <i>Noxious Weeds of Australia</i> . Second Edition. CSIRO Publishing, Collingwood, Australia	"The cotton bushes are natives of South Africa and Ethiopia which, introduced as garden plants, have become naturalized in most of the warmer regions of the world, including Australia."

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Parsons, W.T. & Cuthbertson, E.G. 2001. <i>Noxious Weeds of Australia</i> . Second Edition. CSIRO Publishing, Collingwood, Australia	[Disturbance adapted weed with negative impacts to agriculture and the natural environment] "These plants have an outstanding ability to thrive in areas of low fertility and to produce large quantities of seed, which are readily dispersed by wind and water. This, together with their perennial character and the presence of the acrid milky sap which minimizes grazing by stock, makes them formidable weeds particularly along gullies, hillsides and areas subject to regular burning where the absence of competition increases establishment."

303	Agricultural/forestry/horticultural weed	y
	Source(s)	Notes
	Reeves, A. and Dodd, J. (2014). <i>Situation statement for cotton bush in Western Australia</i> . Department of Agriculture and Food, Western Australia (DAFWA)	"Cotton bush is a common weed in the south west of WA. It invades and tends to dominate run down or low fertility pastures where it displaces useful pasture species such as clover." ... "The presence of cotton bush as a contaminant of hay or chaff may cause problems, because cotton bush and its close relatives contain cardiac glycosides, which are toxic to humans and livestock. Stock do not normally eat the plant because its acrid latex makes it extremely unpalatable (Parsons and Cuthbertson 1992). The main symptom of cotton bush poisoning is severe gastroenteritis, which shows up as congestion of the alimentary canal."
	Parsons, W.T. & Cuthbertson, E.G. 2001. <i>Noxious Weeds of Australia</i> . Second Edition. CSIRO Publishing, Collingwood, Australia	"Narrow leaf cotton bush, when growing in dense patches, substantially reduces grazing capacity. The main problem however, is its toxicity. It has been responsible for deaths of both cattle and sheep in New South Wales, while its presence in chaffed greenfeed has killed poultry."

304	Environmental weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Parsons, W.T. & Cuthbertson, E.G. 2001. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	"These plants have an outstanding ability to thrive in areas of low fertility and to produce large quantities of seed, which are readily dispersed by wind and water. This, together with their perennial character and the presence of the acrid milky sap which minimizes grazing by stock, makes them formidable weeds particularly along gullies, hillsides and areas subject to regular burning where the absence of competition increases establishment. These characters and the ready germination of its seed, give narrow leaf cotton bush an immense competitive advantage over native species. In consequence, narrow leaf cotton bush belongs to the small group of introduced plants capable of competing with native vegetation in its undisturbed state."

305	Congeneric weed	y
	Source(s)	Notes
	Queensland Government. 2011. Weeds of Australia - Balloon cotton bush - <i>Gomphocarpus physocarpus</i> . http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Gomphocarpus_physocarpus.htm . [Accessed 13 Mar 2015]	"Balloon cotton bush (<i>Gomphocarpus physocarpus</i>) is mainly regarded as an environmental weed in Queensland. This species invades grasslands, open woodlands, pastures, floodplains and wetland margins, where it replaces native species and can form relatively dense infestations. It is listed among the top 100 most invasive plant species in south-eastern Queensland and appears on several local environmental weed lists in this region (e.g. in Maroochy Shire, Cooloola Shire, Redland Shire and Ipswich City). Balloon cotton bush (<i>Gomphocarpus physocarpus</i>) has also been recorded in conservation areas in south-eastern Queensland (e.g. in Conondale National Park, the Pimpama River Conservation Area and in recently established conservation areas at Springbrook). This species is common in waste places and on river banks north from the Camden district in New South Wales, and is listed as a common exotic species in the Demon Nature Reserve at Tenterfield in north-eastern New South Wales. It also grows near salt lakes and in winter-wet sites on the Swan Coastal Plain in south-western Western Australia and has been recorded in Belair National Park in south-eastern South Australia."
	Medeiros, A. C., Erwin, T. L., Chimera, C. G., & Loope, L. L. (2003). Vegetation trends at Auwahi dryland forest after five years of restoration (Hawaii). <i>Ecological Restoration</i> , 21(3), 207-209	Following the decline of kikuyu grass, cover and abundance of the non-native herb, balloonplant (<i>Asclepias physocarpa</i>), increased to alarming levels (about 50-75 percent cover). It subsequently decreased (Table 1). perhaps facilitated by our hand-weeding control efforts, copious seed predation by non-native rodents, and seedling herbivory by non-native game birds."

Qsn #	Question	Answer
401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	[No evidence] "Shrubby perennial, much branched from the base, up to 1.5(-2.5) m tall, all parts with latex, branches erect, densely hairy when young, woody at base, with taproot. Leaves opposite, simple and entire; petiole 1-10 mm long; blade linear to narrowly linear-elliptical, (2.5-)4-12 cm x (0.2- 0.3-0.8(-1.3) cm, base cuneate, apex attenuate, mucronate, yellowish-green, sparsely to densely hairy with soft white hairs on veins."

402	Allelopathic	y
	Source(s)	Notes
	Parsons, W.T. & Cuthbertson, E.G. 2001. <i>Noxious Weeds of Australia</i> . Second Edition. CSIRO Publishing, Collingwood, Australia	"Its presence restricts germination in other species allelopathically, while its own seed is especially long lived."

403	Parasitic	n
	Source(s)	Notes
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	[No evidence] "Shrubby perennial, much branched from the base, up to 1.5(-2.5) m tall, all parts with latex, branches erect, densely hairy when young, woody at base, with taproot." [Asclepiadaceae (APG: Apocynaceae)]

404	Unpalatable to grazing animals	y
	Source(s)	Notes
	Parsons, W.T. & Cuthbertson, E.G. 2001. <i>Noxious Weeds of Australia</i> . Second Edition. CSIRO Publishing, Collingwood, Australia	"Although some deaths have occurred, the plant is rarely a problem in the field, because the acrid latex makes it extremely unpalatable when green. The main danger is the possible accidental ingestion by animals feeding contaminated cut grasses and other fodder."

405	Toxic to animals	y
	Source(s)	Notes
	Parsons, W.T. & Cuthbertson, E.G. 2001. <i>Noxious Weeds of Australia</i> . Second Edition. CSIRO Publishing, Collingwood, Australia	"Narrow leaf cotton bush, when growing in dense patches, substantially reduces grazing capacity. The main problem however, is its toxicity. It has been responsible for deaths of both cattle and sheep in New South Wales, while its presence in chaffed greenfeed has killed poultry. Feeding tests give variable results, particularly regarding toxic amounts, but they show that narrow leaf cotton bush can kill sheep, pigs, rabbits and guinea pigs."

406	Host for recognized pests and pathogens	
	Source(s)	Notes

Qsn #	Question	Answer
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2.</i> [CD-Rom]. PROTA, Wageningen, Netherlands	"In Kenya <i>Gomphocarpus fruticosus</i> faces several major pest challenges when planted as a crop. Viral infections cause blackening of stem and fruits and stunting of plants, resulting in small unmarketable fruits. Pests include root knot nematodes and insects such as cotton stainers (<i>Dysdercus</i> sp.), aphids (<i>Aphis gossypii</i>), thrips and bollworms (<i>Helicoverpa armigera</i>), as well as mites (<i>Tetranychus</i> sp.). Larvae and adult beetles of <i>Corynodes</i> and <i>Euryope</i> (<i>Chrysomelidae</i>) feed on the roots. It is also a preferred food plant for caterpillars of <i>Danaus plexippus</i> , but they do not kill the plants."

407	Causes allergies or is otherwise toxic to humans	y
	Source(s)	Notes
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2.</i> [CD-Rom]. PROTA, Wageningen, Netherlands	[Toxic & corrosive latex] "All parts of <i>Gomphocarpus fruticosus</i> are toxic, due to the presence of cardiac glycosides (cardenolides) and to a lesser extent to pregnane glycosides." ... "The latex of <i>Gomphocarpus fruticosus</i> is corrosive, and causes skin irritation, so careful handling of the harvested parts is required."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Brown, K.L. and Bettink, K.A. (2009–) <i>Swan Weeds: Management Notes</i> , FloraBase - The Western Australian Flora. Department of Parks and Wildlife. https://florabase.dpaw.wa.gov.au/weeds/swanweeds/ . [Accessed 13 Mar 2015]	"Fire response. Hot fire will kill mature plants and can destroy soil stored seed."
	Parsons, W.T. & Cuthbertson, E.G. 2001. <i>Noxious Weeds of Australia</i> . Second Edition. CSIRO Publishing, Collingwood, Australia	Increased fire risk not listed among the negative impacts

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	South African National Biodiversity Institute. 2005. <i>Gomphocarpus fruticosus</i> . http://www.plantzafrika.com/plantefg/gomphocarpfrut.htm . [Accessed 13 Mar 2015]	"When cultivated, they generally succeed in ordinary soils in full sun."
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2.</i> [CD-Rom]. PROTA, Wageningen, Netherlands	[full sun or partial shade] " <i>Gomphocarpus fruticosus</i> occurs in well-drained, dry sandy soils in grasslands, along road sides, railway lines and abandoned fields, frequently on river banks, in full sun or partial shade, from sea level up to 2500 m altitude."
	Dave's Garden. 2015. <i>PlantFiles: Swan Plant Milkweed, Tennis Ball Bush - Gomphocarpus fruticosus</i> . http://davesgarden.com/guides/pf/go/37912/ . [Accessed 13 Mar 2015]	Sun Exposure: Sun to Partial Shade

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	

Qsn #	Question	Answer
	Source(s)	Notes
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	" <i>Gomphocarpus fruticosus</i> occurs in well-drained, dry sandy soils in grasslands, along road sides, railway lines and abandoned fields, frequently on river banks, in full sun or partial shade, from sea level up to 2500 m altitude."
	WRA Specialist. 2015. Personal Communication	Unknown, but widespread distribution as a weed suggests the ability to tolerate many soil types

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	"Shrubby perennial, much branched from the base, up to 1.5(-2.5) m tall, all parts with latex, branches erect, densely hairy when young, woody at base, with taproot."

412	Forms dense thickets	y
	Source(s)	Notes
	Brown, K.L. and Bettink, K.A. (2009-) <i>Swan Weeds: Management Notes</i> , FloraBase - The Western Australian Flora. Department of Parks and Wildlife. https://florabase.dpaw.wa.gov.au/weeds/swanweeds/ . [Accessed 13 Mar 2015]	"Capable of forming dense thickets. Seedlings develop the ability to resprout from the root or crown if aerial growth is injured within a few weeks of germination. Can move into undisturbed native vegetation. Has allelopathic properties."
	Michael, P. (ed.). 2012. <i>The Master Weed Wackers Manual</i> . A compilation of the most common weeds found on Port Macquarie Landcare sites. Port Macquarie Landcare Group, Inc., Port Macquarie, NSW	"Dense stands of Cotton Bush compete with desirable vegetation."
	Zalucki, M. P., Oyeyele, S. and Vowles, P. (1989). Selective oviposition by <i>Danaus plexippus</i> L. (Lepidoptera: Nymphalidae) in a mixed stand of <i>Asclepias fruticosa</i> and <i>A. curassavica</i> in southeast Queensland. <i>Australian Journal of Entomology</i> , 28(2), 141-146	"Milkweeds can be found growing as single isolated plants through to dense stands of plants up to 30 m in diam. (patches)"

501	Aquatic	n
	Source(s)	Notes
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	[Terrestrial] " <i>Gomphocarpus fruticosus</i> occurs in well-drained, dry sandy soils in grasslands, along road sides, railway lines and abandoned fields, frequently on river banks, in full sun or partial shade, from sea-level up to 2500 m altitude."

Qsn #	Question	Answer
502	Grass	n
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 12 Mar 2015]	"Family: Apocynaceae subfamily: Asclepiadoideae tribe: Asclepiadeae subtribe: Asclepiadinae. Also placed in: Asclepiadaceae "
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 12 Mar 2015]	[No evidence] "Family: Apocynaceae subfamily: Asclepiadoideae tribe: Asclepiadeae subtribe: Asclepiadinae. Also placed in: Asclepiadaceae "
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Goyder, D. J., & Nicholas, A. (2001). A revision of <i>Gomphocarpus</i> R. Br.(Apocynaceae: Asclepiadeae). <i>Kew Bulletin</i> , 56(4): 769-836	"Shrubby perennial herb 0.5 - 1.5(- 3) m tall arising from a tap root; stems erect, much branched from above the base, woody below, densely spreading-pubescent, sometimes shortly tomentose on young shoots."
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	[No evidence] " <i>Gomphocarpus fruticosus</i> bears fruit almost all year round. As it tends to grow very fast, several harvests can be made in the course of the year." ... " <i>Gomphocarpus fruticosus</i> is common and widespread, and there is no risk of genetic erosion."
602	Produces viable seed	y
	Source(s)	Notes
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	" <i>Gomphocarpus fruticosus</i> is easily propagated by seeds and by lateral roots."
603	Hybridizes naturally	y
	Source(s)	Notes
	Ward, M., Johnson, S. D., & Zalucki, M. P. (2012). Modes of reproduction in three invasive milkweeds are consistent with Baker's Rule. <i>Biological Invasions</i> , 14(6), 1237-1250	"For <i>G. physocarpus</i> flowers, levels of fruit- production were similar when using <i>G. fruticosus</i> pollinia or <i>G. physocarpus</i> pollinia, although significantly lower numbers of seeds were recorded for hybrid fruit as compared to fruits arising from intraspecific crosses..."

Qsn #	Question	Answer
	Goyder, D. J., & Nicholas, A. (2001). A revision of <i>Gomphocarpus</i> R. Br.(Apocynaceae: Asclepiadeae). Kew Bulletin, 56(4): 769-836	" <i>Gomphocarpus physocarpus</i> " ... "The corona and branching pattern are as in South Africa. The follicle tends to be more beaked than in typical (S African) material and may be of partially hybrid origin with <i>G. fruticosus</i> , as also appears to be the case in Australia where Forster (1996) reports hybrid swarms between these two species."

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	" <i>Gomphocarpus fruticosus</i> is a facultative cross-pollinator. "
	Ward, M., & Johnson, S. D. (2013). Generalised pollination systems for three invasive milkweeds in Australia. <i>Plant Biology</i> , 15(3), 566 -572	"Three milkweed species – <i>Asclepias curassavica</i> L., <i>Gomphocarpus fruticosus</i> (L.) W.T. Aiton and <i>Gomphocarpus physocarpus</i> E. Mey– have become invasive in Australia. All three species are non-clonal, self-compatible and dependent on pollinators for seed-set, and the two <i>Gomphocarpus</i> species have shown potential for hybridisation (Ward et al. 2012)."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Ward, M., & Johnson, S. D. (2013). Generalised pollination systems for three invasive milkweeds in Australia. <i>Plant Biology</i> , 15(3), 566 -572	"However, observations of flower visitors in natural populations of the three study species revealed that their pollination systems are essentially specialised at the taxonomic level of the order, but generalised at the species level. Specifically, pollinators of the two <i>Gomphocarpus</i> species included various species of Hymenoptera (particularly vespid wasps), while pollinators of <i>A. curassavica</i> were primarily Lepidoptera (particularly nymphalid butterflies). Pollinators of all three species are rewarded with copious amounts of highly concentrated nectar. It is likely that successful invasion by these three milkweed species is attributable, at least in part, to their generalised pollinator requirements."
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	"Inflorescences an extra-axillary nodding umbel, 4–7(–12)-flowered; peduncle 1.5–3(–4) cm long; bracts filiform, deciduous. Flowers bisexual, regular, 5-merous; pedicel 1–2.5 cm long; sepals lanceolate or triangular, 2–5 mm long, attenuate; corolla reflexed, white, yellowish or pink, lobes ovate, 5–8 mm × 3–5 mm, acute, margins ciliate; corona lobes attached 1–1.5 mm above base of staminal column, laterally compressed, 2–4 mm × 1.5–3 mm, as tall as the column, upper margins entire, proximal margins a pair of falcate teeth c. 1–1.5 mm long, pointing back along the upper margins of the lobe or curved down into the cavity; anther wings 1.5–2 mm long; ovary superior, carpels 2, free, stigma head flat."

Qsn #	Question	Answer
	Goyder, D. J., & Nicholas, A. (2001). A revision of <i>Gomphocarpus</i> R. Br.(Apocynaceae: Asclepiadeae). Kew Bulletin, 56(4): 769-836	"There are few published records of flower visitors for species of <i>Gomphocarpus</i> , and what detailed records there are have been based mostly on observations of plants naturalized outside their natural geographic ranges. Forster (1994) reports pollinium removal and insertion (i.e. pollination confirmed) by Vespidae, Pompilidae and Ichneumonidae (Hymenoptera) on <i>G. physocarpus</i> in Australia. <i>Danaus plexippus</i> (Lepidoptera) , <i>Apis mellifera</i> (Hymenoptera) and various ants (Hymenoptera: Formicidae) were observed with pollinia attached, but reinsertion was not observed. Other circumstantial evidence supports the dominance of Hymenopteran visitors (Ollerton, unpublished data, cited in Ollerton & Liede (2000); Weale 1873), but Scott Elliot (1891) reported 'small mosquito-like' flies on <i>G. cancellatus</i> (as <i>G. arborescens</i>). Most species have yellow-green or brownish flowers, which would fit with the observations above."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	" <i>Gomphocarpus fruticosus</i> is easily propagated by seeds and by lateral roots. Because of their deep taproot, they do not transplant readily. Best results are derived from raising plants from seeds or root cuttings and containing them in individual pots until they are planted."
	Parsons, W.T. & Cuthbertson, E.G. 2001. <i>Noxious Weeds of Australia</i> . Second Edition. CSIRO Publishing, Collingwood, Australia	"Suckering within and along the margins of existing colonies increases the density and size to a small extent."

607	Minimum generative time (years)	2
	Source(s)	Notes
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	" <i>Gomphocarpus fruticosus</i> bears fruit almost all year round. As it tends to grow very fast, several harvests can be made in the course of the year."
	Parsons, W.T. & Cuthbertson, E.G. 2001. <i>Noxious Weeds of Australia</i> . Second Edition. CSIRO Publishing, Collingwood, Australia	"Plants usually do not flower in their first growth season but do so from October to April of the second and subsequent years."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Parsons, W.T. & Cuthbertson, E.G. 2001. <i>Noxious Weeds of Australia</i> . Second Edition. CSIRO Publishing, Collingwood, Australia	"As a weed, it occurs along roadsides, on wastelands, and in run-down pastures as well as old cultivation paddocks, preferring areas of moderate rainfall or moist soils along streambanks." ... Further spread occurs when seeds, in mud, adhere to animal pelts, machinery and other vehicles."

702	Propagules dispersed intentionally by people	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Parsons, W.T. & Cuthbertson, E.G. 2001. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	"Considerable spread took place when plants were sold originally for ornamental purposes."

703	Propagules likely to disperse as a produce contaminant	y
	Source(s)	Notes
	Parsons, W.T. & Cuthbertson, E.G. 2001. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	"Seed may also be spread as contaminants in agricultural produce such as hay and chaff."

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). Prota 11(2): Medicinal plants/Plantes médicinales 2. [CD-Rom]. PROTA, Wageningen, Netherlands	"Fruit a pair of upright follicles, each follicle ovoid, 4–7 cm × 1.5–2.5 cm, tapering gradually or abruptly into a long beak, strongly or weakly inflated, balloon-like, papery, pale green, sometimes tinged reddish, short-hairy, with or without soft spiny processes, many-seeded. Seeds ovate with one convex and one concave face, 3.5–5 mm × c. 2 mm, warted, brownish grey, coma 2.5–3 cm long."
	Parsons, W.T. & Cuthbertson, E.G. 2001. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	"Major spread, however, is by seed, which is well adapted to dispersal by wind and water; and the fruit also floats on water."

705	Propagules water dispersed	y
	Source(s)	Notes
	Parsons, W.T. & Cuthbertson, E.G. 2001. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	"Major spread, however, is by seed, which is well adapted to dispersal by wind and water; and the fruit also floats on water."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Parsons, W.T. & Cuthbertson, E.G. 2001. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	"Major spread, however, is by seed, which is well adapted to dispersal by wind and water; and the fruit also floats on water."

707	Propagules dispersed by other animals (externally)	y
	Source(s)	Notes
	Parsons, W.T. & Cuthbertson, E.G. 2001. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	"As a weed, it occurs along roadsides, on wastelands, and in run-down pastures as well as old cultivation paddocks, preferring areas of moderate rainfall or moist soils along streambanks." ... Further spread occurs when seeds, in mud, adhere to animal pelts, machinery and other vehicles."

708	Propagules survive passage through the gut	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. 2010). Guidance for addressing the Australian Weed Risk Assessment questions. Plant Protection Quarterly, 25(2): 56-74	"Answer 'no' where the taxon is unlikely to be eaten by animals or if seeds are not viable following passage through the gut."
	Parsons, W.T. & Cuthbertson, E.G. 2001. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	"Major spread, however, is by seed, which is well adapted to dispersal by wind and water; and the fruit also floats on water."

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	Parsons, W.T. & Cuthbertson, E.G. 2001. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	"These plants have an outstanding ability to thrive in areas of low fertility and to produce large quantities of seed, which are readily dispersed by wind and water."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Probert, R. J., Daws, M. I., & Hay, F. R. 2009. Ecological correlates of ex situ seed longevity: a comparative study on 195 species. Annals of Botany, 104(1): 57-69.	"Details of species used in the study: classification to family level (following APG, 2003), country of origin, time to 50% viability loss (p50) in the ageing conditions (458C, 60% RH), and germination conditions used." [Gomphocarpus fruticosus - time to 50% viability loss (p50) = 41 days]
	Reeves, A. and Dodd, J. (2014). Situation statement for cotton bush in Western Australia. Department of Agriculture and Food, Western Australia (DAFWA)	"Physical control of infestations is also likely to stimulate germination from the soil-borne seed bank, so a repeat treatment in the second year is necessary to ensure a high level of control."
	Parsons, W.T. & Cuthbertson, E.G. 2001. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Seed longevity in soil unknown] "Its presence restricts germination in other species allelopathically, while its own seed is especially long lived."

803	Well controlled by herbicides	y
	Source(s)	Notes
	Reeves, A. and Dodd, J. (2014). Situation statement for cotton bush in Western Australia. Department of Agriculture and Food, Western Australia (DAFWA)	"Use of herbicides is the most effective management tool to achieve a high level of cotton bush control. The herbicides 2, 4-D, glyphosate and metsulfuron, used individually or in combination (2,4-D + glyphosate) are suitable for killing cotton bush plants and preventing seed set..."
	Parsons, W.T. & Cuthbertson, E.G. 2001. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	"When other methods of control are impractical, herbicides are effective. The cotton bushes are not particularly susceptible to the phenoxy acid herbicides but seedlings are susceptible to dicamba and older plants to MSMA, glyphosate and triclopyr. Apply sprays overall to actively growing plants between September and December, spotspraying where boom application is not warranted."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Reeves, A. and Dodd, J. (2014). Situation statement for cotton bush in Western Australia. Department of Agriculture and Food, Western Australia (DAFWA)	"Adult cotton bush plants recover from physical damage if part of the root system remains in the ground. They also survive if the up-rooted plant is partially buried in soil, enabling it to form new roots from portions of stems that are in contact with the soil. Survival following mechanical control is increased if the soil is moist and the plant has time to recover. Physical control of infestations is also likely to stimulate germination from the soil-borne seed bank, so a repeat treatment in the second year is necessary to ensure a high level of control."
	Gurib-Fakim, A. 2011. <i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>Prota 11(2): Medicinal plants/Plantes médicinales 2</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	" <i>Gomphocarpus fruticosus</i> is easily propagated by seeds and by lateral roots. Because of their deep taproot, they do not transplant readily. Best results are derived from raising plants from seeds or root cuttings and containing them in individual pots until they are planted."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Etchegaray, J. B., & Nishida, T. 1975. Reproductive activity, seasonal abundance and parasitism of the monarch butterfly, <i>Danaus plexippus</i> (Lepidoptera: Danaidae) in Hawaii. <i>Proceedings of the Hawaiian Entomological Society</i> 22(1): 33-39	[Monarch butterflies may impact health of plants] "The monarch butterfly, <i>Danaus plexippus</i> L., first discovered in Ha waii between 1841 and 1852, has been reported from Kauai, Oahu, Molokai, Maui, Lanai and Hawaii (Zimmerman, 1948) and Niihau (Beardsley and Tuthill, 1959). The host plants of this butterfly in Ha waii include <i>Calotropis gigantea</i> (L.) Robert Brown (crown flower), <i>C. procera</i> (Jacquin) Robert Brown, <i>Asclepias curassavica</i> L. and <i>Gomphocarpus physocarpus</i> Ernst Meyer (Swezey, 1910, 1944; Zimmerman, 1948). In Hawaii this insect is considered a pest because the larvae attack crown flower grown as an ornamental plant and as a flower crop for the leimaking business. In 1972 and 1973 it was observed that the larvae caused considerable damage to the leaves of <i>C. gigantea</i> . In Manoa Valley, Waimanalo, and Waialua, Oahu, it was estimated that at least 75-90 percent of the leaves were eaten by the larvae of <i>D. plexippus</i> . The larvae were so numerous that the fully grown larvae crawled into the buildings just before pupation. To control this pest some individuals pruned the branches back heavily to get rid of the caterpillars."

Summary of Risk Traits:

High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Thrives in tropical climates
- Naturalized and rather common in northern Africa, southern Europe and eastern Australia
- A weed of pastures, reducing forage due to toxicity
- Environmental weed, competing with native plants
- Other *Gomphocarpus* species have become invasive
- Allelopathic
- Unpalatable
- Toxic to browsing animals if eaten accidentally (but unpalatable)
- Sap toxic and allergenic to people
- Forms dense thickets
- Produces viable seed
- Hybridizes with other *Gomphocarpus* species
- Self-compatible
- Able to spread by suckering
- Reaches maturity in 2 years
- Seeds, in mud, adhere to animal pelts, machinery and other vehicles
- Seeds spread as a contaminant of hay and chaff
- Seeds wind-dispersed
- Seeds & fruit are buoyant and able to be spread by water
- Able to resprout after cutting

Low Risk Traits

- Unarmed (no spines, thorns or burrs)
- Ornamental & medicinal value
- Herbicides provide effective control
- A potential host plant of Monarch butterflies (*Danaus plexippus*)

